The determinants of sovereign bond yield spreads in the EMU

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- Since autumn 2009 the Euro debt crisis continues unabated.
- In 2010-11, Greece, Portugal, and Ireland first asked for international financial support.
  - Financial rescue packages were organised by the European Union (EU), European Financial Stabilisation Facility (EFSF), European Central Bank (ECB), International Monetary Fund (IMF).
- A second loan was agreed for Greece in 2011, involving a haircut of privately-held debt.
- Italian and Spanish bonds have also come under significant pressure.

- We investigate the determinants of European government bond yield spreads against Germany, using a wide set of fundamentals.
- We assess the existence and impact of possible speculation and institutional intervention on government bond spreads.
- We model credit ratings themselves to determine whether they react to similar information to the one affecting spreads.
- 3 periods:

  1999:01-2007:07, before the global credit crunch;
  2007:08-2009:02, during the global credit crunch;
  2009:03-2010:12, sovereign debt crisis.

Literature

- Banking crisis spills over to EMU sovereign crisis and vice-versa (Acharya, Drechsler, Schnabl, 2011).
- Shifting market expectations about sovereign default and/or exit from the euro (Arghyrou, Tsoukalas, 2011).

- Shift in bond pricing from convergence to fundamentals-based (Arghyrou, Kontonikas 2011; Ejsing, Lemke, Margaritov, 2011).
- Fiscal forecasts relevance for yields (Afonso, 2010).
- Contagion effects (Afonso, Furceri, Gomes, 2012).
- Sovereign rating events (Afonso, Strauch, 2007; Afonso, Gomes, Rother, 2012; Favero, Missale, 2011).
- Sovereign yield volatility (Afonso, Gomes, Taamouti, 2012).

Base line model

$$spr_{it} = \alpha + \beta_1\, spr_{it-1} + \beta_2\, vix_{it} + \beta_3\, ba_{it} + \\ + \beta_4\, balance_{it} + \beta_5\, debt_{it} + \beta_6\, q_{it} + \\ + \beta_7\, gind_{it} + \beta_8\, pc2_{it} + \gamma_i + \varepsilon_{it}$$

spr - 10-year government bond yield spread *vs* Germany;
vix - log, S&P 500 implied stock volatility index (instability);
ba - 10-year government bond bid-ask spread (illiquidity);
balance, debt - expected (1-year ahead) budget balance and debt ratios, differentials *vs* Germany;
q - log, REER, increase (reduction), appreciation (depreciation);
Gind - annual growth, industrial prod. (differential *vs* Germany);
Pc2 - contagion/interdependence proxy (PCA on yield spreads).

Base line model

Slope dummies

D2007.08$_t$=1, from 2007:08 onwards, acknowledged in the literature as the starting of the global credit crunch, first large ECB emergency loan provided to European banks in response to increasing pressures in the interbank market on 9/8/2007.

D2009.03$_t$=1, from 2009:03 onwards, very substantial upward revisions by the EC of projected debt ratios (spring of 2009): markets were officially aware of the costs of fiscal activism.

Extended model

$$spr_{it} = \alpha + \beta_1\, spr_{it-1} + \beta_2\, vix_{it} + \beta_3\, ba_{it} +$$
$$+ \beta_4\, balance_{it} + \beta_5\, debt_{it} + \beta_6\, q_{it} +$$
$$+ \beta_7\, gind_{it} + \beta_8\, pc2_{it} + \gamma_i + \varepsilon_{it}$$
$$+ \beta_9\, ltsdebt_{it} + \beta_{10}\, debt^2_{it}$$
$$+ \beta_{11}\, spr_{it-1} * ba_{it-1}$$
$$+ \beta_{12}\, averagerating_{it}$$
$$+ \beta_{13}\, averageoutlook_{it}$$

ltsdebt - % of long-term government debt (> 1 year) in total debt; *averagerating*, *averageoutlook* - sovereign rating announcements and outlook (average of 3 agencies).

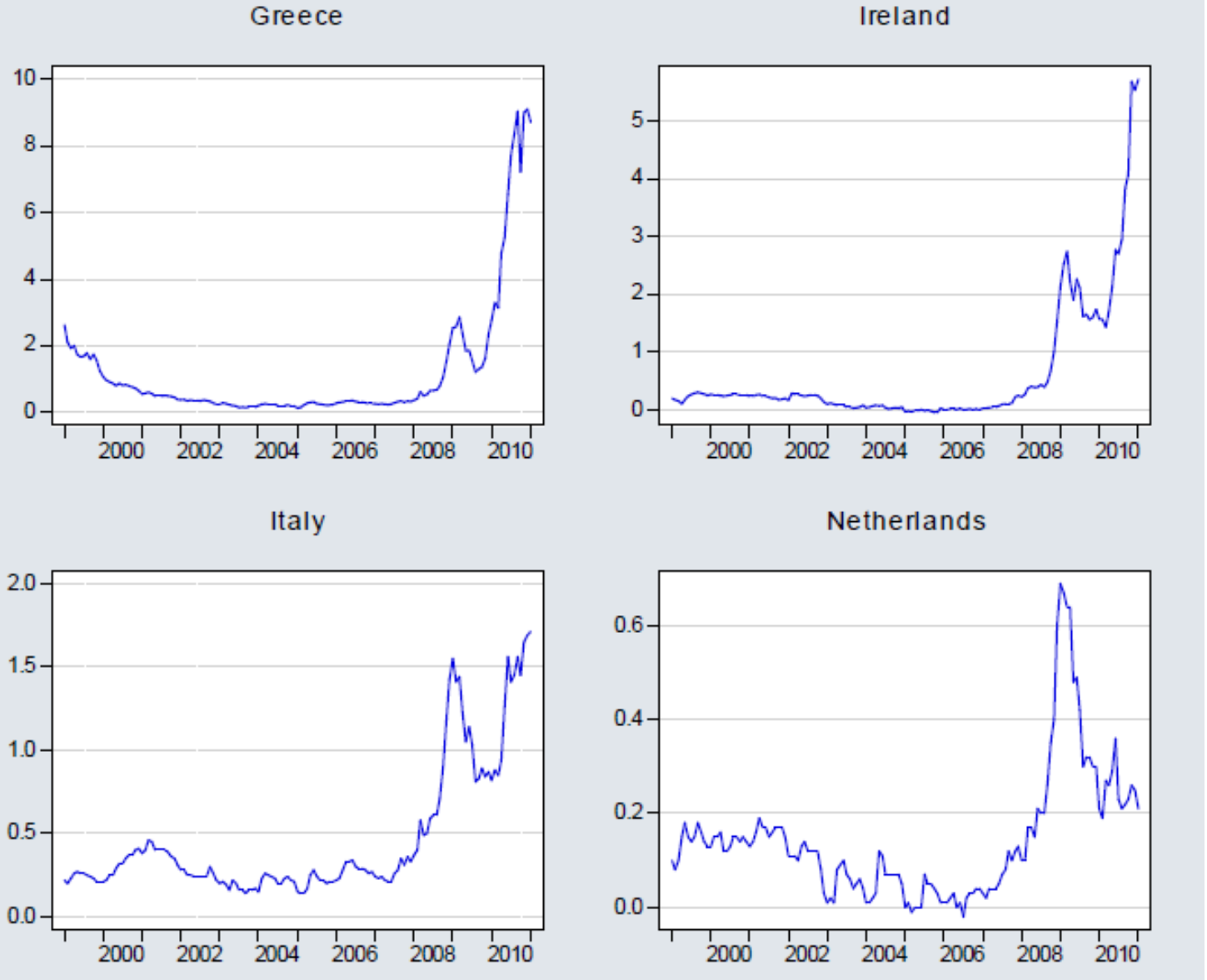
Data (1)

