

Do Sovereign CDS and Bond Markets Share the Same Information to Price Credit Risk? An Empirical Application to the European Monetary Union Case

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Outline



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1. Introduction

- CDS & bond spreads are prices for the same underlying credit risk.
 - Abstracting from market frictions, they should have similar spreads.
- Are there persistent deviations between bond and CDS spreads?
 - NO → Punctual deviations but both spreads tend to be similar.
 - YES → What causes CDS/bond deviations? Are they systematic or random?
 - Random → They share the same information but random discrepancies may appear.
 - Systematic → Some factors have a stronger effect on a given spread and may cause such discrepancies. **Thus, they do not share the same information.**
- Which market reflects information more efficiently? Why? When?
 - One market always reflects information more efficiently → The reference.
 - Price discovery is state dependent → Both markets contain valuable information to infer credit risk and market conditions will reveal which one should be considered.

2. Data

- Daily 5-year sovereign bond yields and CDS spreads for eleven EMU countries:
 - Core: Austria, Belgium, Finland, France, and The Netherlands
 - Peripheral: Greece, Ireland, Italy, Portugal, and Spain.
 - Country of reference: Germany.
 - Sample period: January 2004 - September 2010.
 - Bond yields, bid and ask prices are obtained from Reuters .
 - Bond spread = Bond Country A Yield – German Bond Yield
 - CDS spreads: mid, bid, and ask (Credit Market Analysis, CMA).
- Remaining data are obtained from Datastream, Reuters, and ECB webpage.

3. Are there persistent deviations between CDS and bond spreads?

- A portfolio formed by a bond and a long position in a CDS for the same maturity (T years) should be free of the bond's default risk.
 - Bond yield to maturity (ytm).
 - CDS spread (s).
 - Risk-free rate (r) → German bond yield.
- Absent any friction, arbitrage forces would imply that the net return of the previous portfolio should be equal to r:
$$ytm - s = r \rightarrow ytm - r = s \quad \text{where } ytm - r = \text{bond spread}$$
- We then investigate the existence and persistency of deviations between CDS and bond spreads that violate the previous equilibrium.

3. Are there persistent deviations between CDS and bond spreads?



- We use the statistical arbitrage test employed by Mayordomo, Peña and Romo (2011).
- Our analysis is based on trading strategies which combine CDS and bonds.
 - A statistical arbitrage opportunity represents:
 - i. A zero-cost self-financing trading opportunity
 - ii. that has positive expected cumulative trading profits
 - iii. with a declining time-averaged variance
 - iv. and a probability of loss that converges to zero as time passes.
 - Persistent deviations may be related to potential market frictions but not to unexploited arbitrage opportunities.

3. Are there persistent deviations between CDS and bond spreads?

- The previous conditions (i, ii, iii, and iv) must be simultaneously satisfied to have support for the existence of persistent non-zero basis.
- So, when one of the previous conditions is not satisfied we conclude that no persistent deviations exist.
- Our analysis leads to tests:
 - a) H_0 : no persistent deviations and H_A : negative deviations (the bond spread is significantly higher than the CDS spread);
 - b) H_0 : no persistent deviations and H_A : positive deviations (the CDS spread is significantly higher than the bond spread).
- To test these hypotheses we construct the *p-values* for the previous restrictions following the subsampling methodology (Politis, Romano, and Wolf, 1997 and 1999).

3. Are there persistent deviations between CDS and bond spreads?



- Before Lehman Brothers collapse, we do not find persistent deviations.
- After Lehman Brothers collapse, CDS spread is persistently higher than the bond spread in six cases while there are not persistent negative bases.
 - These deviations cannot be understood as arbitrage opportunities and could be partially explained by market frictions and restrictions on shorting bonds.

	Persistent Negative Basis	Persistent Positive Basis
Austria	No	Yes***
Belgium	No	No
Finland	No	No
France	No	Yes**
Greece	No	No
Ireland	No	Yes***
Italy	No	Yes*
The Netherlands	No	Yes***
Portugal	No	No
Spain	No	Yes**

4. The determinants of the basis

1. **Counterparty Risk:** The higher the counterparty risk of the sellers of protection via CDS is, the lower should be the CDS spread charged as a result of the lower quality of the protection, and hence the basis.
 - First principal component obtained from the CDS spreads of the main 14 banks acting as dealers (common default probability).
2. **Liquidity:** A high liquidity in the bond market relative to the CDS market would go hand in hand with a higher basis.
 - Ratio of bond and CDS relative bid-ask spreads as indicative of the relative liquidity in the bond market vis-à-vis the CDS market. As this ratio rises, liquidity in the bond market relative to the CDS market falls and so does the basis.
3. **Financing Costs:** Higher financing costs would decrease the demand for bonds (buying them require funding) and could lead to a decrease in prices and higher bond spreads → Negative effect on the basis.
 - CDS require a lower amount of funding to get the same (gross) risk position.
 - Spread between the 90-day US AA-rated CP interest rates for financial companies and the 90-day US T-bill.

