Bank Risk during the Financial Crisis: Do business models matter?

David Marques-Ibanez
European Central Bank

(with Simone Manganelli and Yener Altunbas)

The opinions are those of the authors only
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Managing risks is core to banks…

- The evaluation management and sharing of risks is one of the core activities of the banking sector:

  - Delegated monitors: better than other institutions at screening and managing risks (Diamond, 1984),
  - Better than markets at handling risks that can not be diversified (Allen and Gale, 1997).

While managing risks is core to banks…

- Forward-looking market-based indicators of bank risk actually…
  - Concentrated prior to the crisis.
  - Improved prior to the crisis.

- The period of the crisis revealed the largest materialization of bank risk.

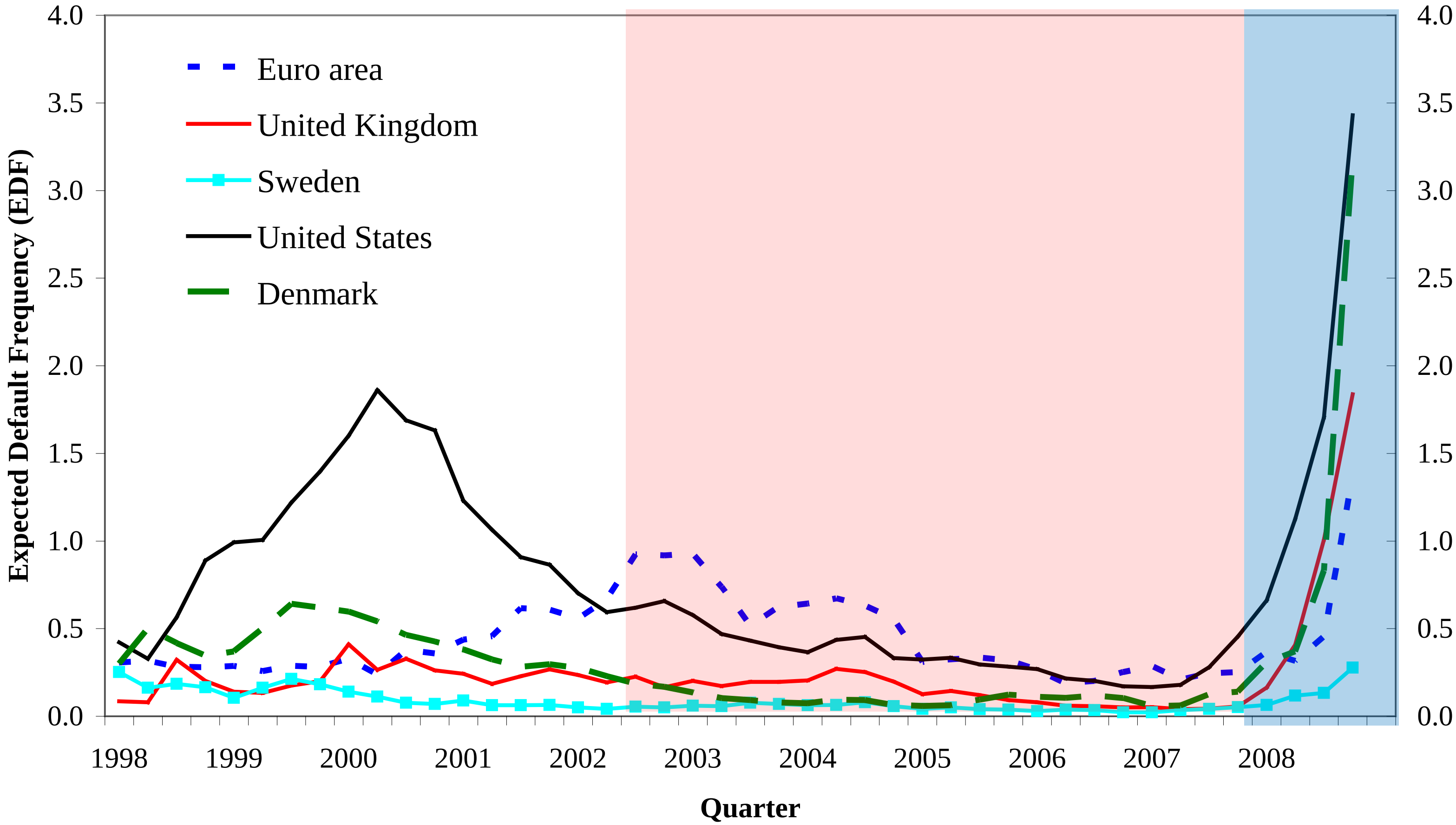
While managing risks is core to banks…

- There was also a huge variability in the performance of individual banks.
- Basic narratives of underlying causes and dynamics offer conflicting views.
- Can we use this variability to predict bank risk?