- Austria, Belgium, Finland, France, Greece, Ireland, Italy, Netherlands, Portugal, Spain;
- Monthly data, 1999:01-2010:12;

- 10-year government bond yields (Reuters);
- VIX: Volatility Index S&P500, Chicago Options (Bloomberg);
- Liquidity: Bid-ask spreads (MTS trading platform, ECB);
- Real effective exchange rates, industrial production (IMF);
- Expected debt/deficit; share of long-term debt (EC, ECB);
- Average ratings/outlook announcements (Afonso, Furceri, Gomes, 2012, from S&P, Moody's, Fitch).

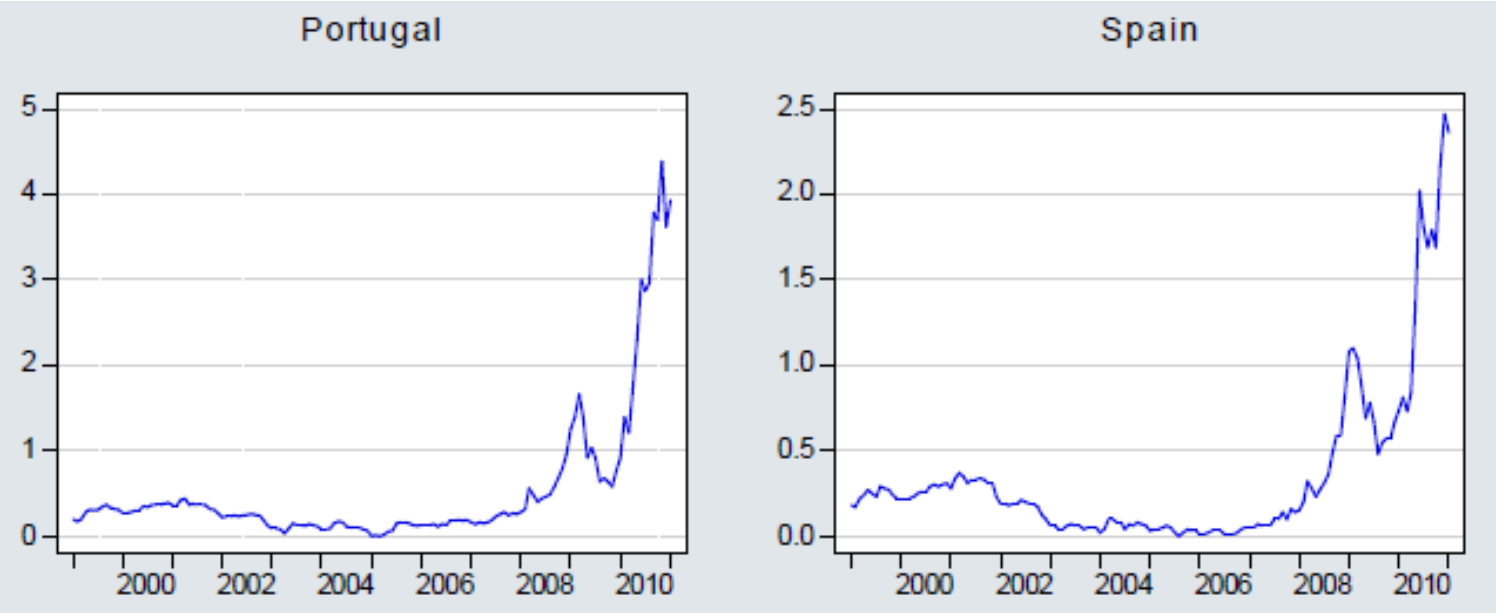
Data (2)

