

A Macro-Financial Analysis of the Euro Area Sovereign Bond Market (Redenomination Risk in the Euro Area Bond Market)

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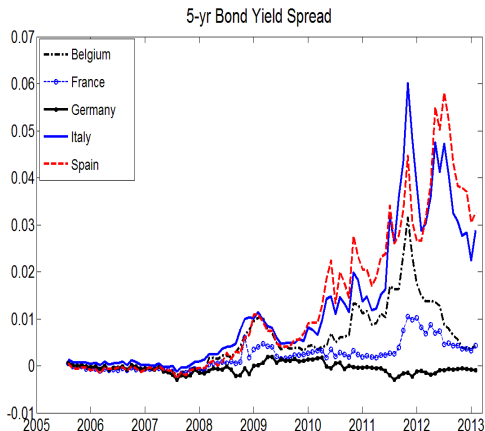
Introduction

The main goal of the paper is to identify and assess the relative importance of the "convertibility" or "redenomination" risk within euro area sovereign bond spreads.

"These premia have to do, as I said, with default, with liquidity, but they also have to do more and more with convertibility, with the risk of convertibility." Mario Draghi
July 2012

Identification issue: redenomination risk is unobserved. We assume it incorporates:

- Effect of flight-to-safety capital flows across borders; and
- Dynamics of bond spreads not justified by country-specific factors, euro-area economic fundamentals, and international influences.



Disclaimer

The views expressed are those of the authors and
do not necessarily reflect those of the NBB.

Overview

- Introduction
- Multi-market affine yield curve model
- Estimation methodology
- Empirical findings
- Application
- Conclusion

Identification of redenomination risk

Alternative approaches have been proposed in the academic literature.

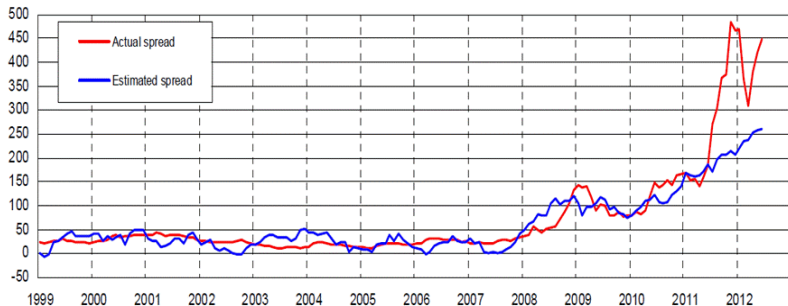
- **Market-based measures** of implicit "devaluation" risk:
 - difference in CDS of euro area countries relative to Germany.
- Implied deviation of observed yield from a **"fair" value**:
 - focus fair yield spreads on (macroeconomic) fundamental components (e.g. Di Cesare et al. (2012), De Grauwe and Li (2012));
 - standard (country-specific) regression approach for specific bond maturities.

Introduction

Identification of non-fundamental (redenomination) risk

Example of fair yield model: (Di Cesare et al (2012)).

**Italian 10-year sovereign spread with respect to Germany
as a function of consensus expectations on fiscal and other economic fundamentals (1)**
(monthly data; basis points)



Contribution of the paper

Decompose of bond yield spreads based on canonical DTSM model.

- Introduce a no-arbitrage, multi-issuer, affine term structure model:
 - Limited number of **spanned factors**: parsimonious pricing function for the yield curve (as in Joslin, Singleton and Zhu (RFS 2011));
 - Large number of **unspanned factors** with predictive content for excess bond returns. This allows the identification of specific shocks (as in Joslin, Pribsch and Singleton (2010)).
- Decompose EA sovereign yield spreads (relative to OIS) for five EA countries (BE, FR, GE, IT and SP):
 - **Economic risk**: global/euro area environment and economic situation of the country;
 - **Idiosyncratic (country-specific) risk**: additional non-economic risk;
 - **Non-fundamental (redenomination) risk**: component not accounted for by macro-financial variables, i.e. that should not be present in a well-functioning monetary union.

Main results

- **Fit of the yield curve**

- In most cases, we obtain a good fit of the OIS and country-specific yield curves.

- **Relative importance of bond spread components (IRFs and Var. Dec.)**

- Redenomination shocks relatively important for shorter forecast horizons;
- Economic fundamentals remain important factor for EA bond spreads for longer forecast horizons.

- **Historical decomposition of spread dynamics during crisis**

- We observe an increase in bond yield spreads due to redenomination risk shocks after the intensification of the debt crisis in September 2011 (in line with Di Cesare, Grande, Manna, and Taboga (2012) and De Grauwe and Ji (2012));
- Economic fundamentals remain an important driver of bond yield spreads.

Affine yield curve model

Affine yield curve models

Basic set up

- Bond pricing equation (no-arbitrage condition):

$$P_{t,n} = E_t[m_{t+1}P_{t+1,n-1}],$$

- Stochastic discount factor is a function of risks present in the economy:

$$m_{t+1} = \exp[-r_t - 0.5\Lambda'_t\Lambda_t - \Lambda'_t\varepsilon_{t+1}] \quad \varepsilon_t \sim N(0, I_K)$$

- Prices of risks, Λ_t , and (risk-free) interest rate, r_t , are a function of state variables:

$$\Lambda_t = \Lambda_0 + \Lambda_1 X_t, \quad r_t = \rho_0 + \rho_1 X_t$$

- Risk-neutral dynamics of the factors, X_t , follow a Gaussian VAR(1) process:

$$X_t = C^{\mathbb{Q}} + \Phi^{\mathbb{Q}} X_{t-1} + \Sigma \varepsilon_t^{\mathbb{Q}}, \quad \varepsilon_t^{\mathbb{Q}} \sim N(0, I_K)$$

