The Systemic Risk of European Banks during the Financial and Sovereign Debt Crises

Lamont Black, Ricardo Correa, Xin Huang and Hao Zhou

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Motivation

- The financial crisis raised the issue of systemic risk
- Europe is now in a sovereign debt crisis
- European banks are tied to the crisis both by cause and effect
- A systemic event in the European banking system would have global implications
- Can we measure the systemic risk of European banks and understand what drives it?

Methodology

- This paper derives a "**distress insurance premium**" (DIP): the hypothetical cost of insuring against the default of a significant share of banks' total liabilities

- Integrates the main components of systemic risk: **default risk**, **interconnectedness**, and **size**

- Results in an aggregate systemic risk indicator for European banks based on each bank's contribution

Interesting Questions

- How high is the systemic risk and how is it changing over time?
- What is driving systemic risk of European banks during these crises?
  - Default risk? Liquidity risk? Sovereign risk?
- Which European banks contribute the most to systemic risk?
- How does our measure compare with other measures?

Preview of Findings

- Systemic risk of European banks is **greater now** than it was during the financial crisis

- Determinants of systemic risk **differ** between the crises

- Focus of the financial crisis was money-center banks, but smaller banks in some countries have become systemically important **as a group**

European Bank Sample

- Sample includes 58 major European banks from EBA stress test

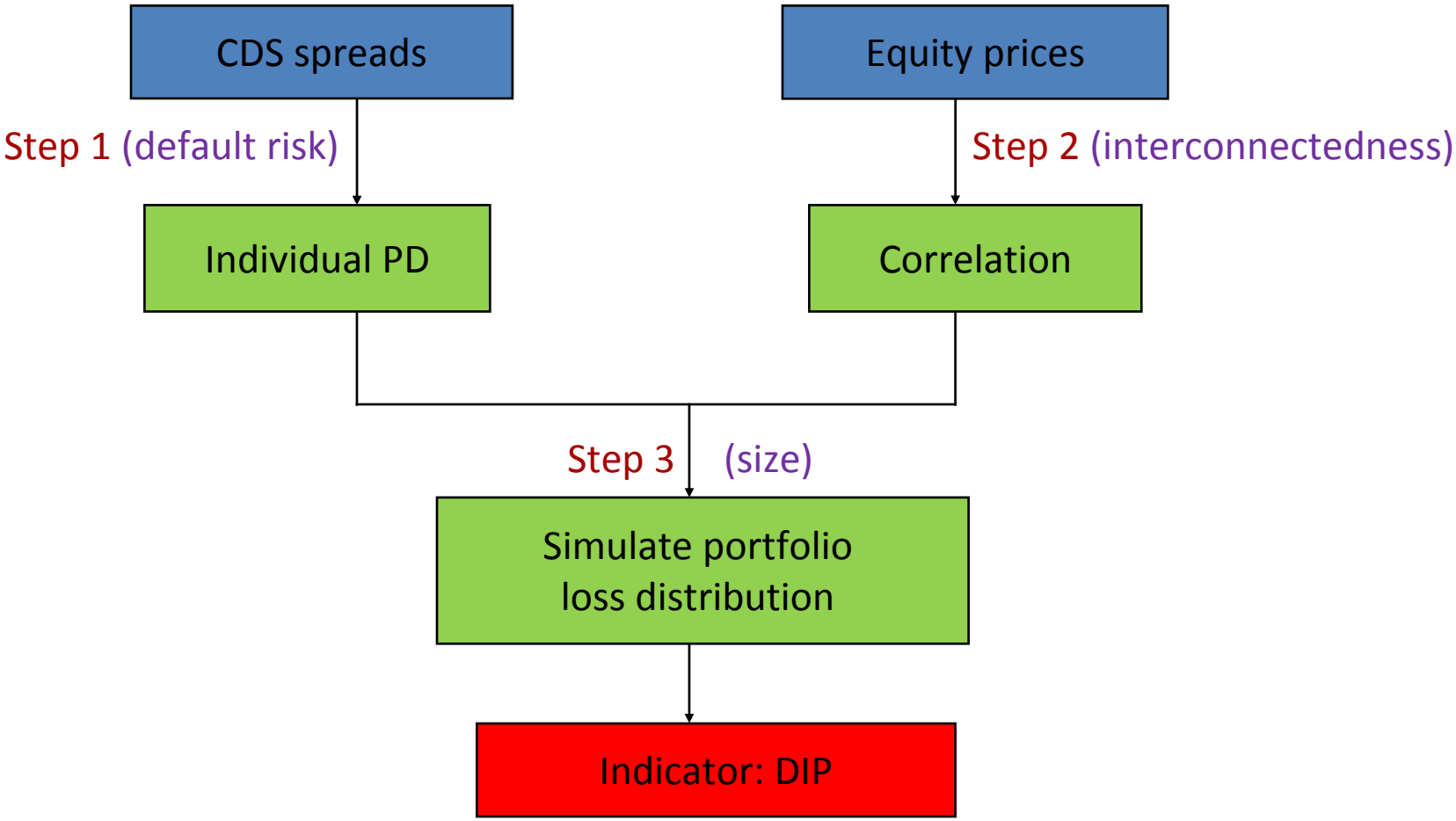
	Assets (EUR billions)	Share of banking sector assets
Austria	257	22%
Belgium	884	77%
Denmark	420	46%
France	5,403	81%
Germany	2,908	36%
Greece	318	75%
Ireland	383	32%
Italy	2,041	73%
Luxembourg	84	11%
Netherlands	1,371	48%
Norway	271	53%
Portugal	140	21%
Spain	2,153	55%
Sweden	1,273	79%
Switzerland	1,883	81%
United Kingdom	7,810	70%
Total	27,598	58%
Total European bank assets	47,658	