10-year bond yield spreads *vs* Germany

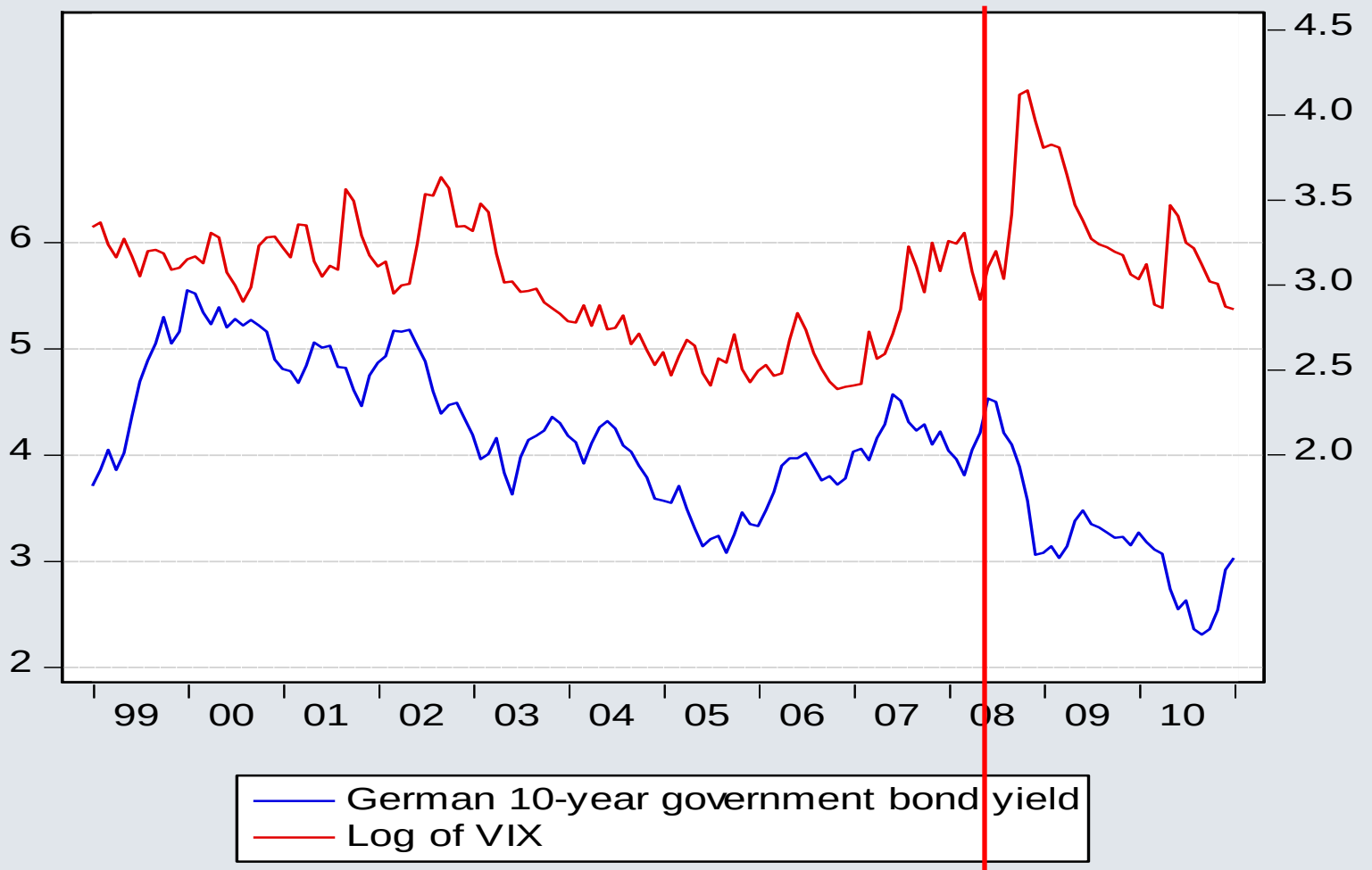


Data (3)

10-year bond yield spreads *vs* Germany



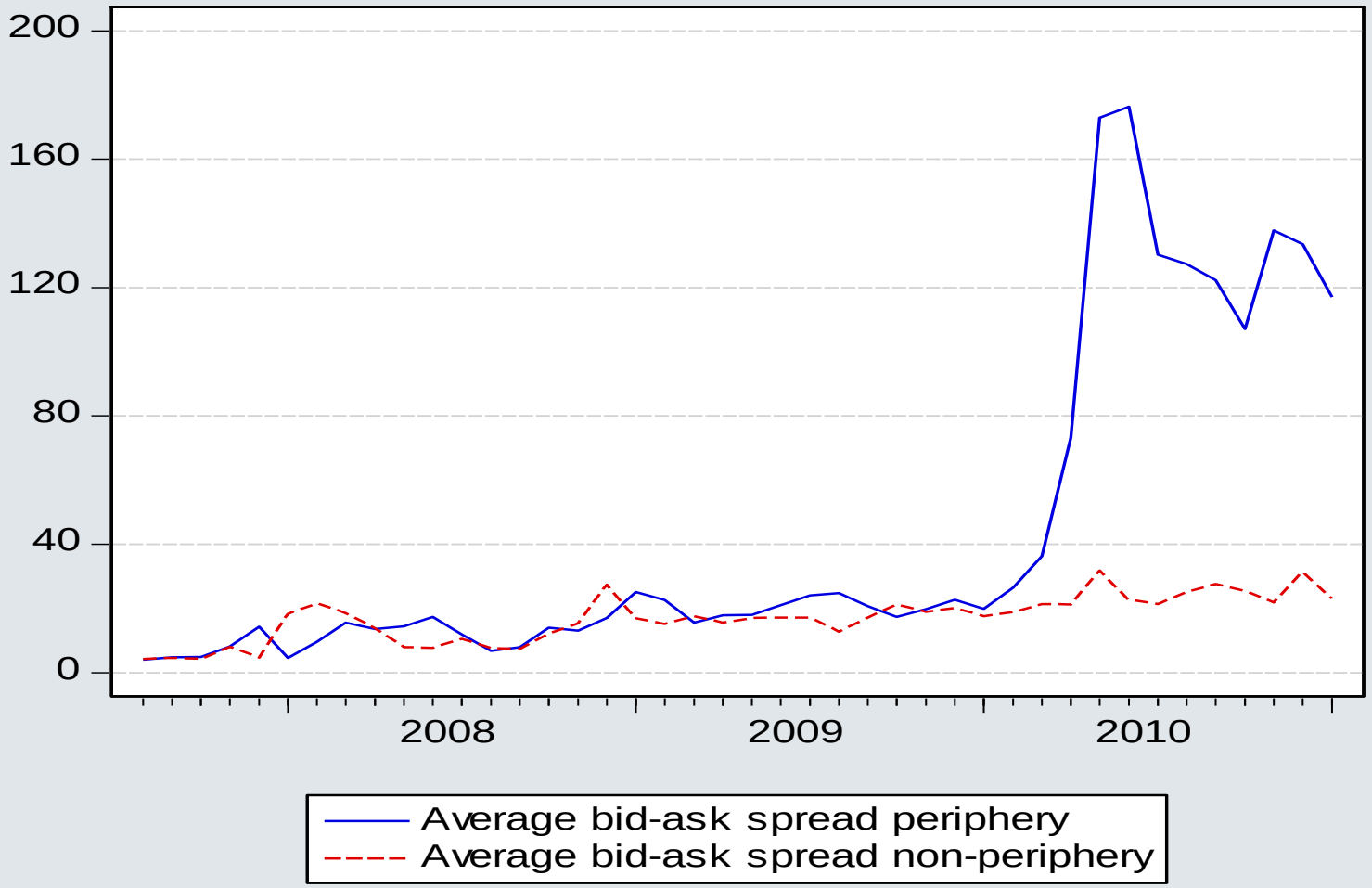
Data (4)



15th Sep 2008, Lehman Brothers bankruptcy.

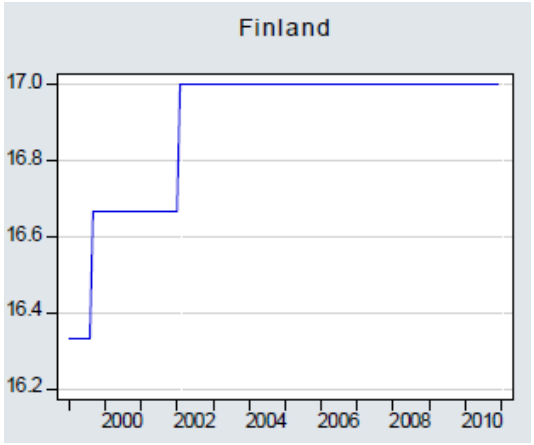
Data (5)