Affine yield curve models

Obtaining the pricing function

- Given these assumptions bond prices can be expressed as exponential affine functions of state variables (see Ang and Piazzesi, JME 2003):

$$P_{t,n} = \exp[A_n + B_n X_t],$$

where A_n and B_n satisfy DEs, imposing the no-arbitrage restrictions on bond prices:

$$\begin{aligned} A_{n+1} &= A_n + B_n \underbrace{(C^{\mathbb{P}} - \Sigma \Lambda_1)}_{C^{\mathbb{Q}}} + 0.5 B'_n \underbrace{(\Phi^{\mathbb{P}} - \Sigma \Lambda_1)}_{\Phi^{\mathbb{Q}}} B_n + A_1 \\ B_{n+1} &= B_n \underbrace{(\Phi^{\mathbb{P}} - \Sigma \Lambda_1)}_{\Phi^{\mathbb{Q}}} + B_1 \end{aligned}$$

- The no-arbitrage affine yield curve representation, for $y_{t,n} = -\ln P_{t,n}/n$ with $n = 1, \dots, L$ and $\Theta = \{C^{\mathbb{Q}}, \Phi^{\mathbb{Q}}, \Sigma, \Lambda_0, \Lambda_1, \rho_0, \rho_1\}$:

$$\begin{aligned} y_{t,n} &= a_n(\Theta) + b_n(\Theta) X_t \\ a_n &= -A_n/n, \quad b_n = -B_n/n \end{aligned}$$

Affine yield curve models

Spanned and unspanned factors (Joslin, Singleton, and Zhu (RFS 2011))

- JSZ propose the use of "spanned" factors by using bond portfolios ($\mathcal{P}_t = Wy_t$) as pricing factors.
- Given a no-arbitrage, affine yield curve representation in the original risk factors X_t :

$$y_t = a(\Theta) + b(\Theta)X_t$$

- Define the set ($\dim(X)$) of yield portfolios \mathcal{P}_t :

$$\mathcal{P}_t = Wy_t$$

- An equivalent yield curve representation in function of the yield portfolios is given by:

$$y_t = \underbrace{[I - b(\Theta)(Wb(\Theta))^{-1}W] a(\Theta)}_{a_p(\Theta)} + \underbrace{b(\Theta)(Wb(\Theta))^{-1}\mathcal{P}_t}_{b_p(\Theta)}$$

- The impact of macroeconomic variables on the yield curve can be assessed using the joint \mathbb{P} -dynamics of Z_t and \mathcal{P}_t

$$\begin{bmatrix} Z_t \\ \mathcal{P}_t \end{bmatrix} = \begin{bmatrix} C_Z \\ C_P \end{bmatrix} + \begin{bmatrix} \Phi_{ZZ} & \Phi_{ZP} \\ \Phi_{PZ} & \Phi_{PP} \end{bmatrix} \begin{bmatrix} Z_{t-1} \\ \mathcal{P}_{t-1} \end{bmatrix} + \begin{bmatrix} \Sigma_{ZZ} & 0 \\ \Sigma_{PZ} & \Sigma_{PP} \end{bmatrix} \begin{bmatrix} \varepsilon_{Z,t} \\ \varepsilon_{P,t} \end{bmatrix}$$

Multi-market affine yield curve model

Multi-market affine yield curve model

Obtaining the pricing function

- Risk-neutral dynamics of the factors:

$$X_t = C_X^Q + \Phi_X^Q X_{t-1} + \Sigma_X \varepsilon_t^Q, \quad \varepsilon^Q \sim N(0, I_K)$$

- Instantaneous interest rate of market m depends on the pricing factors:

$$r_{m,t} = \rho_m X_t, \quad m = 1, \dots, M$$

- Multi-market framework ($m = 2$):

Risk-free interest rate: $r_{0,t} = \rho_0 X_t, \quad \rho_0 = [1, 1, 0, 0]$

$$r_{1,t} = \rho_1 X_t, \quad \rho_1 = [1, 1, 1, 1]$$

Country-specific rate:

$$r_{1,t} = \underbrace{\rho_0 X_t}_{\text{risk-free}} + \underbrace{(\rho_1 - \rho_0) X_t}_{\text{spreads rel risk free}}$$

Multi-market affine yield curve model

Obtaining the multi-market yield curve representation

- Yield curve is as an affine function of the latent factors

$$y_{m,t}(n) = a_n(\Theta, \rho_m) + b_n(\Theta, \rho_m)X_t$$

- Multi-market, no-arbitrage yield curve representation

$$Y_t = \begin{bmatrix} y_{0,t}(1) \\ \vdots \\ y_{0,t}(N) \\ y_{1,t}(1) \\ \vdots \\ y_{1,t}(N) \end{bmatrix} = \begin{bmatrix} a_1(\Theta, \rho_0) \\ \vdots \\ a_N(\Theta, \rho_0) \\ a_1(\Theta, \rho_1) \\ \vdots \\ a_N(\Theta, \rho_1) \end{bmatrix} + \begin{bmatrix} b_1(\Theta, \rho_0) \\ \vdots \\ b_N(\Theta, \rho_0) \\ b_1(\Theta, \rho_1) \\ \vdots \\ b_N(\Theta, \rho_1) \end{bmatrix} X_t$$