European Banks (Groupings)

- Sample covers January 2005 to February 2012

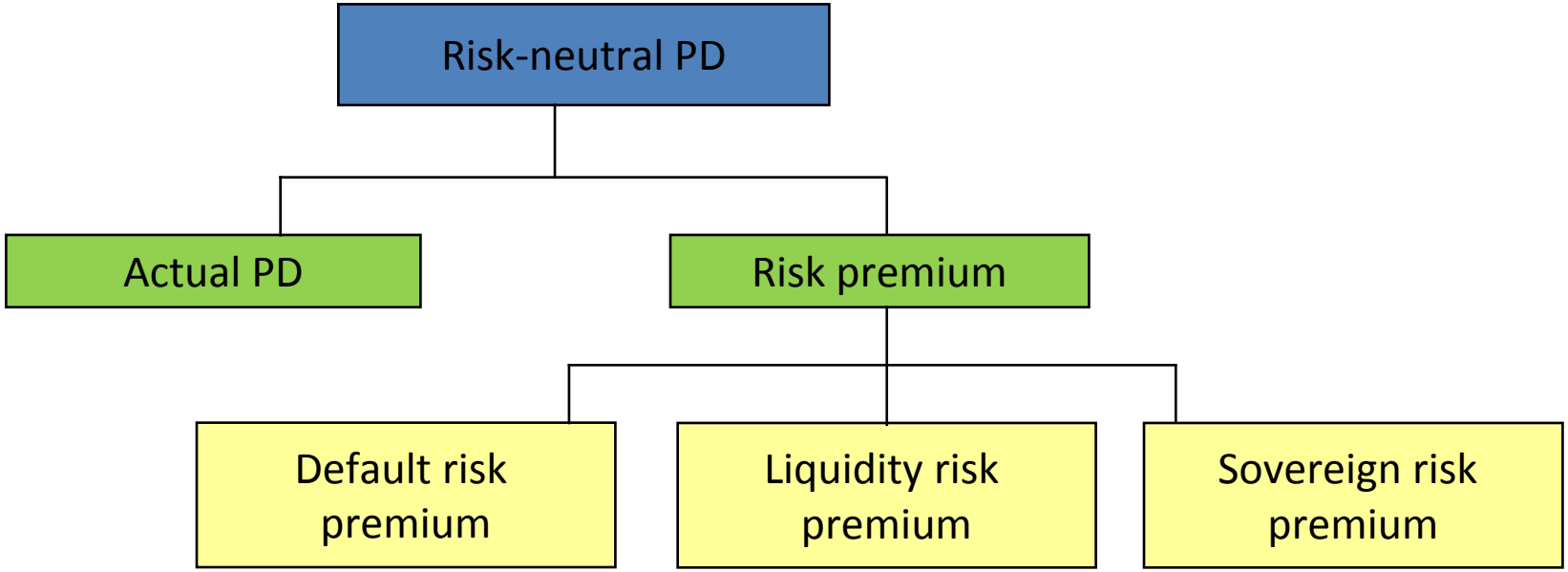
Group	Countries	Total Equity[1]	Total Liability[1]	Average CDS spreads[2]		
				Period 1	Period 2	Period 3
1	FR	148.53	4779.28	9.19	83.41	170.93
2	GE	61.30	2958.23	13.61	95.89	148.56
3	GB	254.31	7145.57	8.20	111.31	169.38
4	SZ	47.64	2129.78	5.22	116.79	126.43
5	AS,BE,LX,NE	81.51	2640.94	11.45	136.98	243.69
6	IT,SP	242.23	3470.32	6.00	104.65	274.75
7	GR,IR,PO	48.01	877.08	12.87	292.15	995.17
8	DE,NO,SW	63.50	1575.25	9.01	90.39	113.64
Mean		118.38	3197.06	9.44	128.95	280.32
Median		72.51	2799.58	9.10	107.98	170.15

Methodology for Distress insurance premium (DIP)



Step 1: Probability of Default

- Estimating PDs from CDS spreads
  - Standard exercise in the literature
  - PDs are *risk-neutral* and *forward-looking*



Step 2: Interconnectedness

- Estimate asset return correlations using equity returns as a proxy (Hull and White 2004)
- Calculate time-varying pair-wise bank equity correlations (within and across country)

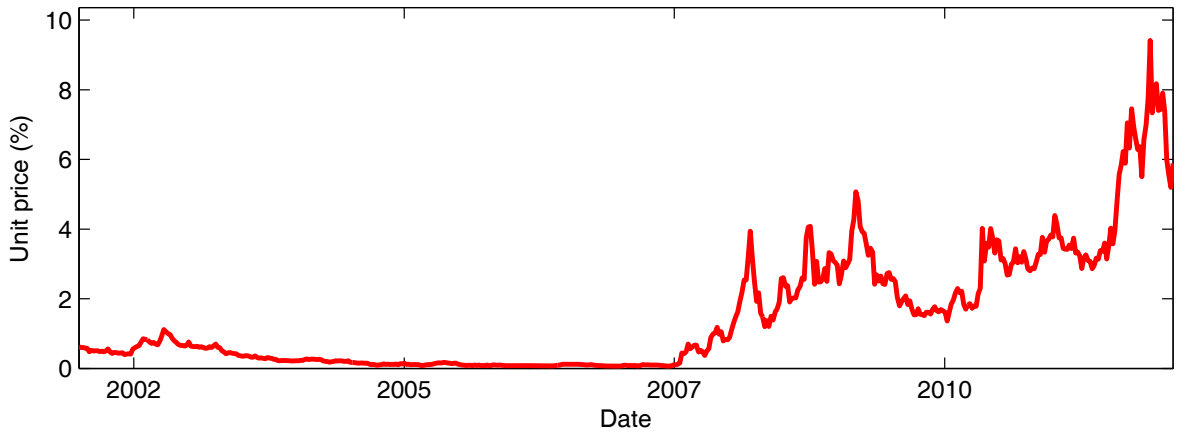
Step 3: Potential Losses (Size)