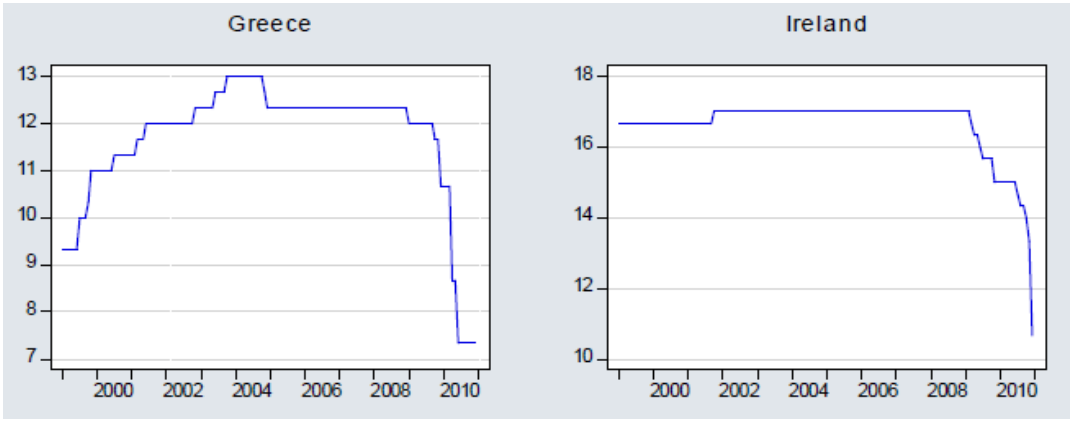
Liquidity: periphery *vs* core (bid-ask spreads)

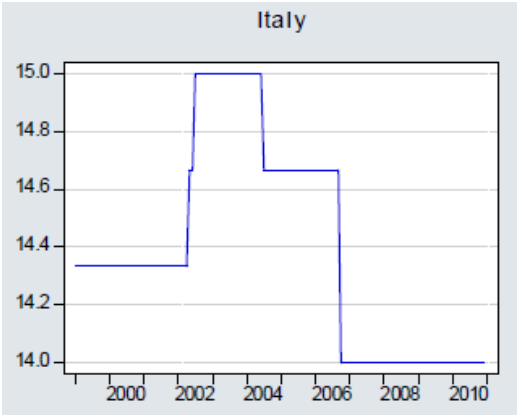


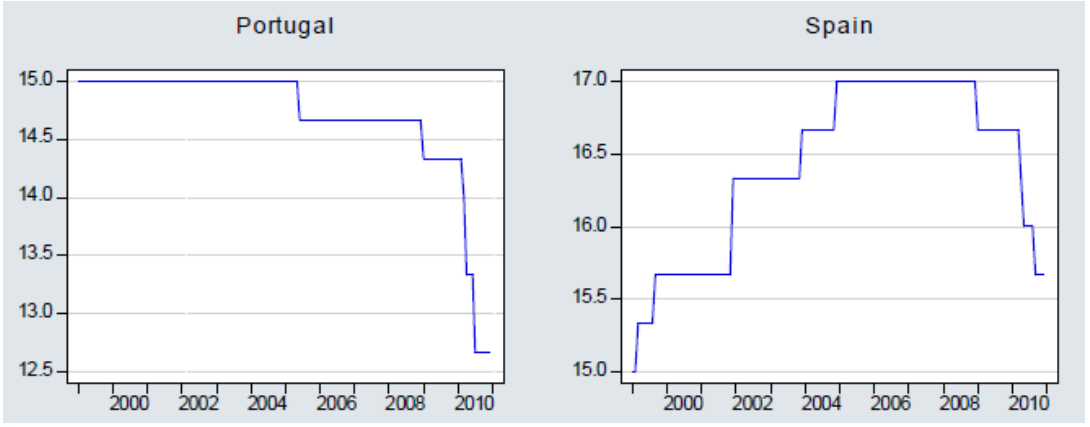
Data (6)

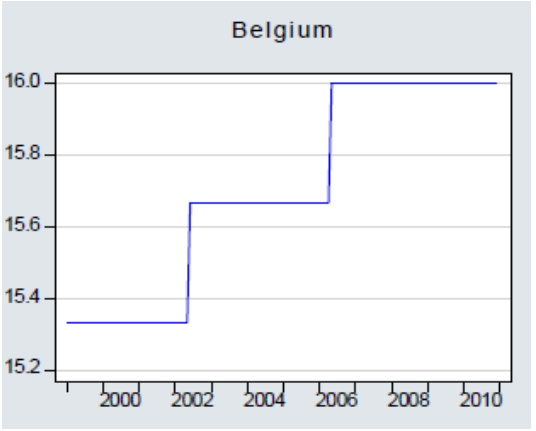
Average credit ratings (scale 1 to 17)