- Re-express the fundamental affine yield curve model in terms of the observable "yield portfolios", i.e. $\mathcal{P}_t = WY_t$. Assuming zero measurement errors on the yield portfolios:

$$Y_t = \underbrace{[I - b(\Theta)(Wb(\Theta))^{-1}W]}_{a_p(\Theta)} a(\Theta) + \underbrace{b(\Theta)(Wb(\Theta))^{-1}}_{b_p(\Theta)} \mathcal{P}_t$$

Multi-market affine yield curve model

Assessing the impact of macro-financial factors on the yield curve

- Multi-market, no-arbitrage yield curve representation

$$Y_t = a_p(\Theta) + b_p(\Theta)\mathcal{P}_t$$

- VAR(1) representation: assess the relative importance of macroeconomic, financial and redenomination variables through their impact on the yield portfolio factors (\mathcal{P}_t)

$$\begin{bmatrix} Z_t \\ \mathcal{P}_t \end{bmatrix} = \begin{bmatrix} C_Z \\ C_{\mathcal{P}} \end{bmatrix} + \begin{bmatrix} \Phi_{ZZ} & \Phi_{Z\mathcal{P}} \\ \Phi_{\mathcal{P}Z} & \Phi_{\mathcal{P}\mathcal{P}} \end{bmatrix} \begin{bmatrix} Z_{t-1} \\ \mathcal{P}_{t-1} \end{bmatrix} + \begin{bmatrix} \Sigma_{ZZ} & 0 \\ \Sigma_{\mathcal{P}Z} & \Sigma_{\mathcal{P}\mathcal{P}} \end{bmatrix} \begin{bmatrix} \varepsilon_{Z,t} \\ \varepsilon_{\mathcal{P},t} \end{bmatrix}$$

- Z_t : set of (appropriately ordered) macroeconomic, financial and redenomination factors
- Σ_{ZZ} and $\Sigma_{\mathcal{P}\mathcal{P}}$ are lower-triangular matrices implied by the Cholesky ordering and identification of structural shocks.

Estimation methodology

Likelihood function

- We use standard maximum likelihood techniques in two steps:
 - We estimate the VAR system using standard OLS regressions;
 - Conditional on VAR estimates, the remaining parameters to fit the OIS and country-specific yield curves are obtained by maximum likelihood .
- Model is estimated on data from Belgium, France, Germany, Italy, and Spain: August 2005 - March 2013 using bonds with maturities of 1, 2, 3, 4 and 5 years.

Estimation methodology

The factors...

$$\left. \begin{matrix} VIX_t \\ ESI_t \end{matrix} \right\} \text{global tension and European economic situation}$$

$$Z_t = \left. \begin{matrix} F2S_t \\ PC_t^{Eur_spr,1} \\ PC_t^{Eur_spr,2} \\ POL_t \end{matrix} \right\} \text{redenomination risk}$$

$$\left. \begin{matrix} GDP_t^m \\ CPI_t^m \\ D_t^m / GDP_t^m \end{matrix} \right\} \text{economic condition/fiscal sustainability of the country } m$$

$$\mathcal{P}_t = \left. \begin{matrix} PC_t^{OIS,1} \\ PC_t^{OIS,2} \end{matrix} \right\} \text{fit OIS yield curve}$$

$$\left. \begin{matrix} PC_t^{spr,1} \\ PC_t^{spr,2} \end{matrix} \right\} \text{fit country-specific yield curve}$$

Spanned factors

- Four factors to fit the OIS and country-specific yield curves.
 - **First two** factors used to explain the dynamics of the **OIS yield curve**.
 - First two principal components of the five OIS rates ($PC_t^{OIS,1}$ and $PC_t^{OIS,2}$).
 - **Last two** factors used to explain the dynamics of the **country-specific yield spreads** (relative to OIS).
 - First two principal components of the yield spreads between the sovereign and the OIS rates for the five maturities considered ($PC_t^{spr,1}$ and $PC_t^{spr,2}$).
- The vector of spanned factors:

$$\mathcal{P}_t = \left[PC_t^{OIS,1}, PC_t^{OIS,2}, PC_t^{spr,1}, PC_t^{spr,2} \right]'$$

Unspanned factors

- Nine factors, divided in three groups:
 - Two factors capturing **global tensions** in financial market and market's expectation regarding the **European economic outlook** (VIX_t and ESI_t).
 - Four factors accounting for **redenomination risks** in the euro area bond market:
 - liquidity factor ($F2S_t$) computed as the spread between the average KfW (Reconstruction Credit Institute) and Bund yields;
 - two factors capturing the common dynamics of euro area sovereign bond yield spreads ($PC_t^{Eur-spr,1}$ and $PC_t^{Eur-spr,2}$).
 - a factor capturing the political uncertainty in the euro area (POL_t) (Baker, Bloom and Davis, 2013).
 - Three factors related to the overall **economic condition** / **fiscal sustainability** of the country (GDP_t^m , CPI_t^m , and D_t^m/GDP_t^m)
- The vector of unspanned factors:

$$Z_t = \left[VIX, ESI, F2S, PC_t^{Eur-spr,1}, PC_t^{Eur-spr,2}, POL_t, GDP_t^m, CPI_t^m, D_t^m/GDP_t^m \right]'$$

Empirical findings

What we look at...

- We assess the overall performance of the model through
 - the fit of the **OIS yield curve** and the **country-specific yield spread curves**.
- We analyze the dynamics of the model with
 - **impulse response functions**.
- We evaluate the contribution of different types of shocks to the variation in bond spreads with
 - **variance decompositions**.
- We identify the contribution over time of each group of shocks with a
 - **historical decomposition** of bond yield spreads.