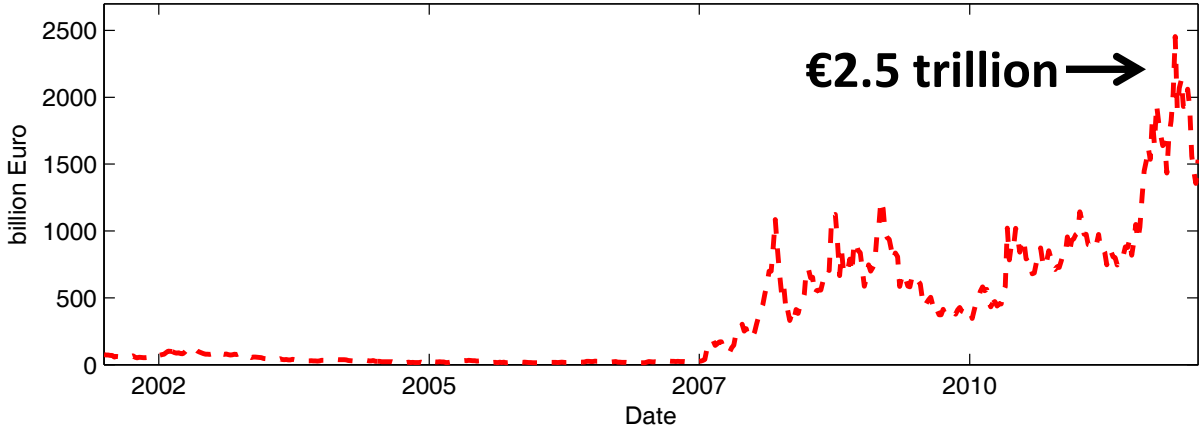
- Simulate (risk-neutral) portfolio loss distribution
  - From steps 1 and 2: PDs and correlations
  - Step 3: Amount of liabilities at risk (size)

$$\mathrm{DIP} = \mathrm{E}^{Q}\left[L | L \geq L_{\min}\right]$$

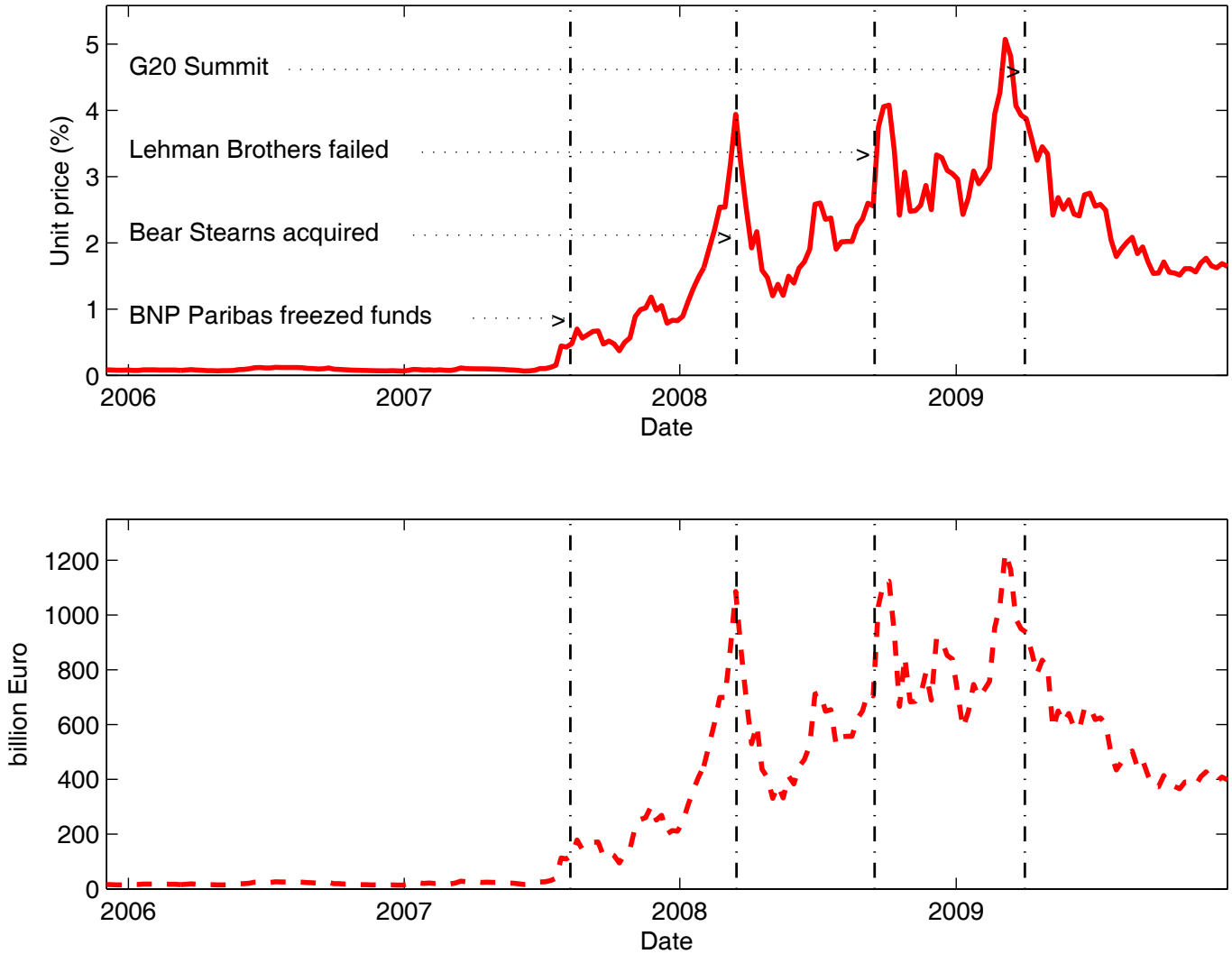
- Similar to "expected shortfall" but with a **threshold** : At least 10 percent of total liabilities of the banking system expected to default

