

Systemic Risk in Europe

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Motivation

Systemic risk in Europe has attracted a lot of attention:

- ▶ Cost of the financial crisis: probably several hundred billion euros to save European banks
- ▶ Regulation is changing: Basel III, ECB Stress tests, Single Resolution Mechanism
- ▶ Methodological issues:
 - ▶ Bank \rightarrow System
 - ▶ System \rightarrow Bank

Our Approach: System \rightarrow Institution

- ▶ Acharya, Pedersen, Philippon, and Richardson (2010): Systemic Risk is the propensity of a firm to be under-capitalized when the financial system as a whole is under-capitalized.
- ▶ Our definition: Systemic Risk is the potential capital shortfall of a firm in case of a new market crash of 40% in the next 6 months.
- ▶ Focus on the European Financial System.

What is special with Europe?

- ▶ Different transmission channels of a financial crisis. European institutions are highly interconnected. Contagion from one country to the rest of Europe (ex: Greek debt crisis).
- ▶ Some banks are really big compared to country size. SIFIs are more systemically important than in the U.S.
- ▶ Possible lack of coordination: decision to rescue a bank is made by local governments.

Approaches to measuring systemic risk

- ▶ Connectivity / Network Approach
 - ▶ Billio, Lo, Getmansky, and Pelizzon (2011).
 - ▶ Kritzman, Li, Page, and Rigobon (2011).
 - ▶ Hautsch, Schaumburg, and Schienle (2012).
- ▶ Extreme events
 - ▶ CoVaR (Adrian and Brunnermeier, 2009)
(Institution \rightarrow System)
 - ▶ MES (Acharya et al., 2010, Brownlees and Engle, 2010)
(System \rightarrow Institution)
 - ▶ This paper.

Outline of the Presentation

- ▶ Objective of the presentation:
 - ▶ Describe the methodology for European institutions
 - ▶ Give an overview of the situation of SIFIs in Europe

- ▶ Methodology for non-U.S. institutions:
 - ▶ Multi-factor model
 - ▶ Asynchronicity of time zones

- ▶ Main results:
 - ▶ SRISK by industry group, country, and firm.
 - ▶ G-SIFIs versus D-SIFIs.
 - ▶ Recent developments
 - ▶ Issues with SRISK measures

Capital Shortfall

Our approach to Systemic Risk (System \rightarrow Institution):

- ▶ Acharya et al. (2010)
- ▶ Brownlees and Engle (2010).

We consider a crisis in the next T periods. At the end of period $t + T$, the capital shortfall of firm i in case of a crisis is:

$$CS_{i,t:t+T} = E_{t-1} [\theta A_{i,t+T} - W_{i,t+T} \mid \text{Crisis}_{t:t+T}]$$

where A and W denote the assets and equity of the firm.
 θ is a prudential ratio of equity to assets.

Capital Shortfall (cont'd)

If we define financial leverage at t by $L_{i,t} = A_{i,t}/W_{i,t}$ and if we keep debt D_t constant over the period, we find:

$$CS_{i,t:t+T} = [\theta(L_{i,t} - 1) - (1 - \theta)(1 - LRMES_{i,t:t+T})] W_{i,t}$$

$LRMES_{i,t:t+T}$ is the long-run marginal expected shortfall of the firm return conditional on a market crash:

$$LRMES_{i,t:t+T} = -E_{t-1} [R_{i,t:t+T} \mid R_{M,t:t+T} \leq -40\%]$$

Systemic Risk

Systemic risk of firm i corresponds to positive values of CS:

$$SR_{i,t:t+T} = \max(CS_{i,t:t+T}, 0)$$

Systemic risk is driven by 3 factors:

- ▶ Size (market capitalization): $W_{i,t}$
- ▶ Quasi-leverage (assets / equity): $L_{i,t}$
- ▶ Sensitivity of equity return to a market crisis: $LRMES_{i,t:t+T}$

Remark 1: Equity versus Market Cap

- ▶ Capital ratio (and leverage ratio) consider Book Equity, whereas we use Market Cap.
- ▶ SRISK does not measure current lack of capital / does not mean the banks have to recapitalize right now.
- ▶ It is a prospective measure of what could happen in case of a new crisis, given the current balance sheet of the bank.
- ▶ Market cap allows to simulate what would be the bank capital shortfall in the crisis.