Fit of the yield curves

- **OIS yield curves**

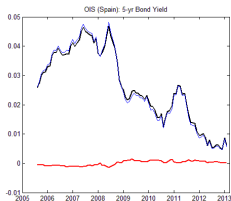
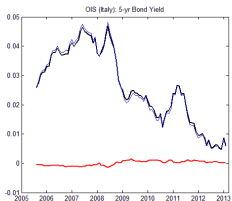
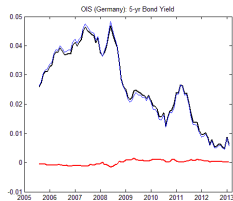
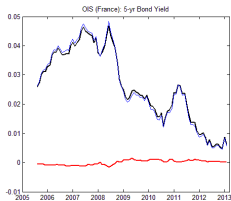
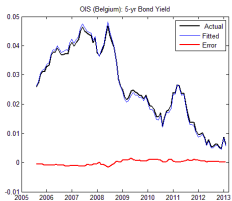
- We obtain a very good and similar fit of the OIS yield curve for the different countries (“pairs” of markets).
 - e.g. OIS and Italy, OIS and Spain, etc.
- The model should probably be restricted so as to obtain exactly the same fit for the OIS yield curve across countries.

- **Country-specific yield spread curves**

- We obtain a reasonable fit for all countries.

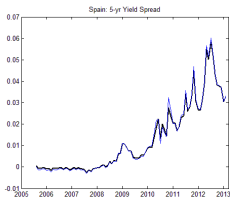
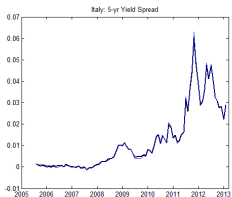
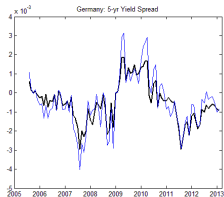
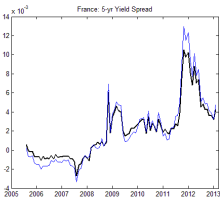
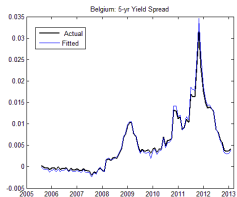
Empirical findings

Fit of the OIS yield curve: 5-year rates - all countries



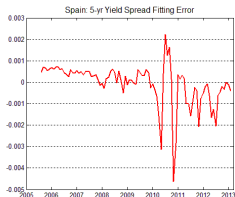
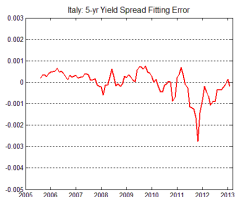
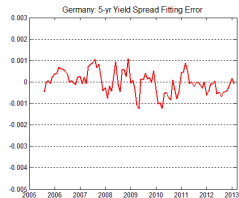
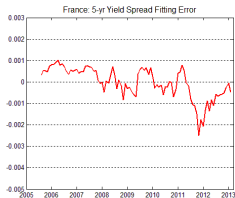
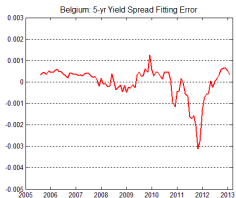
Empirical findings

Fit of the 5-year yield spread - all countries



Empirical findings

Fitting error of the 5-year bond yield spread - all countries



Empirical findings

Fitting error of bond yield spread - all countries

Table: DIAGNOSTIC STATISTICS OF THE ESTIMATED MODELS

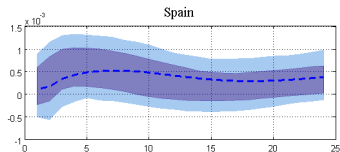
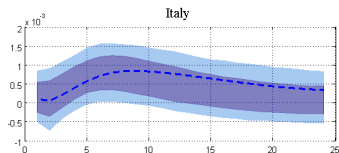
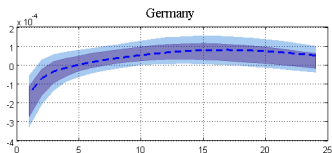
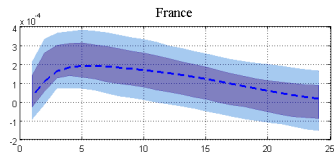
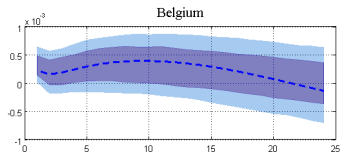
		Mean		Std		Fitting error		
		data	emp.	data	emp.	mean	std	auto
		(bp)	(bp)	(bp)	(bp)	(bp)	(bp)	
<i>Belgium</i>	spread _{1yr}	22	22	40	44	-0.2	5	0.838
	spread _{5yr}	53	53	65	71	-0.2	7	0.877
<i>France</i>	spread _{1yr}	0	0	18	19	0.1	3	0.815
	spread _{5yr}	20	21	29	35	-0.3	7	0.874
<i>Germany</i>	spread _{1yr}	-13	-13	19	19	-0.2	2	0.585
	spread _{5yr}	-5	-5	11	14	-0.2	5	0.629
<i>Italy</i>	spread _{1yr}	91	91	122	126	-0.2	5	0.780
	spread _{5yr}	122	122	145	149	-0.4	6	0.841
<i>Spain</i>	spread _{1yr}	79	79	127	129	-0.5	5	0.518
	spread _{5yr}	127	128	158	164	-0.5	10	0.547

Mean denotes the sample arithmetic average, and *Std* the standard deviation, all expressed in basis points. *auto* denotes the first-order monthly autocorrelation and *emp.* the empirical result from the model.