4. The determinants of the basis

4. **Domestic and global risk premiums:** If both the CDS and bond spreads are prices for the same credit risk, the effect of both premiums should be non-significantly different from zero.
 - Stock market index volatility and VIX Index, respectively.
5. **Bond-CDS Spillovers:**
 - A spillover is defined as the variation in the CDS (bond) spread that is not attributable to its past values but to contemporary shocks to the bond (CDS) spread.
 - The Bond-CDS spillovers variable is obtained after dividing the spillovers from the changes in bond spread to the changes in CDS spread relative to spillovers from the CDS to the bond spread changes.
 - A positive (negative) sign implies that when the ratio increases, then the basis widens (narrows) , or in other words, the CDS spread increases (decreases) with respect to the bond spread (it overreacts).
6. **Lagged basis:** it should absorb any lagged information transmitted into the current observation. It also reflects the speed of adjustment.

4. The determinants of the basis



- Estimation methodology: fixed-effects panel regression robust to heteroskedasticity.

	Jan04 - Sep10	Jan07 - Sep10	Jan08 - Sep10
Counterparty risk net of Global Risk	-0.017 (-0.31)	-0.044 (-0.86)	-0.157*** (-3.19)
Ratio Bond/CDS Liquidity	-0.082** (-1.98)	-0.083* (-1.88)	-0.086* (-1.83)
Financing costs	-0.592 (-1.38)	-0.676 (-1.48)	-0.877 (-1.62)
Global risk (VIX)	0.008 (0.71)	0.004 (0.37)	-0.011 (-0.89)
Squared of Country Stock Index Returns	637.908 (1.63)	659.727* (1.68)	690.787* (1.66)
Shock Spillovers from Bond to CDS spreads relative to spillovers from CDS to Bond spreads	0.735** (2.25)	0.720** (2.18)	0.642** (2.13)
Lagged Basis	0.946*** (34.71)	0.944*** (33.48)	0.941*** (33.99)
Constant	0.212 (1.19)	0.494* (1.68)	1.430*** (2.66)
Number of observations	11089	8207	6478
F statistic	65116.88	55045.15	41138.17
Prob>F	0.00	0.00	0.00
Adjusted R-squared	0.93	0.93	0.92

4. The determinants of the basis

The asymmetry between positive and negative bases

- We repeat the previous regression but we now distinguish between positive and negative lagged bases:
 - *Positive basis = $\max(\text{Basis}, 0)$.*
 - *Negative basis = $\min(\text{Basis}, 0)$.*

	Jan04 - Sep10	Jan07 - Sep10	Jan08 - Sep10
Positive Lagged Basis	0.975*** (57.84)	0.974*** (56.58)	0.970*** (58.83)
Negative Lagged Basis	0.907*** (11.16)	0.903*** (10.84)	0.900*** (10.94)