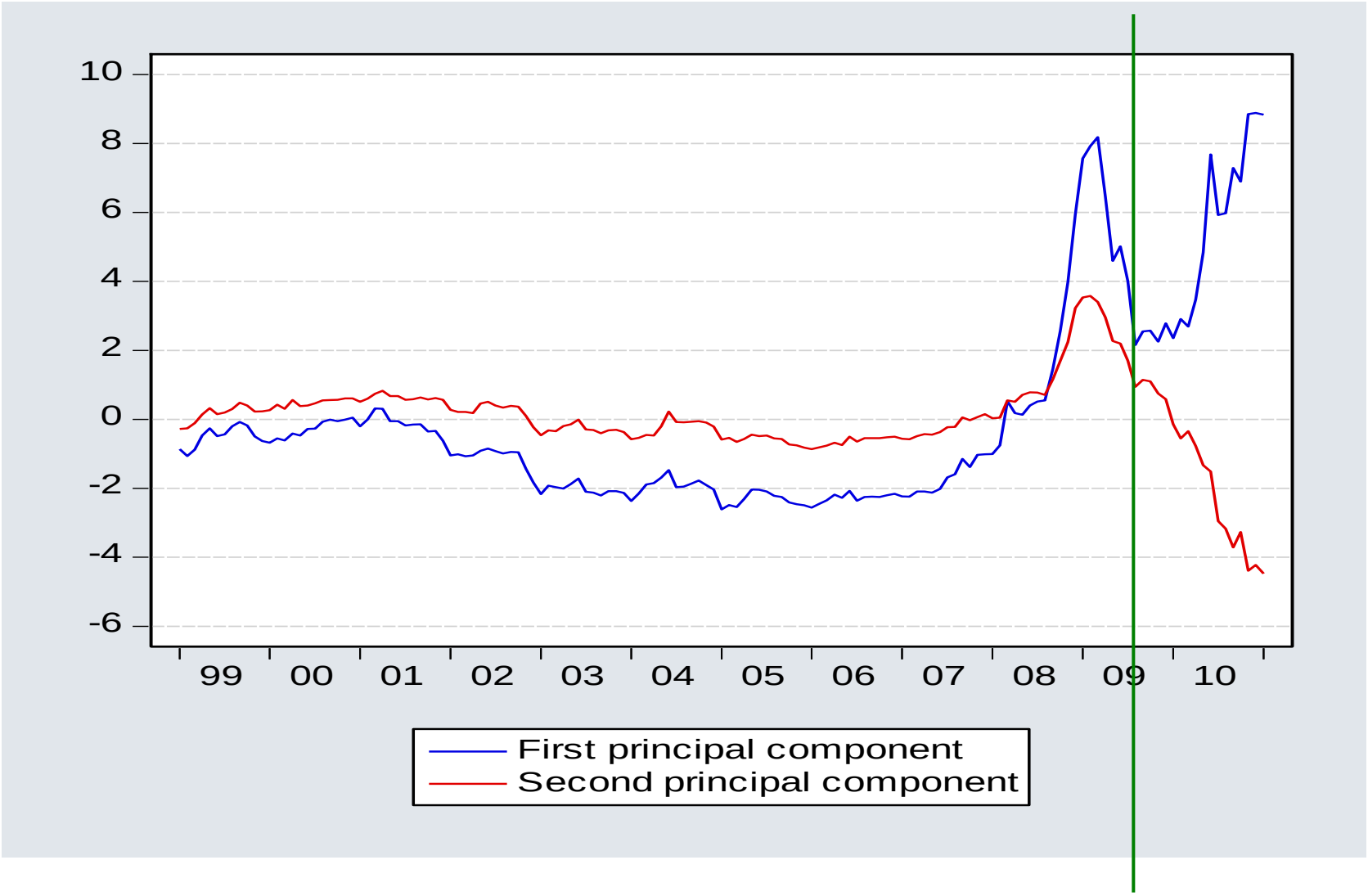


PCA on spreads to capture: % of data variation due to global co-movement across all spreads; variation of data explained by the movement of one group against another [core, periphery].

Nº	Eigenvalues	Cumulative proportion of σ^2	Eigenvectors (Loadings)	*1st principal component*	*2nd principal component*
1	**8.193**	**0.819**	Austria	0.315	**0.330**
2	**1.477**	**0.967**	Belgium	0.343	**0.070**
3	0.121	0.979	Finland	0.278	**0.458**
4	0.058	0.985	France	0.336	**0.160**
5	0.049	0.990	Greece	0.290	**-0.424**
6	0.034	0.993	Ireland	0.323	**-0.265**
7	0.022	0.995	Italy	0.340	**-0.058**
8	0.019	0.997	Netherlands	0.295	**0.422**
9	0.016	0.999	Portugal	0.307	**-0.380**
10	0.011	1.000	Spain	0.327	**-0.273**

Principal components analysis, 1999:01-2011:01; T=145)

Principal components of 10-year government bond yield spreads



proxy for contagion/interdependence: -*pc2*

Panel results (1)

Modelling bond yield spreads (FGLS,for cross-section heteroskedasticity)

	(1)	(2)	(3)	(4)	(5)
spr_{it-1}	0.883 ***	0.885 ***	0.877 ***	0.880 ***	0.865 ***
vix_t	**-0.008**	**-0.008**	**-0.008**		
vix_t*D2007.08$_t$	**0.116 *****	**0.122 *****	**0.130 *****	**0.108 *****	**0.116 *****
vix_t*D2009.03$_t$	**-0.005**	**-0.016**	**-0.018**		
$pc2_t$	-0.024 ***	-0.024 ***	-0.026 ***	-0.022 ***	-0.024 ***
$pc2_t$ *D2007.08$_t$	0.002	-0.002	0.005		
$pc2_t$ *D2009.03$_t$	0.032 ***	0.036 ***	0.030 ***	0.030 ***	0.035 ***
ba_{it}	**0.000**	**0.000**	**0.000**		
ba_{it}*D2007.08$_t$	**0.000**	**0.000**	**0.000**		
ba_{it} *D2009.03$_t$	**0.004 *****	**0.005 *****	**0.005 *****	**0.004 *****	**0.003 *****
q_{it}	0.021	0.029	0.022		
q_{it}*D2007.08$_t$	0.670 ***	0.532 **	0.525 **	0.605 ***	0.686 ***
q_{it} *D2009.03$_t$	0.036	0.136	0.215		
$balance_{it}$	**-0.006 *****	**-0.006 *****	**-0.006 *****	**-0.006 *****	**-0.006 *****
$balance_{it}$ *D2007.08$_t$	**0.002**	**0.003**	**0.004**		
$balance_{it}$ *D2009.03$_t$	**-0.008 ****	**-0.008 ****	**-0.009 ****	**-0.007 ****	**-0.008 *****
$debt_{it}$	0.000	0.000	0.000		
$debt_{it}$ *D2007.08$_t$	0.001 *	0.001 **	0.001 **	0.001 **	0.0003 *
$debt_{it}$ *D2009.03$_t$	0.001 ***	0.001 ***	0.001 ***	0.002 ***	0.001 ***

Panel results (2)

Modelling bond yield spreads (FGLS,for cross-section heteroskedasticity)

	(1)	(2)	(3)	(4)	(5)
$gind_{it}$	**0.000**	**0.000**	**0.000**		
$gind_{it}$ *$D2007.08_t$	**0.000**	**0.000**	**-0.001**		
$gind_{it}$ *$D2009.03_t$	**-0.004 *****	**-0.004 *****	**-0.003 ****	**-0.004 *****	**-0.003 *****
$ltsdebt_{it}$		-0.013	-0.027		
$ltsdebt_{it}$ *$D2007.08_t$		0.279 ***	0.262 ***	0.194 **	0.232 ***
$ltsdebt_{it}$ *$D2009.03_t$		-0.429 ***	-0.390 ***	-0.374 ***	-0.252 **
spr_{it-1}* ba_{it-1}			**-0.001**		
spr_{it-1}* ba_{it-1}*$D2007.08_t$			**0.003**	**0.001 ***	**0.001 ****
spr_{it-1}* ba_{it-1}*$D2009.03_t$			**-0.002 ****	**-0.001 ***	**-0.001 ****
$debt_{it}^2$				1.14E-05 **	0.000
$debt_{it}^2$*$Dper_{it}$					2.99E-05 *
ba_{it}*$D2009.03_t$*$Dper_{it}$					0.002 ***
$debt_{it}$*$D2007.08_t$*$Dper_{it}$					0.001 *
$debt_{it}$*$D2009.03_t$*$Dper_{it}$					0.006 ***
$N*T$	1420	1420	1420	1420	1420
$Adj\text{-}R^2$	0.970	0.971	0.970	0.971	0.972

speculation, pushing prices down?

institutional intervention, pushing prices up?

Main findings (I)

- Prior to 2007 markets priced only expected fiscal balances and high levels of expected **public debt** (the non-linear term).
- Since August 2007 spreads respond to higher global financial volatility and **real exchange rate** appreciation.
- Expected debt (linear term) is priced since August 2007. Since March 2009 the role of **expected debt and fiscal balance** becomes much more pronounced.
- Since March 2009 **contagion** spreads in all EMU countries (*pc2*).
- Since March 2009 spreads increase as a response to a slowdown in **growth**.