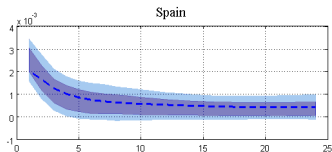
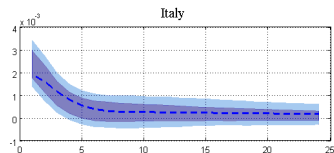
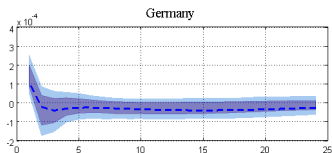
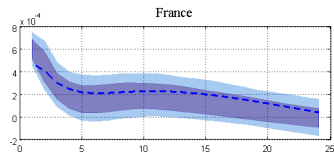
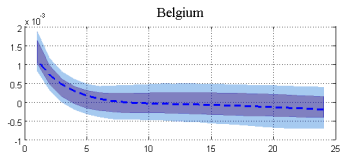
Observations

- Overall, IRFs are in line with expectations;
- For country-specific sovereign spreads, we find important impact of:
 - Redenomination shocks:
 - Positive shocks on F2S increase spreads except Germany
 - Positive shocks on PC1 increase spreads (less for Germany)
 - Positive shocks on PC2 decrease spreads except Germany
 - Positive shocks on POL (political risk) increase spreads except Germany
 - VIX: increase in the implied volatility increases in general the sovereign yield spreads (exception for Germany);
 - ESI: improved economic outlook leads to decreases in short term spreads;
 - Country-specific debt dynamics on the country-specific spreads.

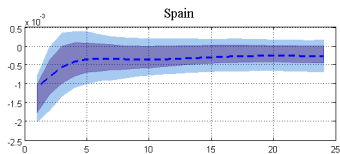
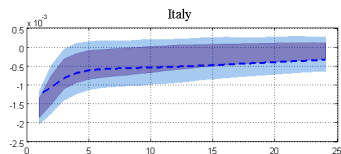
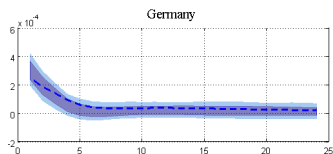
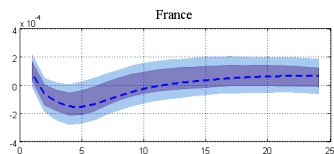
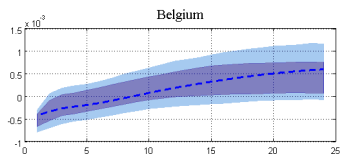
IRFs: Response of 5-yr spread to F2S shock



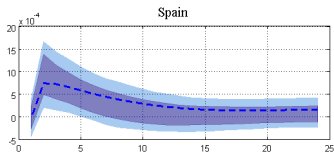
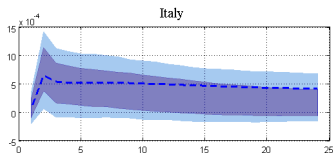
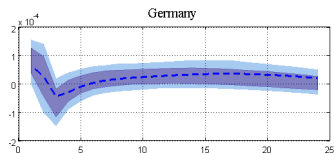
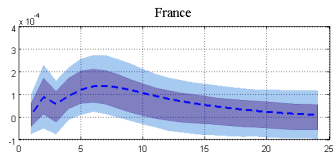
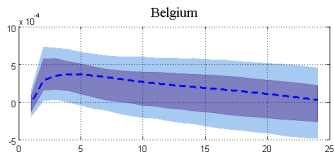
IRFs: Response of 5-yr spread to PC(Eur_spr,1) shock



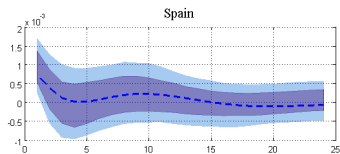
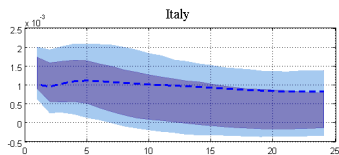
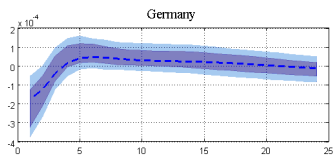
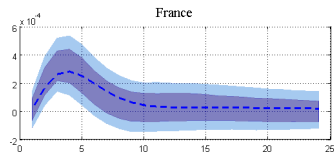
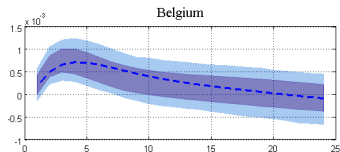
IRFs: Response of 5-yr spread to PC(Eur_spr,2) shock



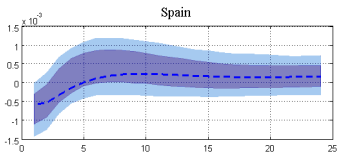
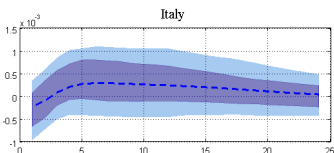
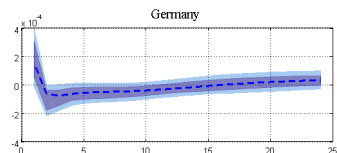
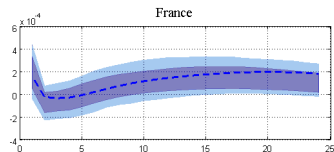
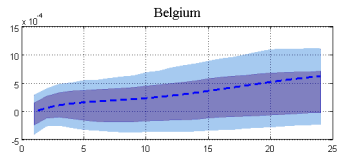
IRFs: Response of 5-yr spread to Pol Risk shock