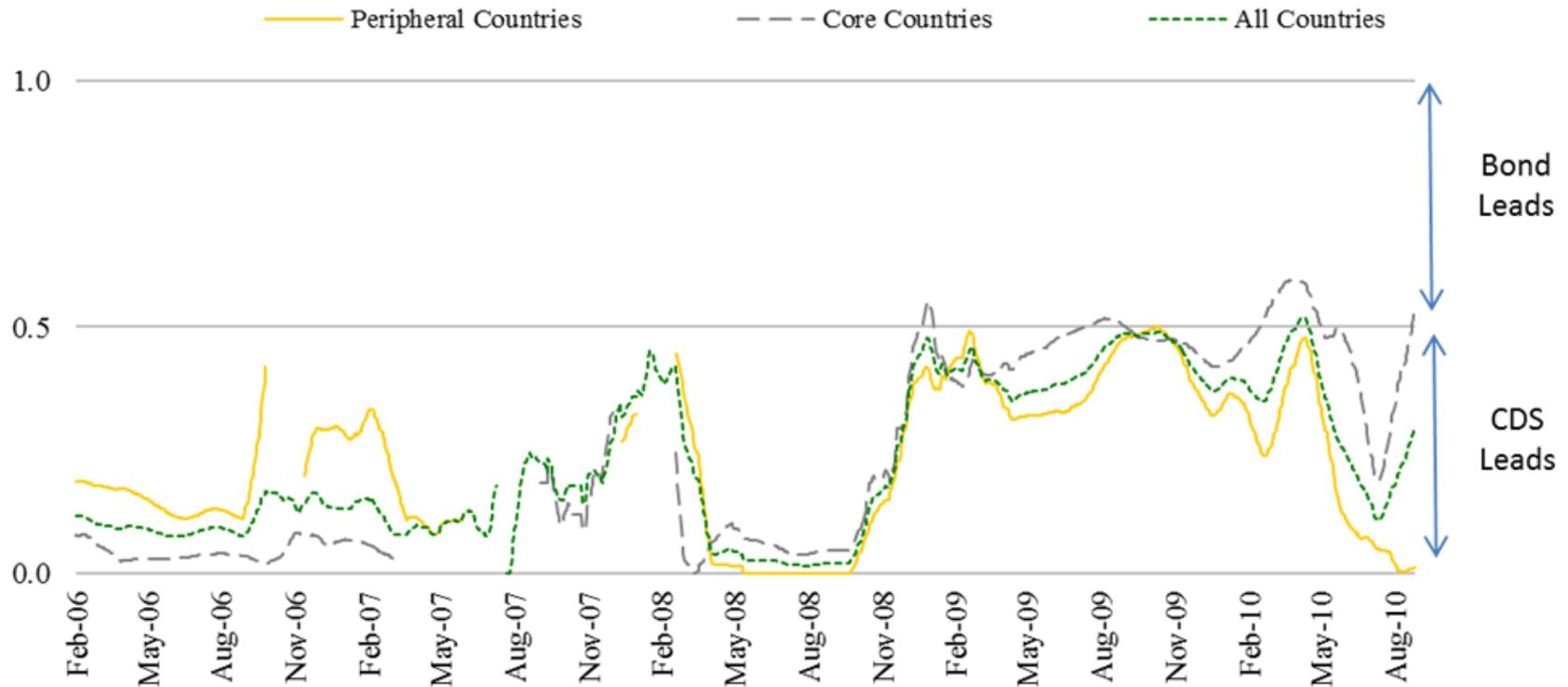
- The difference between these coefficient is significantly higher than zero for the three time periods considered.
- It is more difficult to close a positive basis than the opposite (restrictions on shorting bonds).

5. Price-discovery analysis

- An efficient price discovery process is characterized by a quick adjustment of market prices from the old to the new equilibrium as new information arrives (Yan and Zivot, 2007).
- The previous literature that has tried to measure this form of market-efficiency has focused on static price-discovery analyses.
 - Price discovery could be state dependent
 - ... and influenced by market frictions as well as by risk and liquidity factors.
- We use Gonzalo and Granger (1995) methodology using rolling windows to study the price discovery process.

