Determinants of intra-euro area government bond spreads during the financial crisis

by
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- This paper does not necessarily reflect views of the European Commission -

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Motivation

• Government bond spreads in the EA have risen sharply since the beginning of the financial crisis.
• 10-year yield spreads to the German Bund averaged
  – 18 bp in the period from 1999 to mid-2007
  – 56 bp since August 2007
  – 99 bp since October 2008 (as of 30 July 2009).
  – 68 bp since August 2009 – January 2010 (as of 26/01/2010)
• Differences between EA countries become more pronounced, especially so in periods of high global risk aversion
• What explains increase in spreads during the crisis? Are there structural reasons beyond market dynamics (risk aversion)?
Outline

1) Determinants of spreads and literature overview
2) Government bond yields in historical perspective
3) Government bond yields and risk aversion
4) Empirical evidence at the country-level from weekly data
5) The role of public debt and macroeconomic imbalances: evidence from quarterly data
6) Summary and outlook
1. Determinants of spreads and literature overview
Determinants of EA bond spreads

a) Credit risk
   • differences in creditworthiness, risk that issuer fails to meet obligations

b) Liquidity risk
   • differences in the ability of a bond to be converted into cash quickly and without any price discount

c) Risk aversion
   • willingness of investors to take risk ("price of risk")
Literature on EA gov bond yield spreads I

Pre-crisis period:

- Some pre-crisis studies stress the importance of international factors (see Codogno et al. 2003, Longstaff et al. 2007),
- Role for domestic factors, such as government debt and deficits (Schuknecht et al. 2008).
- Differences in government bond market liquidity have also been found to be significant (Bernoth et al. 2006).
- Beber et al. (2006) find that, while credit risk matters for bond valuation in normal times, liquidity becomes more important in times of financial stress.
Literature on gov bond yield spreads II

Crisis period:

- Some studies stressing the importance of international factors (see Haugh et al. 2009)
- ECB (2009a) find important role for credit risk both (measured by CDS spreads) before and since the crisis.
- Sgherri and Zoli (2009) find that the sensitivity of sovereign spreads to projected debt changes has significantly increased after September 2008.
2. Historical perspective
EA gov bond spreads since 1999

Sovereign spreads of 10Y benchmark bonds to German Bund
EA gov bond spreads since 2008
Bond yields before and since the crisis

- Countries with higher pre-crisis spreads also with higher financing costs during crisis.
- Differences across countries have become pronounced.
- Financing costs in the crisis period close to the historical average.
Bond yields and government debt

- Only weak positive relationship.
- One pp rise in government debt increases bond yields by around one bp.
- Ireland and Greece outsider.

Source: Ecow in and Eurostat.
Bond yields and fiscal deficit

- One pp rise in expected fiscal deficit for 2009 increases, c.p., government bond yields by around 10 bp.
- Relationship driven by Ireland.
- Similar results for fiscal forecast 2010.

Source: Ecowin and Eurostat.
Bond yields and current account deficit

- Current account imbalances mostly reflect private lending and borrowing across borders.
- Adjustment may lead to negative implications for government budget.
- Distinction between private and public debt has become blurred.

Source: Ecowin and Eurostat.
3. Sovereign bond yields spreads and risk aversion
Common sovereign risk factor

Construction of common sovereign risk factor

• Spreads decomposed into common and country-specific component (principal component analysis)
• First principal component (common sovereign risk factor)
  – common variation in the sovereign bond spreads of individual countries
  – explains 90 percent of the total variation in the correlation matrix.
  – nearly uniform weighting of the sovereign bond spreads of all countries.
• Second principal component
  – significant positive weights on IE and GR,
  – slight positive weight on AT
  – negative weight on all other countries.
General risk aversion indicator

First principal component of

- spreads on AAA-corporate bonds (CB_AAA),
- spreads on BBB-corporate bonds (CB_BBB),
- measure of stock market volatility (VSTOXX),
- exchange rate volatility in the euro-yen exchange rate (XRVOLA)

\[ x_t = \begin{pmatrix}
    CB_{-AAA_t} \\
    CB_{-BBB_t} \\
    VSTOXX_t \\
    XRVOLA_t
\end{pmatrix} \]
General risk aversion and sovereign risk

- General risk and sovereign risk moved in tandem until end of 2008q3.
- After 2008q3: Further rise in sovereign risk, downward shift in overall risk.
- Transfer of risk from the banking sector to the public sector (see also ECB 2009b).
4. Evidence at the country-level from weekly data
Estimation approach (weekly data)

\[ \Delta \text{sov\_spread}_t = \alpha + \beta \Delta \text{CDS}_t + \gamma \Delta b\_a_t + \eta \Delta \text{risk\_av}_t + \lambda \text{crisis}_t + u_t \]