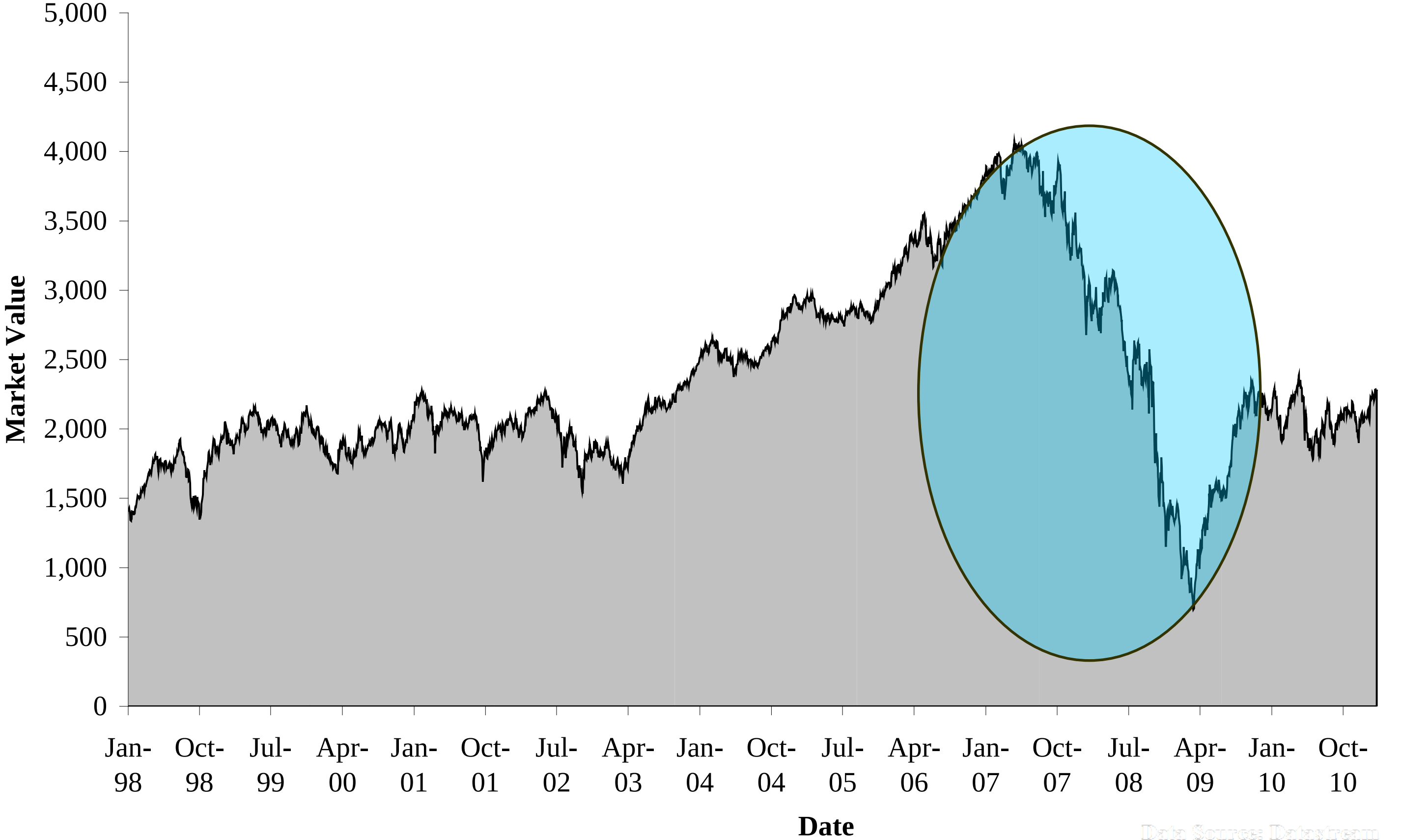
Some history: Indicators of bank risk…

Banks' EDFs

(over 1-year ahead horizon; averages by country and group of countries)



Aggregate valuation of banks (EUR bill.)