5.1. A dynamic price-discovery metric

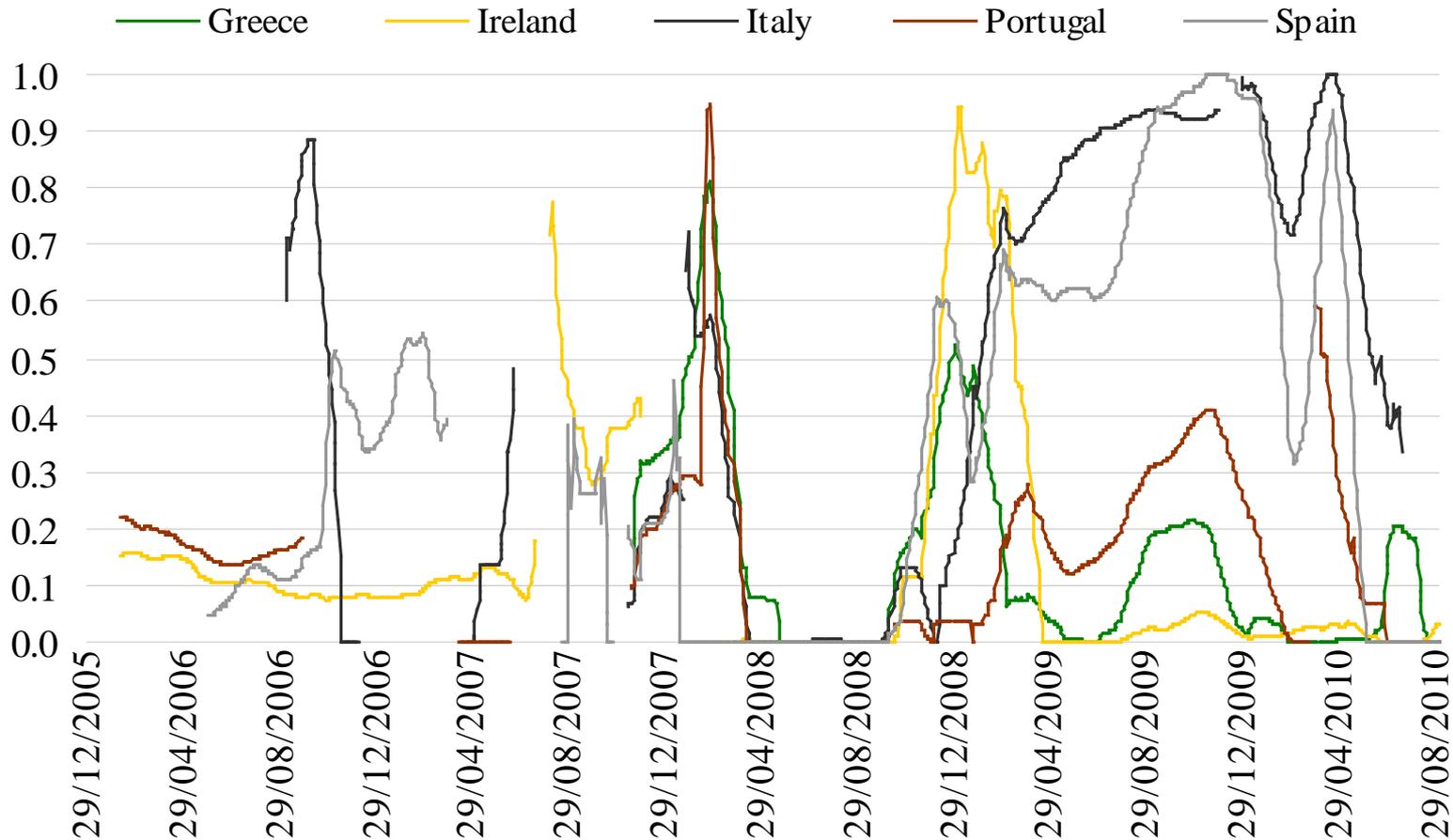
Core and peripheral countries' 30-day moving average price discovery metric



- Using Granger causality test we do not find clear evidence on whether bond or CDS market leads the price discovery process → Bidirectional causation and no-causation.

5.1. A dynamic price-discovery metric

Peripheral countries' 30-day moving average price discovery metric



5.2. The determinants of the market leadership in price-discovery



- Logit regression with fixed effects and robust to heteroskedasticity.
- Dependent variable.
 - Dummy variable which is equal to 1 when the bond market reflects information more efficiently than the CDS market and 0 otherwise.
- Explanatory variable.
 - The same used to study the determinants of the basis with the exception of the lagged basis and the relative spillovers measure.
 - The amount of sovereign debt purchased by the ECB.
- We estimate the effect of the price discovery metrics using a panel formed for the 10 EMU countries and for two different groups of countries: core and peripheral countries.

5.2. The determinants of the market leadership in price-discovery

- Negative and significant effect (CDS leads)
 - Financing costs
 - Ratio bond/CDS liquidity
 - Bond purchased by ECB
- Positive and significant effect (Bond leads)
 - Counterparty risk net of global risk
 - Global risk (VIX)
- Non significant effect
 - Squared of country stock index returns

6. Conclusions

- After the subprime crisis there are persistent deviations from the theoretical parity relation that were absent before the crisis.
- These deviations are not random but related to systematic factors (counterparty risk, liquidity, and the spillovers measure).
 - CDS and bond spreads do not share the same information.
- The price discovery process is state-dependent.
- The levels of counterparty and global risk, funding costs, market liquidity and the volume of debt purchases by the European Central Bank are significant factors in determining which market leads price discovery.

Thanks for your attention