- Credit risk - 5-year CDS spreads relative to Germany
- Liquidity risk - bid-ask spreads
- Risk aversion - common sovereign risk factor (PC analysis)
- Crisis – dummy, denoted 1 from mid-September 2008 onwards

- Countries – AT, BE, ES, FR, EL, IT, PT (with DE as benchmark).
- Time period - March 2003-April 2009, weekly data
- Methodology – OLS with robust standard errors, adjusted for clustering, separately for each country
### Country Results

**Table 1: Determinants of sovereign bond yield spreads in the euro area: evidence from weekly data (March 2003 – April 2009)**

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<thead>
<tr>
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<td>Constant</td>
<td>0.049</td>
<td>-0.033</td>
<td>-0.027</td>
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<td>0.057</td>
<td>0.030</td>
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<td>D(CDS)</td>
<td>0.12*</td>
<td>0.012</td>
<td>0.36**</td>
<td>0.068</td>
<td>0.53**</td>
<td>0.25*</td>
<td>0.52**</td>
</tr>
<tr>
<td>D(b_a)</td>
<td>6.03</td>
<td>5.53</td>
<td>5.81</td>
<td>9.04**</td>
<td>32.53**</td>
<td>55.11**</td>
<td>14.27</td>
</tr>
<tr>
<td>D(risk_av)</td>
<td>1.51</td>
<td>4.13**</td>
<td>2.39</td>
<td>2.21**</td>
<td>0.69</td>
<td>3.79**</td>
<td>3.96**</td>
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<tr>
<td>crisis</td>
<td>2.07**</td>
<td>2.18*</td>
<td>2.20</td>
<td>1.16*</td>
<td>4.24**</td>
<td>1.87</td>
<td>3.28*</td>
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<tr>
<td>R²</td>
<td>0.17</td>
<td>0.11</td>
<td>0.23</td>
<td>0.12</td>
<td>0.42</td>
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<td>259</td>
<td>313</td>
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<td>313</td>
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*Note: *, ** means significance at the 0.1, 0.05 percent level.*

1 bp rise in CDS spread (relative rise in "insurance costs" of 1,000 euro per 10 mio euro of govt debt) leads to 0.53 bp rise in yield spread

1 pp in the bid-ask spread leads to increase of 55 bp in the yield spread
## Crisis vs pre-crisis period

### March 2003–July 2007

<table>
<thead>
<tr>
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<tr>
<td>D(CDS)</td>
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<td>-3.1</td>
<td>0.065</td>
<td>-0.33</td>
<td>-0.009</td>
<td>-0.16</td>
<td>-0.48</td>
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<tr>
<td>D(b_a)</td>
<td>8.33</td>
<td>9.41*</td>
<td>-2.93</td>
<td>1.20</td>
<td>-7.80</td>
<td>5.34</td>
<td>12.68</td>
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<tr>
<td>D(risk av)</td>
<td>0.38</td>
<td>2.81**</td>
<td>1.39*</td>
<td>2.54**</td>
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<td>0.10</td>
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### August 2007–April 2009

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</tr>
<tr>
<td>D(CDS)</td>
<td>0.12*</td>
<td>0.01</td>
<td>0.36*</td>
<td>0.07</td>
<td>0.53**</td>
<td>0.23</td>
<td>0.53**</td>
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<tr>
<td>D(b_a)</td>
<td>5.74</td>
<td>4.68</td>
<td>6.04</td>
<td>10.94*</td>
<td>37.00**</td>
<td>84.26**</td>
<td>13.42</td>
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<tr>
<td>D(risk av)</td>
<td>1.71</td>
<td>5.49*</td>
<td>2.65</td>
<td>2.10*</td>
<td>0.10</td>
<td>3.18*</td>
<td>4.41*</td>
</tr>
<tr>
<td>crisis</td>
<td>2.06*</td>
<td>2.34</td>
<td>2.28</td>
<td>1.24</td>
<td>4.31*</td>
<td>2.01</td>
<td>3.60*</td>
</tr>
<tr>
<td>R²</td>
<td>0.18</td>
<td>0.11</td>
<td>0.23</td>
<td>0.13</td>
<td>0.43</td>
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<tr>
<td>DW</td>
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<td>91</td>
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<td>91</td>
<td>91</td>
<td>91</td>
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</tbody>
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5. The role of public debt and macroeconomic imbalances
Estimation approach (quarterly)

\[ sov\_spread_{it} = c + \lambda_1 \text{fiscal\_conditions}_{it} + \lambda_2 \text{current\_account}_{it} + \lambda_3 x_{it} + u_{it} \]