Main findings (II)

- Since March 2009 spreads increase in response to tightening bond market **liquidity**.
- The multiplicative term for past spreads and **illiquidity** is statistically significant only during the debt crisis period
  - 2007:8-2009:3, speculation, pushing prices down?
  - 2009:04-2010:12, institutional intervention, pushing prices up? (ECB Securities Markets Programme, since May 2010)
- During 2007:08-2009:02 lower **long-term debt issuance** is associated with lower yield spreads (markets did not penalise in that period the shift to lower debt maturity).
- After March 2009 this reverses: higher share of long-term debt is associated with lower spreads, and the multiplicative term suggests additional demand for sovereign bonds.
- This may be due to institutional intervention without which spreads would have been even higher.

Modelling bond yield spreads: the relevance of credit ratings and credit outlook announcements

	(1)	(2)	(3)	(4)
	S&P	Moody's	Fitch	**Average**
$rating_{it}$	-0.578 ***	-0.822 ***	-0.583 ***	**-0.925 *** **
*N*T*	1440	1440	1440	**1440**
Adj-R^2	0.466	0.366	0.344	**0.556**

	(5)	(6)	(7)	(8)
	S&P	Moody's	Fitch	**Average**
$outlook_{it}$	-0.506 ***	-0.300 ***	-0.611 ***	**-0.931 *** **
*N*T*	1440	1440	1440	**1440**
Adj-R^2	0.205	0.155	0.146	**0.230**

Fixed effects panel estimates, Feasible Generalised Least Squares cross-section weights, which account for cross-sectional heteroskedasticity. ***, **, * indicate significance at the 1, 5, 10% level respectively.

Yield spreads and ratings (FGLS,for cross-section heteroskedasticity)

	(1)	(2)	(3)	(4)	(5)
spr_{it-1}	0.812 ***	0.807 ***	0.856 ***	0.856 ***	0.800 ***
vix_t	-0.002		-0.006		
vix_t*$D2007.08_t$	0.120 ***	0.124 ***	0.132 ***	0.109 ***	0.122 ***
vix_t*$D2009.03_t$	0.001		-0.022		
$pc2_t$	-0.032 ***	-0.029 ***	-0.030 ***	-0.025 ***	-0.031 ***
$pc2_t$ *$D2007.08_t$	0.001		0.008		
$pc2_t$ *$D2009.03_t$	0.040 ***	0.040 ***	0.029 ***	0.034 ***	0.041 ***
ba_{it}	0.000		0.000		
ba_{it}*$D2007.08_t$	0.000		0.000		
ba_{it} *$D2009.03_t$	0.005 ***	0.004 ***	0.004 ***	0.004 ***	0.004 ***
q_{it}	0.047		0.000		
q_{it}*$D2007.08_t$	0.523 **	0.560 ***	0.735 ***	0.531 ***	0.554 ***
q_{it} *$D2009.03_t$	-0.147		-0.219		
$balance_{it}$	-0.007 ***	-0.005 ***	-0.007 ***	-0.006 ***	-0.004 ***
$balance_{it}$ *$D2007.08_t$	0.000		0.005 *		
$balance_{it}$ *$D2009.03_t$	-0.013 ***	-0.013 ***	-0.005		-0.012 ***
$debt_{it}$	-0.001		0.000		
$debt_{it}$ *$D2007.08_t$	0.000		0.001 ***	0.001 **	
$debt_{it}$ *$D2009.03_t$	0.001		0.001 ***	0.002 ***	

Yield spreads and ratings (FGLS,for cross-section heteroskedasticity)

The ratings (3)

$gind_{it}$	0.000		0.000		
$gind_{it}$ *$D2007.08_t$	0.000		0.000		
$gind_{it}$ *$D2009.03_t$	-0.002	-0.002 **	-0.003 **	-0.003 ***	-0.002 **
$ltsdebt_{it}$	0.059		-0.033		
$ltsdebt_{it}$ *$D2007.08_t$	0.188 *	0.233 ***	0.234 **	0.213 ***	0.233 ***
$ltsdebt_{it}$ *$D2009.03_t$	-0.324 ***	-0.292 ***	-0.398 ***	-0.406 ***	-0.293 ***
spr_{it-1}* ba_{it-1}	0.001		-0.001		
spr_{it-1}* ba_{it-1}*$D2007.08_t$	0.001	0.002 ***	0.003	0.001 **	0.002 ***
spr_{it-1}* ba_{it-1}*$D2009.03_t$	-0.002 ***	-0.002 ***	-0.002 **	-0.001 **	-0.002 ***
$debt_{it}^2$	1.05E-05 *		1.17E-05 **	1.15E-05 **	
average rating$_{it}$	-0.037 ***	-0.027 ***			-0.032 ***
average rating$_{it}$ *D2007.08$_t$	-0.019 **	-0.015 ***			-0.016 ***
average rating$_{it}$ *D2009.03$_t$	-0.031 ***	-0.039 ***			-0.037 ***
average outlook$_{it}$			-0.003		-0.028 **
*average outlook$_{it}$ *D2007.08$_t$*			-0.095 *		
*average outlook$_{it}$ *D2009.03$_t$*			-0.069	-0.168 ***	
*N*T*	1420	1420	1420	1420	1420
Adj-R^2	0.972	0.972	0.971	0.971	0.972

Main findings

- Credit ratings, and to a smaller extent outlook announcements, are significant.
- The main spreads' drivers, macro and fiscal fundamentals, contagion, international risk and liquidity, also remain statistically significant.
- Sovereign ratings' announcements were more relevant after March 2009.
- In practice this suggests bidirectional causality between yield spreads and ratings.

Determinants of ratings (1)