Remark 2: Risk Weights

- ▶ In principle, risk weights reinforce the effect of the financial crisis (procyclicality).
- ▶ We do not use risk weights.
 - ▶ external weights from rating agencies (conflict of interest?)
 - ▶ no access to internal models used by banks.
- ▶ Our measure considers total assets (similar to the leverage ratio).

Estimating Long-run MES and SRISK

- ▶ World / European / Country crisis.
- ▶ A 40% decline of stock markets over the next 6 months.
- ▶ LRMES is estimated using Monte-Carlo simulations
- ▶ SRISK is based on
 - ▶ $\theta = 5.5\%$ with unweighted assets (similar to a leverage ratio)
 - ▶ (Targets: Basel III: 3%, Switzerland: 4.5%, U.S.: 5-6%)
 - ▶ It is comparable to $\theta = 8\%$ in the U.S. (differences in accounting standards)

Data

- ▶ 196 firms with a minimum market cap of 1 billion euros (as of end of 2011) and a price series starting before January 2000.
- ▶ Sample: January 1990 - August 2012.
- ▶ 72 banks, 36 insurance companies, 53 financial services, and 35 real estate.
- ▶ 45 financial firms in the U.K., 22 in France, 21 Switzerland, 18 in Sweden, 14 in Germany.
- ▶ Cumulative market cap as of August 2012: 1'448 billion euros.

Systemic risk measures by industry group

(As of August 2012 - Based on a World shock)

	SRISK (bln euro)	LRMES (in %)	Leverage	Mkt cap (bln euro)
Banks	1011.0	37.6	31.4	873.1
Insurance	186.7	39.0	20.2	320.2
Fin. Services	21.3	32.4	6.9	156.2
Real Estate	0.0	21.6	2.2	93.6

Systemic risk measures by country

(As of August 2012 - Based on a World shock)

	SRISK (bln euro)	LRMES (in %)	Leverage	Mkt cap (bln euro)
France	333.4	38.6	39.3	190.0
UK	303.8	37.6	23.3	396.2
Germany	172.3	33.4	36.0	129.0
Italy	100.1	35.9	36.4	74.1
Switzerland	82.7	32.5	21.5	131.8
Netherlands	70.2	44.7	26.6	59.4
Spain	69.5	44.1	21.6	110.2
Sweden	33.7	35.9	14.7	107.9

Ranking of G-SIFIs as of August 2012 (World shock)

	Bank	Country	SRISK (bln eur)	LRMES (in %)	Lvg	Mkt cap. (bln eur)
1	Deutsche Bank	Germany	106.4	43.4	84.8	26.1
2	Crédit Agricole	France	93.7	47.0	87.9	21.9
3	Barclays	U.K.	92.5	48.2	69.4	28.3
4	RBS	U.K.	82.9	39.7	96.8	17.6
5	BNP Paribas	France	81.1	46.1	44.3	43.3
6	Soc. Gén.	France	57.9	50.3	73.6	16.4
7	ING Group	Netherl.	55.5	56.9	51.7	23.3
8	BPCE Group	France	49.9	38.6	58.3	19.4
9	Lloyds Banking	U.K.	43.4	33.5	39.1	29.5
10	UBS	Switz.	42.9	40.8	34.0	34.1
11	UniCredit	Italy	38.5	39.9	49.8	18.2
12	Santander	Spain	36.9	46.4	22.2	56.0
13	Credit Suisse	Switz.	33.6	36.7	42.0	20.3
14	Commerzbank	Germany	31.1	37.2	88.9	7.3
15	HSBC	U.K.	26.6	31.8	16.5	126.2

Ranking of D-SIFIs as of August 2012 (World shock)