- fiscal conditions
  - fiscal balance for current year, as % of GDP
  - debt level for current year, as % of GDP
  - interest payments/total gov revenues)
- current account balance (as % of GDP)
- Liquidity risk - bid-ask spreads
- Risk aversion - common sovereign risk factor (PC analysis)

Countries – AT, BE, ES, EL, IT, PT (with DE as benchmark).
Time period - March 2003-April 2009, quarterly data
Methodology – panel regressions, OLS-PCSE (Beck and Katz 1999)
Current account balance, EA countries

![Chart showing current account balance for selected countries from 1999 to 2008. The chart displays the balance in billion euros, with positive values indicating a surplus and negative values indicating a deficit. The countries included are Germany, France, Spain, Italy, Netherlands, Greece, Other surplus, and Other deficit. The source is Eurostat.]
Table 4: Determinants of sovereign bonds yields spreads in the euro area: evidence from quarterly data (2003q1-2009q2)

<table>
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<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
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<tr>
<td>Risk aversion</td>
<td>0.062***</td>
<td>0.071***</td>
<td>0.071***</td>
<td>0.050***</td>
<td>0.151***</td>
</tr>
<tr>
<td></td>
<td>(0.018)</td>
<td>(0.019)</td>
<td>(0.011)</td>
<td>(0.017)</td>
<td>(0.013)</td>
</tr>
<tr>
<td>Bid-ask</td>
<td>0.012***</td>
<td>0.011***</td>
<td>0.003*</td>
<td>0.016***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.002)</td>
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<tr>
<td>Fiscal balance</td>
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<td>-0.013**</td>
<td>-0.015***</td>
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<tr>
<td></td>
<td>(0.006)</td>
<td>(0.005)</td>
<td>(0.003)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current account</td>
<td>-0.008***</td>
<td>-0.005***</td>
<td>-0.008***</td>
<td>-0.012***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.001)</td>
<td>(0.002)</td>
<td>(0.003)</td>
<td></td>
</tr>
<tr>
<td>Debt</td>
<td></td>
<td></td>
<td></td>
<td>0.003***</td>
<td>0.002***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Debt²</td>
<td></td>
<td></td>
<td></td>
<td>0.007**</td>
<td>0.005*</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
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<tr>
<td>Interest payment</td>
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<td>0.007***</td>
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<td></td>
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<td>(0.002)</td>
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<tr>
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<td>(0.000)</td>
<td>(0.000)</td>
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<tr>
<td>R²</td>
<td>0.66</td>
<td>0.68</td>
<td>0.68</td>
<td>0.72</td>
<td>0.65</td>
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</table>

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Coefficients estimated using panel-corrected standard errors assuming first-order autocorrelation in disturbance terms based on the Durbin Watson approach
Impact of budget balance on 10Y gov bond spreads at high level of risk aversion and high debt level

- At high levels of risk aversion, increase in public deficit by one pp leads to additional premium of 1.9 bp.
- Sensitivity of spreads to deficit forecast similar for high- and low-debt countries.
Interaction effects II

Impact of budgetary balance on 10Y gov bond spread at high level of risk aversion and large current account deficit

- Additional risk premium for high current account deficit countries jumps from 2.4 bp to 11.2 bp for each pp deterioration in the budget deficit.
6. Summary and outlook
Summary I

• International factors such as general risk perception play a crucial role.
• Role played by domestic factors is smaller, but non-negligible.
• Significant interaction of general risk aversion and macroeconomic fundamentals.
Summary II

• Impact of deteriorated fiscal balance remains limited: a deterioration by 1 pp in deficit (versus Germany) imply a rise by 2.4 bp in the government bond yield spread (versus Germany).

• Combination of high risk aversion and large current account deficits tend to magnify the incidence of deteriorated public finances on government bond yield spreads. (+ 11 bp increase in government bond yield spread for each additional pp deterioration in public deficit for high current account deficit countries).
Looking ahead…

Unlikely that spreads will revert to pre-crisis levels in the near future:

- Spread widening also correction of (too) narrow spreads in pre-crisis period.
- Debt levels have increased significantly in a number of countries (relative to German benchmark).
- Contingent liabilities linked to the financial sector will continue to weigh on the outlook for public finances.
- Will greater market discrimination across countries provide higher incentives for governments to consolidate?
Thank you for your attention