A Systemic Risk Indicator for European Banks

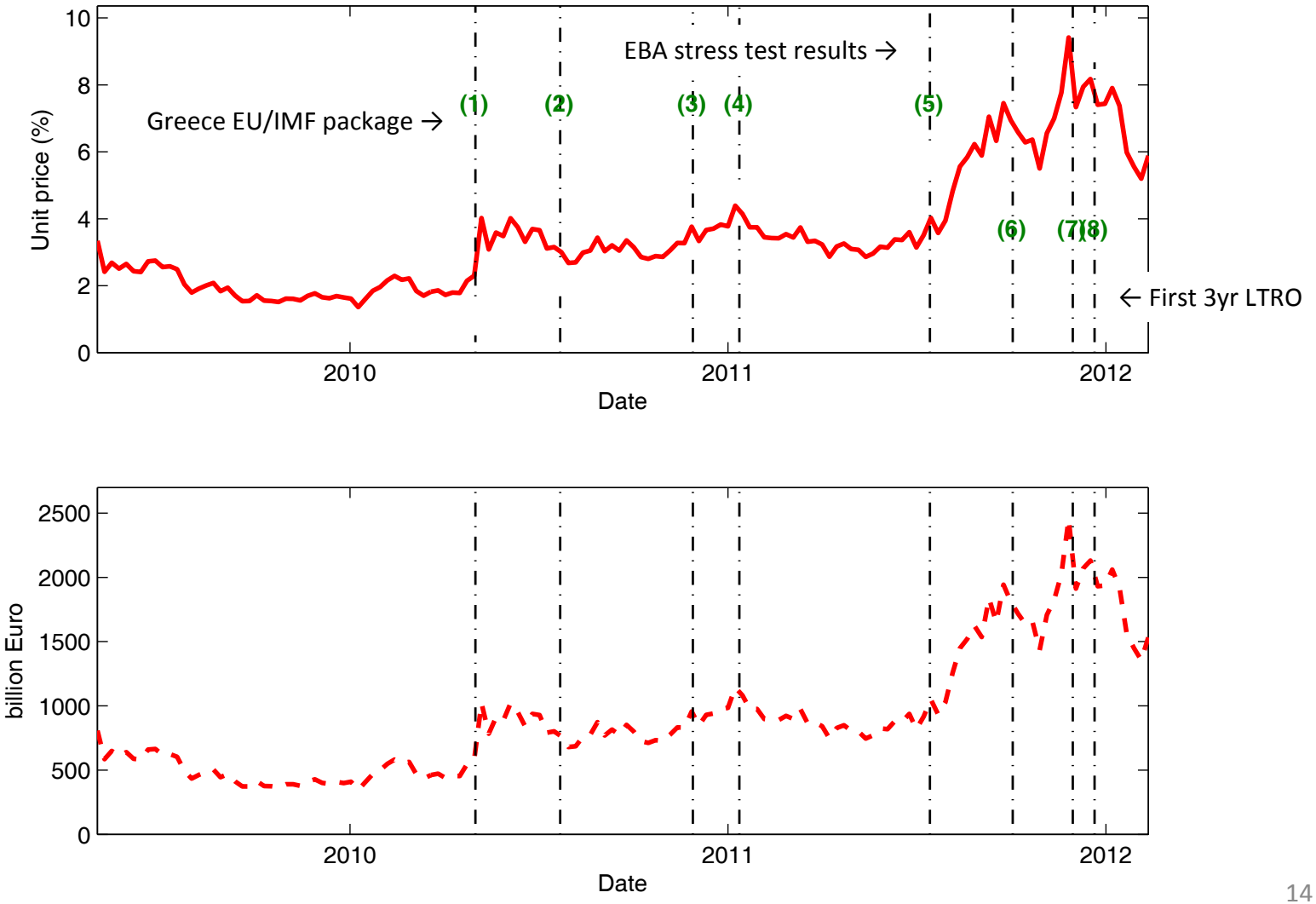




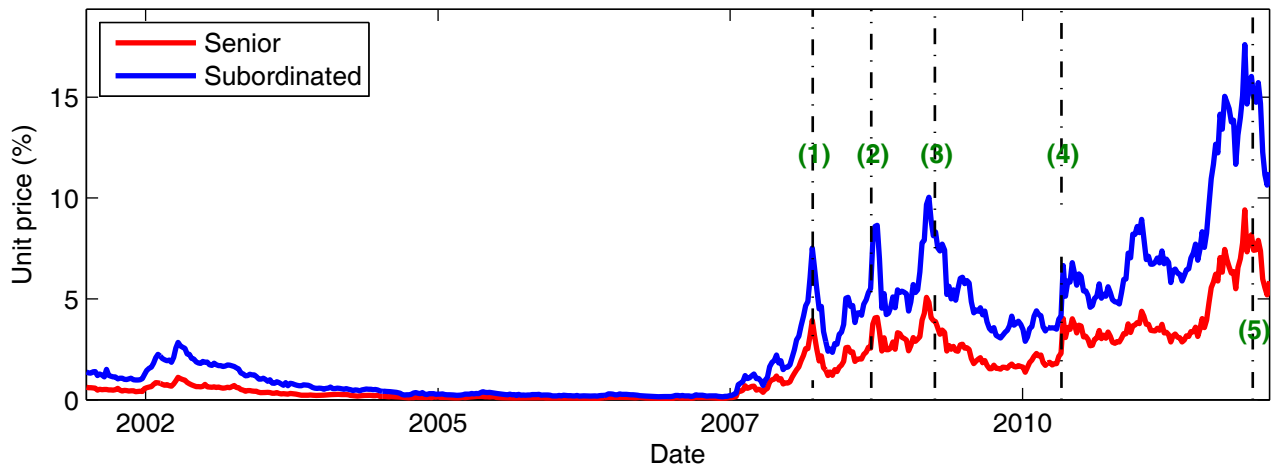
European Banks' Systemic Risk – Financial Crisis