	Bank	Country	SRISK (% GDP)	SRISK (bln eur)	Mkt cap. (bln eur)
1	ING Group	Netherl.	9.3	55.5	23.3
2	UBS	Switzerland	8.8	42.9	34.1
3	Credit Suisse	Switzerland	6.9	33.6	20.3
4	Danske Bank	Denmark	6.6	15.9	12.9
5	Nordea Bank	Sweden	5.1	20.7	29.7
6	Barclays	U.K.	4.9	92.5	28.3
7	Crédit Agricole	France	4.7	93.7	21.9
8	RBS	U.K.	4.4	82.9	17.6
9	Deutsche Bank	Germany	4.1	106.4	26.1
10	BNP Paribas	France	4.0	81.1	43.3
11	Bank of Ireland	Ireland	4.0	6.5	2.7
12	Santander	Spain	3.6	36.9	56.0
13	KBC Group	Belgium	3.1	11.4	6.2
14	Soc. Gén.	France	2.9	57.9	16.4
15	Nat. Bk of Greece	Greece	2.6	4.9	1.3

Alternative measures of capital shortfall

Bank	Assets / Book equity	Assets / Mkt cap	SRISK (stressed)
Deutsche Bank	70.6	95.7	106.4
Crédit Agricole	41.9	76.6	93.7
Barclays	31.8	79.6	92.5
RBS	41.2	76.3	82.9
BNP Paribas	21.7	62.2	81.1
Société Générale	14.8	50.1	57.9
ING Group	17.6	43.0	55.5
BPCE Group	14.2	44.5	49.9
Lloyds Banking	3.4	34.0	43.4
UBS	21.3	29.7	42.9
UniCredit	0.0	31.7	38.5
Banco Santander	0.0	12.3	36.9
Credit Suisse	16.6	26.5	33.6
Commerzbank	13.1	28.5	31.1
HSBC	0.0	0.0	26.6
Correlation with SRISK	0.854	0.976	—

Empirical issues

- ▶ How to deal with unlisted companies?
 - ▶ all the European G-SIBs (FSB) are listed companies
 - ▶ may be a problem in some countries (private banks)
- ▶ How to deal with cooperative banks?
 - ▶ we have recently changed the methodology
- ▶ How to deal with insurance companies?
 - ▶ ongoing investigation
- ▶ The regulation in Europe is changing
 - ▶ will the European banking union do a good job?

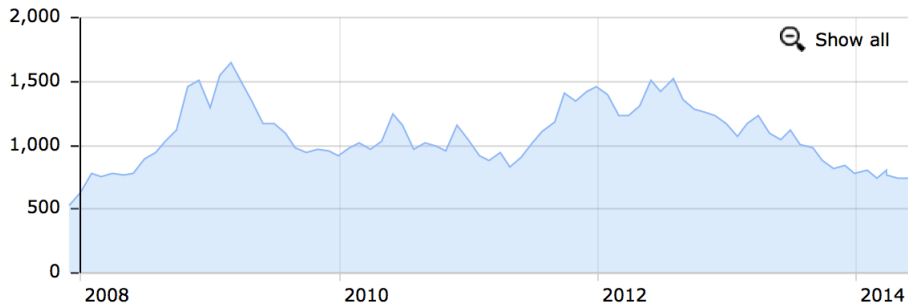
Comparison with Recent Estimates

Based on Systemic Risk measures of European financial institutions (available at www.crml.ch).

31 August 2012			30 May 2014		
Rk	Institution	SRISK	Rk	Institution	SRISK
1	Deutsche Bank	106.4	1	Deutsche Bank	70.1
2	Crédit Agricole	93.7	2	BNP Paribas	63.4
3	Barclays	92.5	3	Barclays	63.0
4	RBS	82.9	4	Crédit Agricole	60.2
5	BNP Paribas	81.1	5	Société Générale	49.8
6	Société Générale	57.9	6	RBS	36.8
7	ING Group	55.5	7	ING Group	31.2
8	BPCE Group	49.9	8	London Stock Exch.	28.9
9	Lloyds Banking	43.4	9	BPCE Group	27.7
10	UBS	42.9	10	UniCredit	22.8
Grand Total		1353.9	Grand Total		769.0

European SRISK Over Time

From www.crml.ch



Conclusion

- ▶ The situation in European Banking System is improving
- ▶ We already had a lot of discussions with banks and insurance companies
 - ▶ better understanding of special situations
- ▶ Cooperation between regulators and academics would be beneficial to improve systemic risk measures
 - ▶ availability of data
 - ▶ design of scenarios
 - ▶ dissemination of information / communication

THANK YOU FOR YOUR ATTENTION