	(1)	(2)	(3)	(4)	
	Average rating		S&P		
vix$_t$	**0.100 *****	**0.089 *****	**0.126 *****	**0.099 *****	mispricing
*vix$_t$*D2007.08$_t$*	-0.015		-0.004		
*vix$_t$*D2009.03$_t$*	-0.251 **	-0.255 ***	-0.571 ***	-0.541 ***	pricing ok
pc2$_t$	0.021		0.013		
*pc2$_t$ *D2007.08$_t$*	-0.016		0.018		
*pc2$_t$ *D2009.03$_t$*	-0.045 *	-0.037 ***	-0.105 ***	-0.072 ***	
ba$_{it}$	0.000		0.014 ***	0.014 ***	
*ba$_{it}$*D2007.08$_t$*	0.001		-0.013 ***	-0.013 ***	
*ba$_{it}$ *D2009.03$_t$*	-0.010 ***	-0.009 ***	-0.015 ***	-0.014 ***	
q$_{it}$	**1.118 *****	**1.191 *****	0.260		mispricing
*q$_{it}$*D2007.08$_t$*	-0.189		-0.312		
*q$_{it}$ *D2009.03$_t$*	-7.400 ***	-7.226 ***	-12.086 ***	-11.65 ***	pricing ok
balance$_{it}$	-1.90E-05		-0.047 ***	-0.047 ***	
*balance$_{it}$ *D2007.08$_t$*	-0.044 ***	-0.043 ***	-0.002		pricing ok
*balance$_{it}$ *D2009.03$_t$*	**0.024 ******	**0.030 *****	**0.039 ******	**0.039 *****	
debt$_{it}$	**-0.023 *****	**-0.021 *****	**-0.019 *****	**-0.020 *****	
*debt$_{it}$ *D2007.08$_t$*	-0.006 ***	-0.007 ***	-0.008 ***	-0.008 ***	
*debt$_{it}$ *D2009.03$_t$*	-0.002		0.000		
gind$_{it}$	0.003 *		-0.004 *	-0.004 **	
*gind$_{it}$ *D2007.08$_t$*	-0.005		0.003		pricing ok
*gind$_{it}$ *D2009.03$_t$*	0.013 ***	0.010 ***	0.019 ***	0.022 ***	
ltsdebt$_{it}$	**3.003 *****	**2.951 *****	**2.967 *****	**2.870 *****	
*ltsdebt$_{it}$ *D2007.08$_t$*	-2.085 ***	-2.300 ***	-1.610 ***	-1.381 ***	
*ltsdebt$_{it}$ *D2009.03$_t$*	-0.293		0.142		
debt$_{it}^2$	1.29E-05		2E-04 ***	2E-04 ***	
*N*T*	1430	1430	1430	1430	
Adj- R^2	0.963	0.964	0.930	0.930	

Main findings

- Credit rating model very similar to bond market pricing model.
- 1999:01-2007:07, not pricing, or even mispricing, of risk factors. Only expected debt, squared debt and share of long-term debt properly priced.
- 2007:08-2009:02, lack of pricing or mispricing.
- 2009:03-2010:12, all risk factors correctly priced.
- To some degree, credit rating agencies may lead markets, but they themselves also follow markets.

i) The 2nd principal component of yield spreads, including GR, PT, SP, IR, IT, captures the risk involved in investing in periphery relative to core countries. Starting from early 2009, the two groups decoupled, with the risk of periphery countries increasing rapidly.

ii) Since August 2007, higher global financial volatility and real exchange rate appreciation have been associated with higher spreads.

iii) Since March 2009 bond yield spreads increase as a response to a slowdown in growth and tightening bond market liquidity (higher bid-ask spreads).

iv) Expected government debt ratio starts being positively reflected in spreads since August 2007, and in line with the expected budget balance finding, the response of spreads to debt becomes much more pronounced since March 2009.

v) The relationship between spreads and debt is non-linear, especially for the so-called periphery countries.

vi) Summer of 2007, spring of 2009, the decrease in long-term debt issuance in most euro area countries was associated with lower yield spreads, while since March 2009 the relationship between the two variables reverses.

vii) After March 2009 spreads were shortly lower as compared to what the increasingly stressed bond market conditions would imply, suggesting additional demand for sovereign bonds, after accounting for all other determinants (institutional intervention in the sovereign bonds' markets?).

viii) Credit ratings are statistically significant in explaining spreads.

ix) In the pre-crisis period rating agencies have not reacted to macro and fiscal developments (budgetary imbalances, growth conditions), a behaviour that changed after March 2009.

Ratings

Sovereign credit rating in the euro area countries (17 May 2012)

Characterization of debt and issuer	Ratings					
	S&P	Countries	Moody's	Countries	Fitch	Countries
Highest quality	AAA	DE, FI, LU, NL	Aaa	AT, DE, FI, FR, LU, NL	AAA	AT, DE, FI, FR, LU, NL
High quality	AA+	AT, BE, FR	Aa1		AA+	ES
	AA	BE	Aa2		AA	BE, SI
	AA-	EE	Aa3	BE	AA-	
Strong payment capacity	A +	SI	A1	EE	A+	EE, MT, SK
	A	CY, SK	A2	CY, SI, SK	A	ES, SI
	A-	MT	A3	ES, IT, MT	A-	IT
Adequate payment capacity	BBB+	ES, IE, IT	Baa1		BBB+	IE
	BBB		Baa2		BBB	
	BBB-		Baa3		BBB-	CY
Likely to fulfil obligations	BB+	CY	Ba1	CY, IE	BB+	PT
	BB	PT	Ba2		BB	
	BB-		Ba3	PT	BB-	
High credit risk	B+		B1		B+	
	B		B2		B	
	B-		B3		B-	GR
Very high credit risk	CCC	GR	Caa1		CCC	
Default			C	GR	C	

Ratings scale

Characterization of debt and issuer (source: Moody's)		Rating			
		S&P	Moody's	Fitch	Scale
Highest quality	Investment grade	**AAA**	**Aaa**	**AAA**	**17**
High quality		**AA+**	**Aa1**	**AA+**	**16**
		AA	**Aa2**	**AA**	**15**
		AA-	**Aa3**	**AA-**	**14**
Strong payment capacity		**A+**	**A1**	**A+**	**13**
		A	**A2**	**A**	**12**
		A-	**A3**	**A-**	**11**
Adequate payment capacity		BBB+	Baa1	BBB+	10
		BBB	Baa2	BBB	9
		BBB-	Baa3	BBB-	8
Likely to fulfil obligations, ongoing uncertainty	Speculative grade	BB+	Ba1	BB+	7
		BB	Ba2	BB	6
		BB-	Ba3	BB-	5
High credit risk		B+	B1	B+	4
		B	B2	B	3
		B-	B3	B-	2
Very high credit risk		CCC+	Caa1	CCC+	1
		CCC	Caa2	CCC	
		CCC-	Caa3	CCC-	
Near default with possibility of recovery		CC	Ca	CC	
				C	
Default		SD	C	DDD	
		D		DD	
				D	

Determinants of ratings (2)