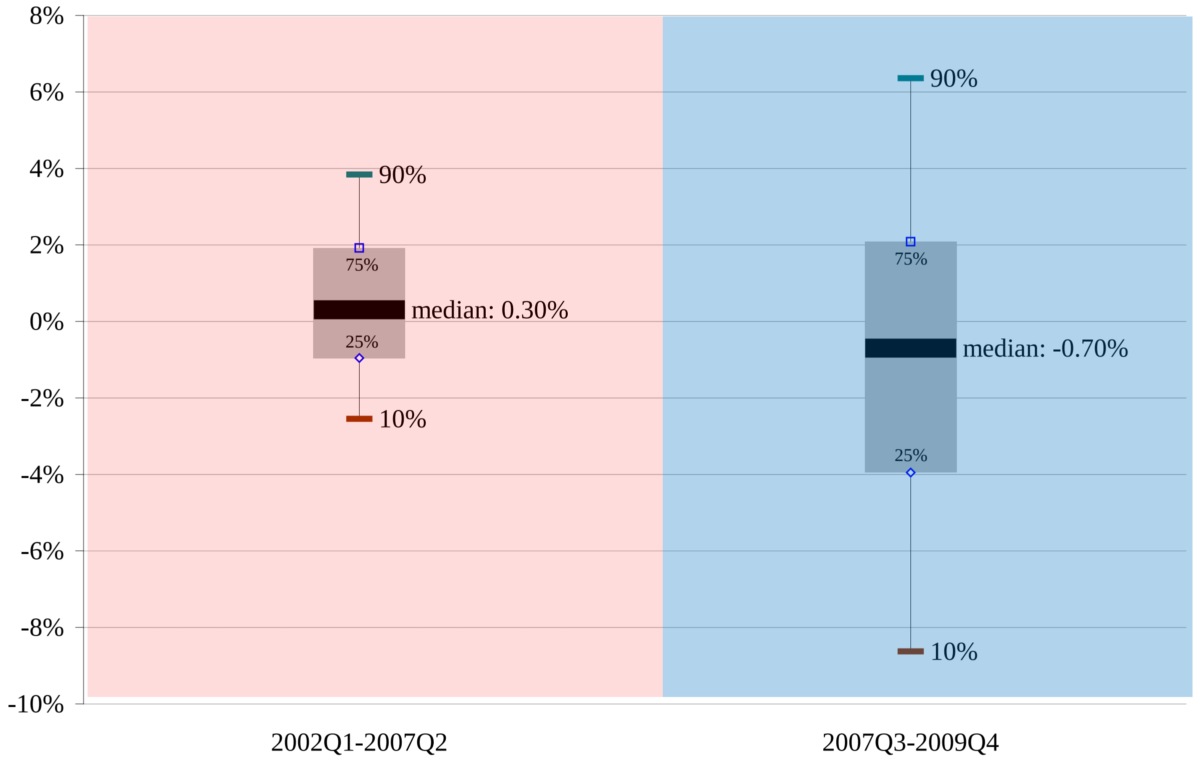


Tightening and widening