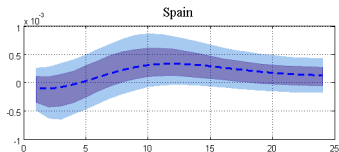
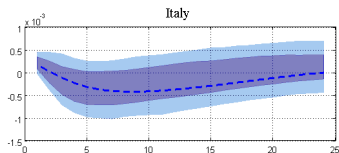
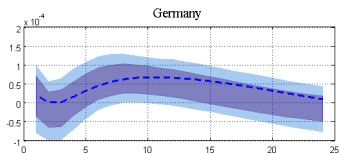
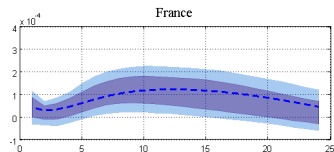
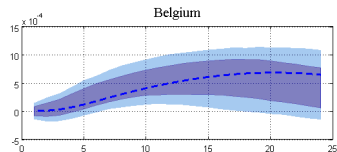
IRFs: Response of 5-yr spread to VIX shock



IRFs: Response of 5-yr spread to ESI shock



IRFs: Response of 5-yr spread to D/GDP shock



Variance decomposition

- To identify the main drivers behind movements in sovereign bond spreads, we perform a variance decomposition and report results for **groups of shocks**.
 - **Economic shocks**
 - Shocks to the economic situation of the country and the market's perception regarding the euro area and global environments (VIX , ESI , GDP , CPI , D/GDP , $PC_t^{OIS,1}$, and $PC_t^{OIS,2}$).
 - **Country-specific idiosyncratic shocks**
 - Shocks to country-specific conditions that cannot be captured by the economic and financial variables included in the model ($PC_t^{spr,1}$ and $PC_t^{spr,2}$) nor by redenomination risk.
 - **Redenomination risk shocks**
 - Flight-to-safety ($F2S$) shocks, shocks capturing the dynamics of bond spreads not justified by country-specific factors, euro area economic fundamentals, and international influences ($PC_t^{Eur-spr,1}$ and $PC_t^{Eur-spr,2}$), and political risk shocks (POL).

Empirical findings

Variance decomposition of **5-yr bond yield spreads**

hor.	<i>Italy</i>			<i>Spain</i>		
	Eco	Idios	Red	Eco	Idios	Red
1m	0,19	0,13	0,68	0,17	0,26	0,58
1yr	0,48	0,05	0,47	0,37	0,14	0,49
3yr	0,59	0,03	0,38	0,52	0,08	0,40
5yr	0,60	0,03	0,37	0,60	0,05	0,34
7yr	0,60	0,03	0,37	0,63	0,05	0,33
10yr	0,60	0,03	0,37	0,64	0,04	0,32

Note: Eco: economic shocks; Idios: country-specific idiosyncratic shocks; Red: redenomination risk shocks.

Application

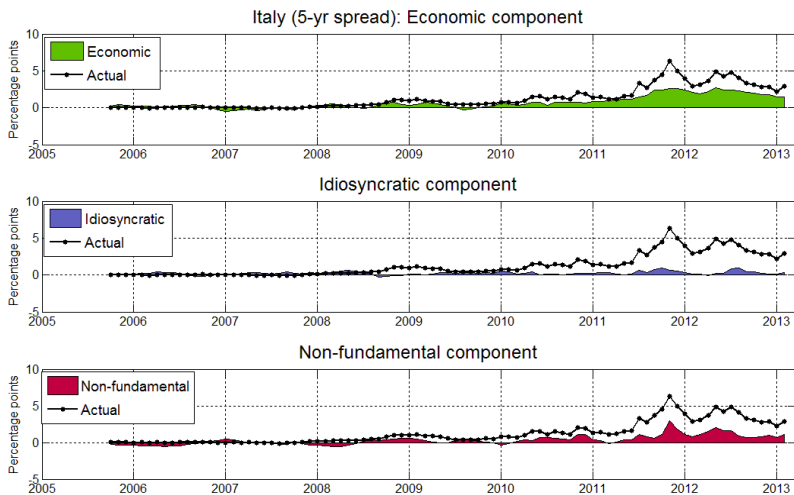
Historical decomposition of bond yield spreads

Observations

- **Economic shocks** are responsible for a substantial part of yield spread dynamics for all countries (in line with the results of the variance decomposition).
- **Redenomination risk** shocks: Small impact until the intensification of the debt crisis in September 2011. The contribution since September 2011 is substantial; Especially relevant for Spain and Italy.
- **Idiosyncratic shocks** had overall a smaller role, with a few exceptions:
 - E.g. Spain; the impact of this type of shock increased substantially by the second quarter of 2012.