	(5) Moody's	(6) Moody's	(7) Fitch	(8) Fitch	
vix_t	0.032	0.054 ***	0.046	0.081 ***	mispricing
vix_t*$D2007.08_t$	0.031		0.024		
vix_t*$D2009.03_t$	-0.286 ***	-0.306 ***	-0.174	-0.164 **	pricing ok
$pc2_t$	0.000		-0.036		
$pc2_t$ *$D2007.08_t$	-0.021		0.039		
$pc2_t$ *$D2009.03_t$	-0.039	-0.069 ***	-0.012		
ba_{it}	-0.003 **	-0.002 **	-0.004 ***	-0.002 *	
ba_{it}*$D2007.08_t$	0.002		0.004 *		
ba_{it} *$D2009.03_t$	-0.006 ***	-0.006 ***	-0.007 ***	-0.005 ***	
q_{it}	1.619 ***	1.263 ***	1.582 ***	1.519 ***	mispricing
q_{it}*$D2007.08_t$	-0.905		0.529		
q_{it} *$D2009.03_t$	-7.402 ***	-8.937 ***	-5.385 ***	-4.247 ***	pricing ok
$balance_{it}$	0.010		0.017 **	0.020 ***	
$balance_{it}$ *$D2007.08_t$	-0.005		-0.046 ***	-0.042 ***	pricing ok
$balance_{it}$ *$D2009.03_t$	0.006		0.051 ***	0.046 ***	
$debt_{it}$	-0.010 ***	-0.010 ***	-0.029 ***	-0.028 ***	
$debt_{it}$ *$D2007.08_t$	0.001	0.002 **	-0.005 ***	-0.004 ***	
$debt_{it}$ *$D2009.03_t$	-0.003 *	-0.003 **	0.002		
$gind_{it}$	0.004 **		0.003		
$gind_{it}$ *$D2007.08_t$	-0.007 *		-0.005		pricing ok
$gind_{it}$ *$D2009.03_t$	0.011 **	0.008 ***	0.014 **	0.011 ***	
$ltsdebt_{it}$	1.731 ***	1.553 ***	2.267 ***	2.364 ***	
$ltsdebt_{it}$ *$D2007.08_t$	-0.713 **	-0.918 ***	-2.183 ***	-2.014 ***	
$ltsdebt_{it}$ *$D2009.03_t$	-0.280		-1.00 **	-1.145 ***	
$debt_{it}^2$	-1E-04 ***	-1E-04 ***	-3E-04 ***	-4E-04 ***	
$N*T$	1430	1430	1430	1430	
Adj- R^2	0.950	0.953	0.952	0.952	

Panel results (1.1)

Modelling bond yield spreads (2SLS)

	(1)	(2)	(3)	(4)
spr_{it-1}	0.890 ***	0.890 ***	0.871 ***	0.880 ***
vix_t	0.007	0.006	0.004	
vix_t*$D2007.08_t$	0.078 **	0.090 **	0.094 **	0.150 ***
vix_t*$D2009.03_t$	0.078	0.063	0.061	
$pc2_t$	0.001	0.002	-0.003	
$pc2_t$ *$D2007.08_t$	-0.030 *	-0.037 **	-0.032 **	-0.029 ***
$pc2_t$ *$D2009.03_t$	0.047 ***	0.054 ***	0.055 ***	0.064 ***
ba_{it}	0.000	0.000	0.000	
ba_{it}*$D2007.08_t$	0.001	0.000	0.000	
ba_{it} *$D2009.03_t$	0.003 ***	0.004 ***	0.004 ***	0.005 ***
q_{it}	-0.154	-0.176 *	-0.160	-0.220 ***
q_{it}*$D2007.08_t$	0.239	0.326	0.045	
q_{it} *$D2009.03_t$	1.044	1.059	1.541 **	3.403 ***
$balance_{it}$	-0.008 ***	-0.007 ***	-0.006 ***	-0.005 **
$balance_{it}$ *$D2007.08_t$	0.003	0.003	0.004	
$balance_{it}$ *$D2009.03_t$	-0.011 **	-0.009 **	-0.010 **	
$debt_{it}$	0.000	0.000	0.000	
$debt_{it}$ *$D2007.08_t$	0.000	0.000	0.000	
$debt_{it}$ *$D2009.03_t$	0.002 ***	0.002 ***	0.002 ***	0.002 ***

Panel results (1.2)

Modelling bond yield spreads (2SLS)

	(1)	(2)	(3)	(4)
$gind_{it}$	0.000	0.000	0.000	
$gind_{it}$ *$D2007.08_t$	-0.003	-0.004	-0.004 *	-0.003 ***
$gind_{it}$ *$D2009.03_t$	0.000	0.000	0.001	
$ltsdebt_{it}$		-0.032	-0.042	
$ltsdebt_{it}$ *$D2007.08_t$		0.349 ***	0.355 ***	0.346 **
$ltsdebt_{it}$ *$D2009.03_t$		-0.504 ***	-0.510 ***	-0.577 ***
spr_{it-1}* ba_{it-1}			-0.001	
spr_{it-1}* ba_{it-1}*$D2007.08_t$			0.003	
spr_{it-1}* ba_{it-1}*$D2009.03_t$			-0.002 *	
$N*T$	1420	1420	1420	1420
$Adj\text{-}R^2$	0.97	0.97	0.97	0.97

institutional intervention, pushing prices up?

Yield spreads and ratings (2SLS)

The ratings (2.1)

	(1)	(2)
spr_{it-1}	0.799 ***	0.745 ***
vix_t	0.016	
vix_t*$D2007.08_t$	0.116 ***	0.289 ***
vix_t*$D2009.03_t$	0.043	
$pc2_t$	-0.009	
$pc2_t$ *$D2007.08_t$	-0.021	
$pc2_t$ *$D2009.03_t$	0.044 ***	0.046 ***
ba_{it}	-0.001	-0.003 ***
ba_{it}*$D2007.08_t$	0.000	
ba_{it} *$D2009.03_t$	0.004 ***	0.005 ***
q_{it}	-0.146	-0.417 ***
q_{it}*$D2007.08_t$	0.801	2.001 ***
q_{it} *$D2009.03_t$	-0.586	
$balance_{it}$	-0.008 ***	-0.012 ***
$balance_{it}$ *$D2007.08_t$	-0.001	
$balance_{it}$ *$D2009.03_t$	-0.021 ***	-0.018 ***
$debt_{it}$	-0.001	
$debt_{it}$ *$D2007.08_t$	0.000	
$debt_{it}$ *$D2009.03_t$	0.000	

	(1)	(2)
$gind_{it}$	-0.001	
$gind_{it}$ *$D2007.08_t$	-0.002	
$gind_{it}$ *$D2009.03_t$	0.002	
$ltsdebt_{it}$	0.065	
$ltsdebt_{it}$ *$D2007.08_t$	0.260 **	0.882 ***
$ltsdebt_{it}$ *$D2009.03_t$	-0.379 ***	-1.561 ***
spr_{it-1}* ba_{it-1}	0.005	0.006 ***
spr_{it-1}* ba_{it-1}*$D2007.08_t$	-0.001	
spr_{it-1}* ba_{it-1}*$D2009.03_t$	-0.003 *	-0.006 ***
$debt_{it}^2$	0.000	1.11E-05 *
$average\ rating_{it}$	-0.032 **	-0.024 **
$average\ rating_{it}$ *$D2007.08_t$	-0.018	
$average\ rating_{it}$ *$D2009.03_t$	-0.046 ***	-0.100 ***
$average\ outlook_{it}$	-0.014	
$average\ outlook_{it}$ *$D2007.08_t$	0.024	
$average\ outlook_{it}$ *$D2009.03_t$	0.051	
$N*T$	1420	1420
$Adj\text{-}R^2$	0.97	0.97

During a briefing by academics at the London School of Economics on the turmoil on the international markets and the credit crunch the Queen asked: (Nov. 2008)

"Why did nobody notice it?”