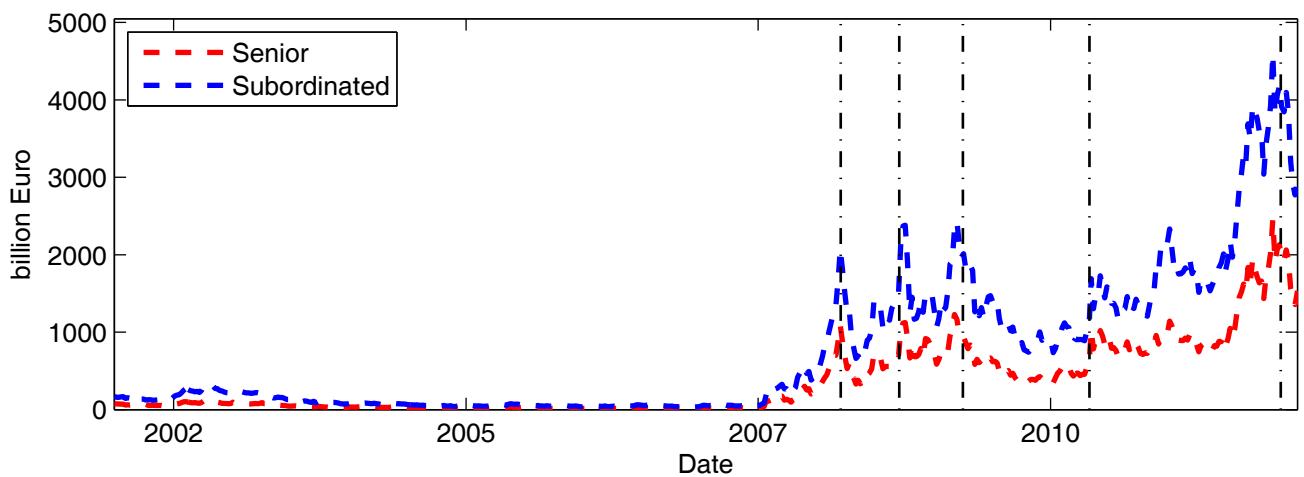


European Banks' Systemic Risk – Sovereign Debt Crisis

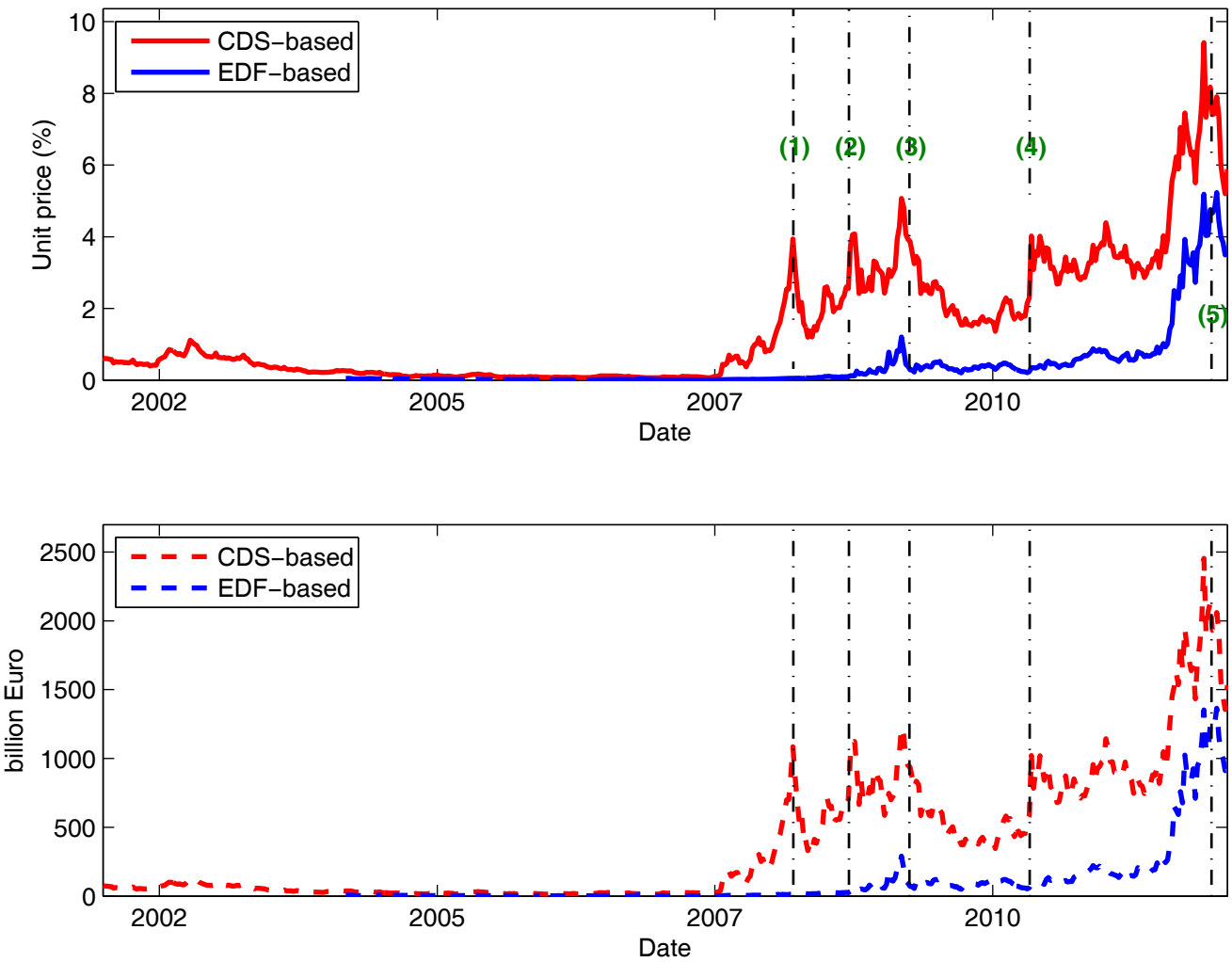