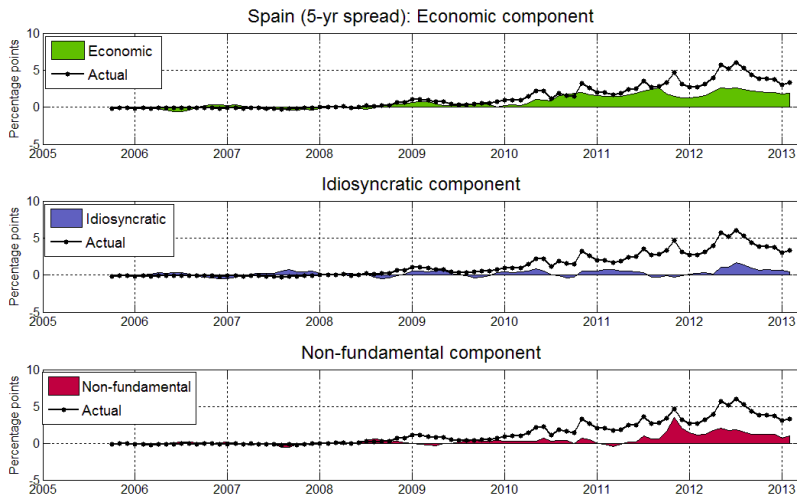
Application

Historical decomposition of bond yield spreads: ITALY, 5-yr yield spread



Application

Historical decomposition of bond yield spreads: SPAIN, 5-yr yield spread



“Fair” spreads: January 2013

mat.	Spread			Level		
	Eco	Idios	Red	OIS	Obs	Fair
Italy (% p.a.)						
1yr	0,711	0,077	0,871	0,079	1,738	0,873
3yr	1,200	0,247	0,993	0,270	2,710	1,728
5yr	1,472	0,331	1,102	0,607	3,512	2,392
Spain (% p.a.)						
1yr	0,946	0,133	0,608	0,079	1,766	1,150
3yr	1,537	0,358	0,856	0,270	3,020	2,191
5yr	1,848	0,469	0,990	0,607	3,914	2,883

Note: mat: maturity; Eco: economic component; Idios: country-specific idiosyncratic component; Red: redenomination risk component; Obs.: observed spread; Fair: fair value; and OIS: OIS rate.

Conclusion

- Proposed approach is able to identify the component of euro area sovereign bond spreads due to redenomination risk.
 - Yield spread decomposition achieved with the use of a common-currency, two-market, no-arbitrage affine term structure model based on Joslin, Singleton, and Zhu (RFS 2011) and Joslin, Pribsch, and Singleton (2010).
 - Approach is computationally faster than standard likelihood-based methods and allows for the inclusion of unspanned macro factors.
- Application to yield curve data from Belgium, France, Germany, Italy, and Spain (2005-2013) reveal that:
 - **Redenomination risk** plays an important role in the dynamics of euro area sovereign bond spreads for all countries and maturities analyzed (Especially since the intensification of the crisis in the summer of 2011).
 - Nevertheless, **economic fundamentals** remain an important driver behind sovereign bond yield spreads.
- Research agenda:
 - Analysis of impact of risk factors (spanned and unspanned) on risk premia
 - Application to other bond markets: corporate bond market, inflation indexed bonds

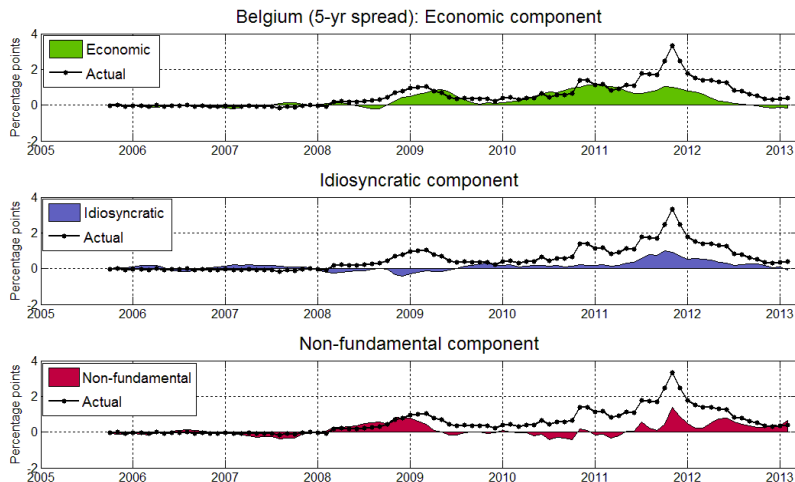
“Fair” spreads: January 2013

mat.	Spread			Level		
	Eco	Idios	Red	OIS	Obs	Fair
Belgium (% p.a.)						
1yr	-0,241	-0,159	0,467	0,079	0,147	-0,293
3yr	-0,203	-0,118	0,596	0,270	0,545	-0,066
5yr	-0,167	-0,098	0,664	0,607	1,005	0,363
France (% p.a.)						
1yr	-0,150	0,088	-0,044	0,079	-0,027	0,020
3yr	0,086	0,079	0,070	0,270	0,505	0,462
5yr	0,189	0,133	0,141	0,607	1,071	0,891
Germany (% p.a.)						
1yr	-0,165	-0,101	-0,217	0,079	-0,404	-0,177
3yr	-0,051	-0,040	-0,097	0,270	0,082	0,183
5yr	0,065	-0,028	-0,122	0,607	0,522	0,636

Note: mat: maturity; Eco: economic component; Idios: country-specific idiosyncratic component; Red: redenomination risk component; Obs.: observed spread; Fair: fair