of bank risk

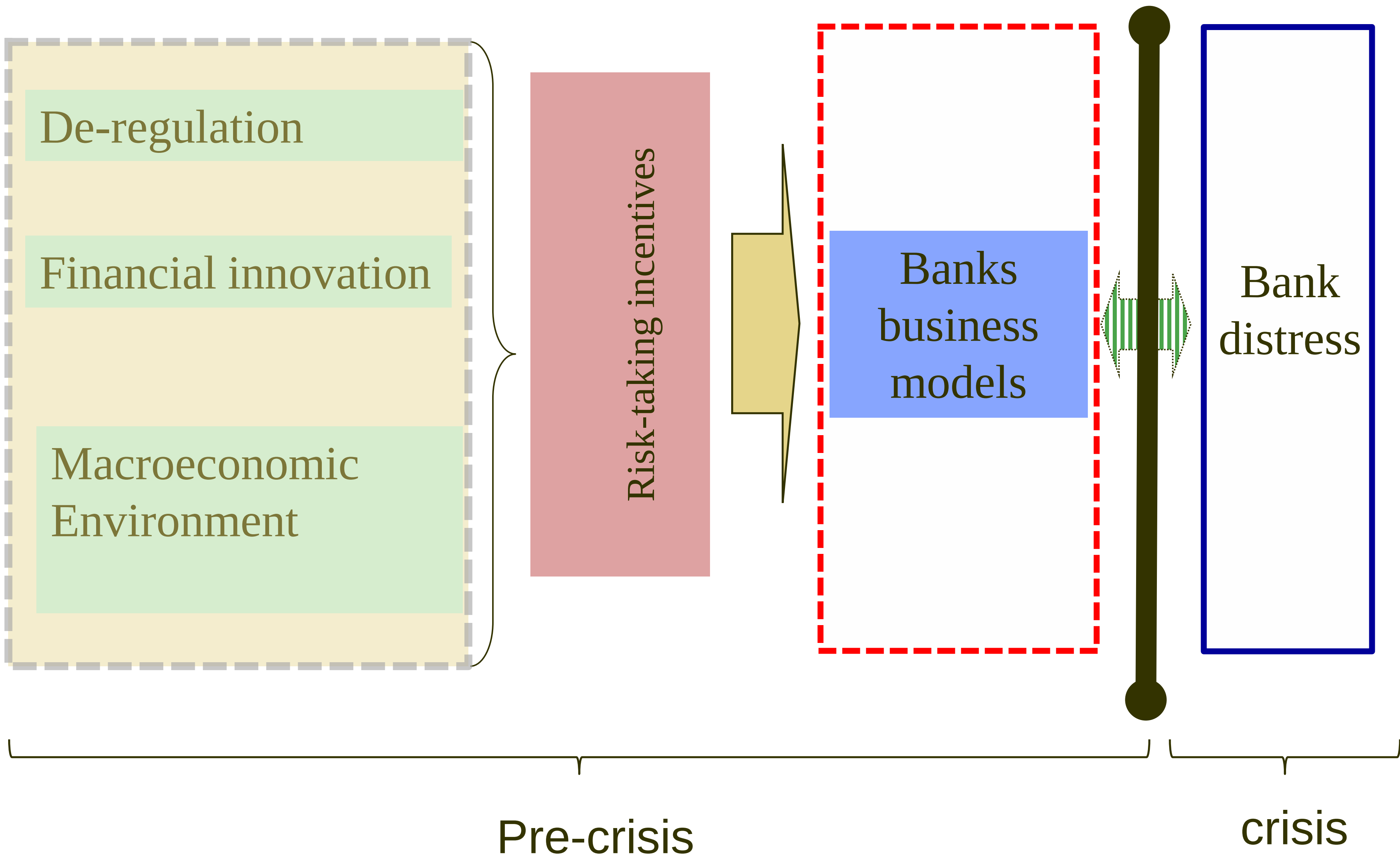
Figure 1.