Systemic Risk based on Subordinated Debt

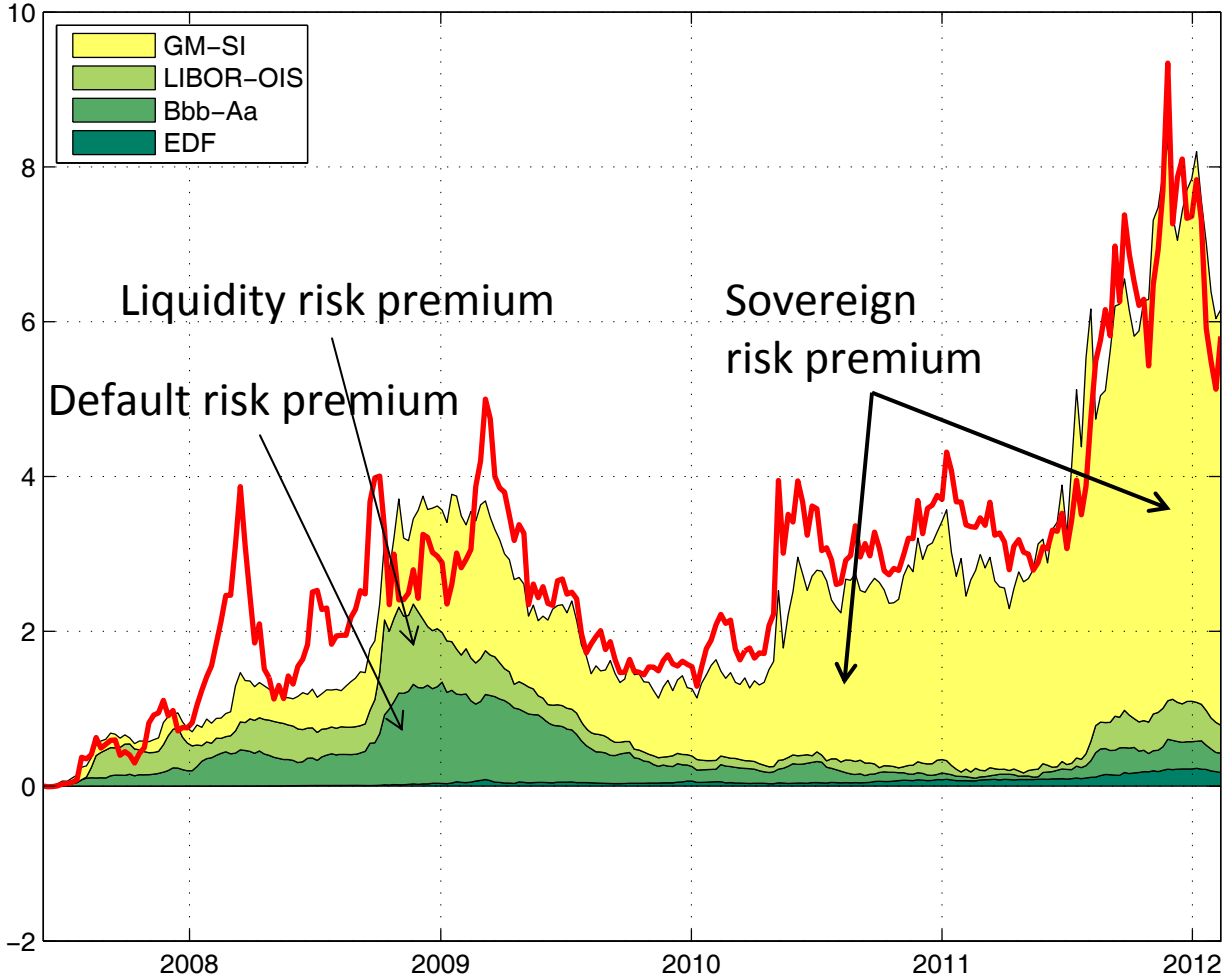




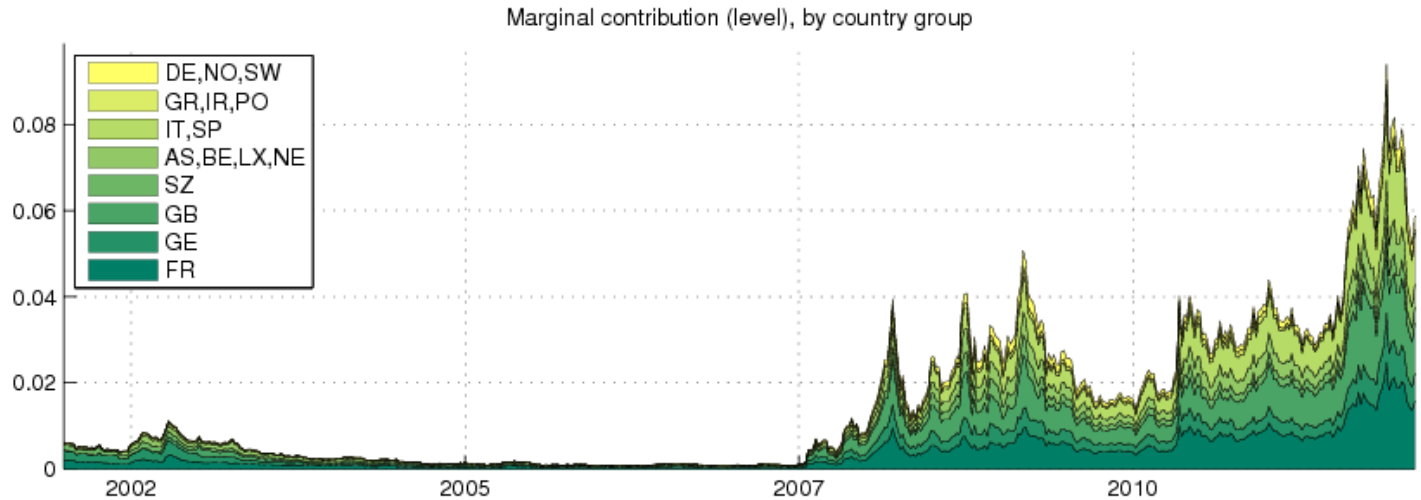
Systemic Risk based on Actual Default Risk