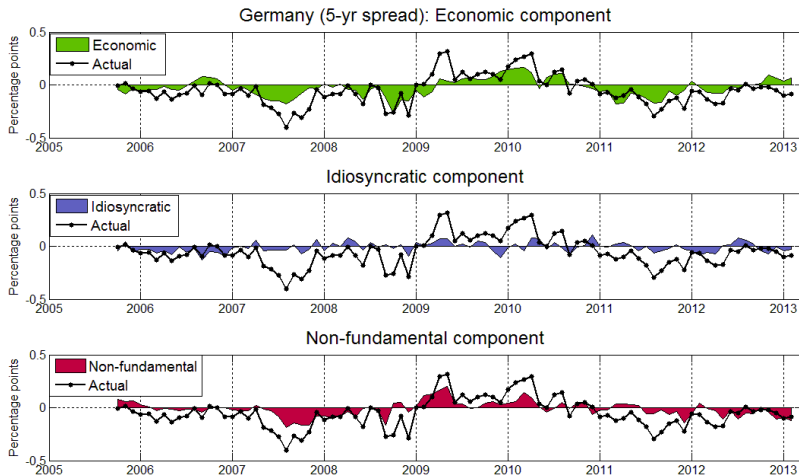
Application

Historical decomposition of bond yield spreads: BELGIUM, 5-yr yield spread



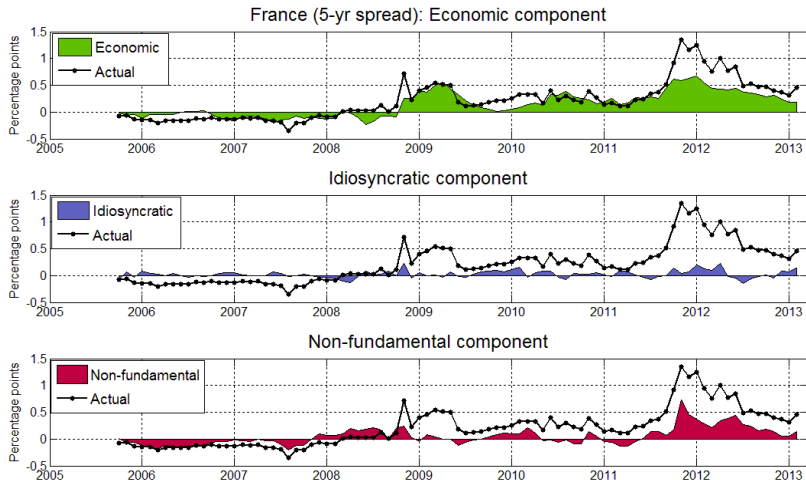
Application

Historical decomposition of bond yield spreads: GERMANY, 5-yr yield spread



Application

Historical decomposition of bond yield spreads: FRANCE, 5-yr yield spread



Empirical findings

Variance decomposition of 5-yr bond yield spreads

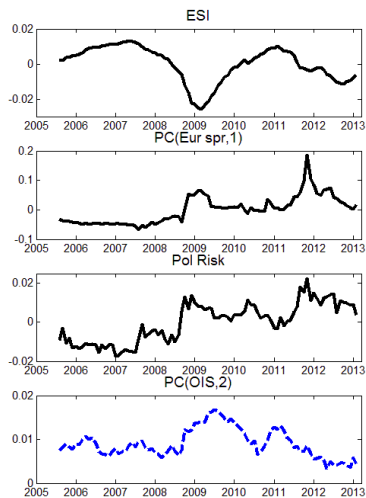
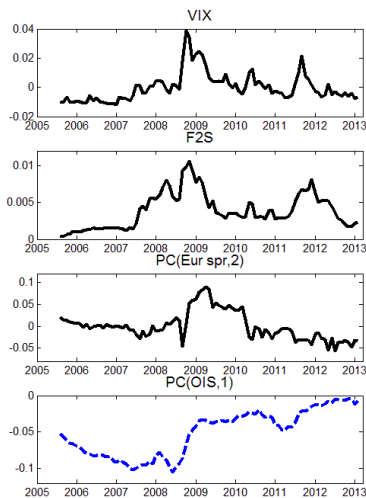
hor.	<i>Belgium</i>			<i>France</i>			<i>Germany</i>		
	Eco	Idios	Red	Eco	Idios	Red	Eco	Idios	Red
1m	0,03	0,19	0,78	0,15	0,23	0,62	0,31	0,33	0,36
1yr	0,45	0,24	0,30	0,32	0,06	0,62	0,43	0,20	0,37
3yr	0,55	0,23	0,23	0,46	0,04	0,50	0,46	0,15	0,39
5yr	0,55	0,22	0,24	0,47	0,04	0,49	0,47	0,13	0,40
7yr	0,55	0,22	0,23	0,47	0,04	0,49	0,47	0,13	0,40
10yr	0,55	0,22	0,23	0,48	0,04	0,48	0,47	0,13	0,40

hor.	<i>Italy</i>			<i>Spain</i>		
	Eco	Idios	Red	Eco	Idios	Red
1m	0,19	0,13	0,68	0,17	0,26	0,58
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10yr	0,60	0,03	0,37	0,64	0,04	0,32

Note: Eco: economic shocks; Idios: country-specific idiosyncratic shocks; Red: redenomination risk shocks.

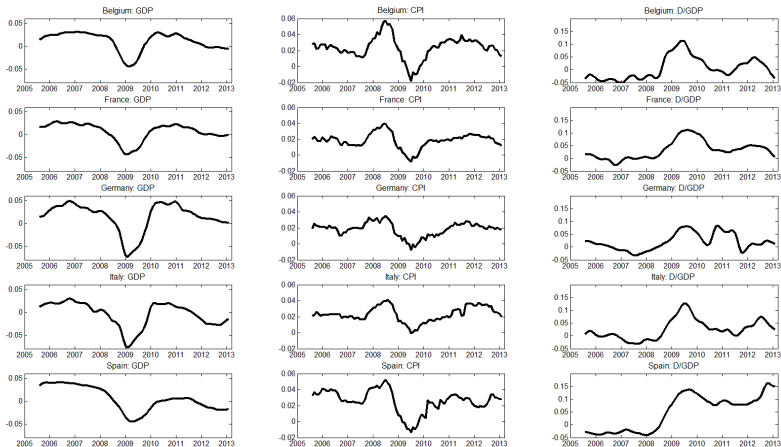
Estimation methodology

Unspanned and spanned common factors



Estimation methodology

Unspanned country-specific macroeconomic factors



Estimation methodology

Spanned country-specific factors