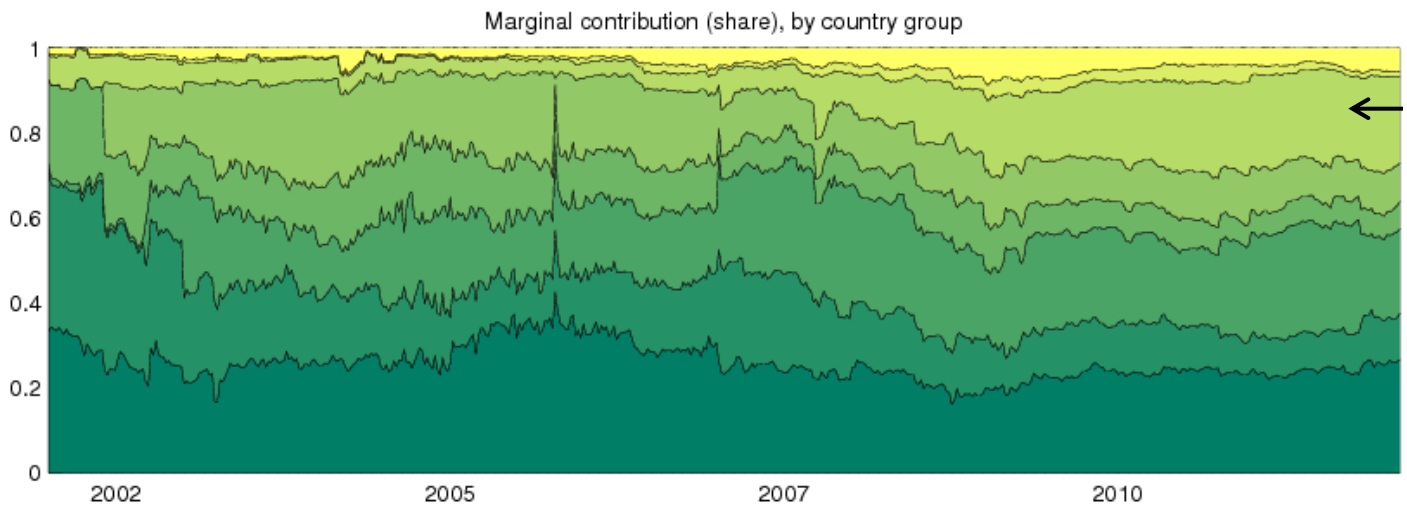


Contributing Factors to European Banks' Systemic Risk



Systemic Risk Contribution by Country



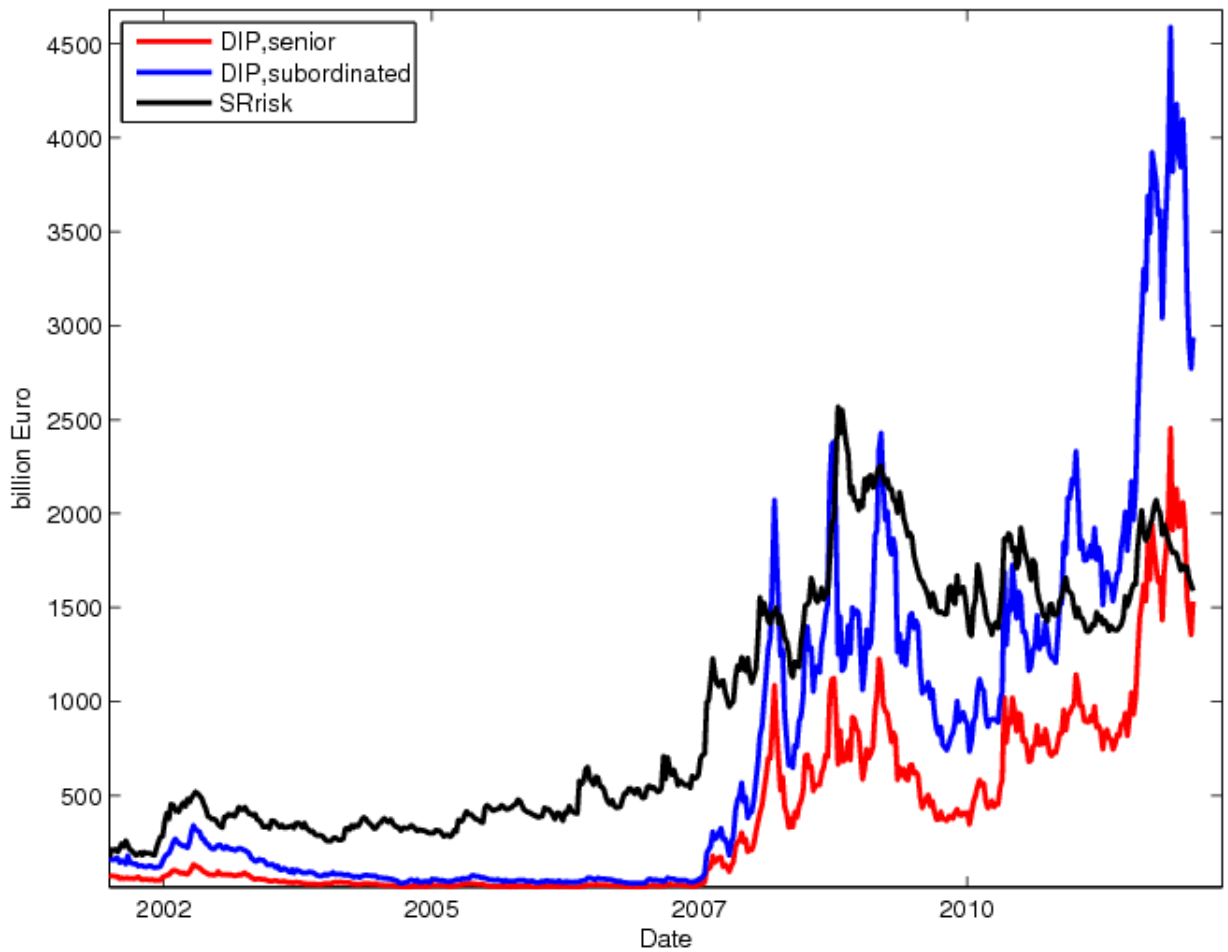


← Italy & Spain

Comparisons with Other Measures of Systemic Risk

Bank Name	Country	Group	G-SIFI	March 7, 2009			November 26, 2011		
				DIP	SRisk	CoVaR	DIP	SRisk	CoVaR
BNP	FR	1	1	86.90	171.43	24.31	232.51	163.51	19.16
DBK	GE	2	1	78.09	176.09	26.02	231.97	176.42	26.13
ACA	FR	1	1	67.88	131.01	16.90	203.48	130.46	9.06
RBS	GB	3	1	98.37	217.96	7.80	199.74	145.25	10.74
SOCGEN	FR	1	1	41.95	93.26	11.26	159.08	95.82	7.53
SAN	SP	6	1	63.42	92.61	23.19	158.02	81.24	21.36
UCG	IT	6	1	53.80	87.22	6.75	129.80	73.31	5.13
HSBC	GB	3	1	84.23	162.60	37.99	113.67	99.75	35.92
ING	NE	5	1	58.06	113.66	8.66	110.84	105.60	13.22
LLOY	GB	3	1	104.07	53.51	9.25	103.21	86.70	7.65
ISP	IT	6	0	28.93	58.36	7.06	88.71	54.60	4.62
UBS	SZ	4	1	71.21	116.21	30.11	83.18	81.37	20.58
BBVA	SP	6	0	30.52	47.19	14.22	75.87	36.55	11.99
CBK	GE	2	1	25.29	48.87	1.46	63.41	59.43	3.52
CSG	SZ	4	1	41.51	62.98	17.60	60.22	62.55	13.09
DEXIA	BE	5	1	29.90	54.22	4.89	47.00	33.17	1.70
NORDEA	SW	8	1	23.61	36.69	6.41	45.23	45.05	11.52
KN	FR	1	1	26.65	44.20	1.53	43.85	35.11	1.60
DANSKE	DE	8	0	20.15	36.66	1.84	30.88	31.61	3.30
KBC	BE	5	0	14.55	30.41	1.36	30.77	24.68	1.04
BMPS	IT	6	0	7.72	14.19	1.63	29.97	18.93	0.71
STAN	GB	3	0	16.64	NaN	0.13	23.23	NaN	0.15
SEB	SW	8	0	13.78	17.97	1.76	19.40	16.75	3.93
POP	SP	6	0	8.98	9.09	1.42	19.11	8.40	1.23

DIP vs. SRisk


DIP,senior
DIP,subordinated
SRrisk
4500
4000
3500
3000
2500
2000
1500
1000
500
billion Euro
2002
2005
2007
2010
Date

Conclusion

- Systemic risk of European banks reached its height in late 2011
- Sovereign risk premium and physical default risk have become driving factors
- Global crisis was about money-center banks, but Spanish & Italian banks have become systemic as a group
- DIP captures some systemic risk in sovereign crisis better than others
- **Policy implication:** Support for EU banking union with centralized, macroprudential regulation