Box-plot distribution of individual stock market returns of banks

Figure 1 plots the pre and during crisis cross-sectional distribution of the stock market returns of listed banks operating in the European Union and the United States. Data consists of monthly stock market prices from 2002Q1 to 2009Q4 obtained from Datastream. The charts report the 10%, 25%, 50%, 75% and 90% quantiles before and after the crisis. The “box plot” consists of a “box” which goes from the first to the third quartile (Q1, Q3). Within the box the thick horizontal line represents the median. The bottom whisker goes from 25% to the 10% quantile, while the top goes from the 75% to 90% quantile of the distribution.



Source: Constructed from Datastream data.



De-regulation
Financial innovation
Macroeconomic Environment
Risk-taking incentives
Banks business models
Bank distress
Pre-crisis
crisis

Accounts of crises drivers vary (Lo, 2011) ……look at cross-section and banking literature.

- Do variability in pre-crisis business models explain bank distress during the **crisis?**
- Which business models explain bank distress **for the different dimensions of bank distress?**
- Which business models explain bank distress **for the tail of riskier banks?**
- **Does** stock market value creation explain bank distress **on top of business models characteristics?**

Model

$$r_{i,c} = \beta_0 + \underbrace{\beta_1 eta_{i,b} + \beta_2 eta\_reg_{i,b} * k_{i,b}}_{\text{Capital structure}} + \underbrace{\beta_3 size_{i,b} + \beta_4 loan\_ta_{i,b} + \beta_5 abs_{i,b}}_{\text{Asset structure}} +$$

$$+ \underbrace{\beta_6 mkt\_assets_{i,b} + \beta_7 dep_{i,b}}_{\text{Funding structure}} + \underbrace{\beta_8 niinco_{i,b} + \beta_9 exlend_{i,b}}_{\text{Income structure}} + \varepsilon_i$$

Other: controls

Crisis

Pre-crisis

Bank *i*, country *k*, time *c*,*b*

- Realization of risk during the crisis period (2007Q4-2009Q4),
- Regressors include bank characteristics averaged from the pre-crisis period (2003Q4 to 2007Q3),
- Other control values averaged from the pre-crisis period (2003Q4 to 2007Q3).

Bank risk data

Variables	Symbol	Source	Description
Panel A: Bank risk			
Financial support	*resc*	European Commission, central banks, Bank for International Settlements, governmental institutions and Bloomberg.	Binary variable – with a value of 1 if public financial support was received during the crisis period (2007Q4 to 2009Q4) and 0, if otherwise
Systematic risk	*risk*	Authors' calculation and Datastream	Average of the quarterly non-overlapping beta in a capital asset pricing model calculated for each bank using daily stock market data during the crisis period (2007Q4 to 2009Q4)
Expected default frequency	*edf*	Moody's KMV	Probability of a bank defaulting within a year during the crisis period (2007Q4 to 2009Q4) calculated by Moodys KMV
Central bank liquidity	*bid*	European Central Bank	Ratio of total liquidity received from the Eurosystem to total assets * 100 during the crisis-period (2007Q4 to 2009Q4)

Data

- **Global sample** of 16 countries. Initial sample includes over 1,100 listed banks from: Belgium, Denmark, Germany, Greece, Finland, France, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, the United Kingdom and the United State
- **Quarterly data:** Banks' balance sheet indicators from Bloomberg manually matched to 1) risk, 2) securitization, 3) ownership information.
- **Macro variables:** from IMF, OECD, World bank and BIS database: competition, Regulation, asset prices.

Probit estimates of the likelihood of being rescued

(only partial results shown)

		(I)		(II)		(III)		(IV)	
Capital structure	Tier I capital	-0.0448	***	-0.0699	***	-0.0743	***	-0.0781	***
		(0.008)		(0.006)		(0.004)		(0.030)	
	Undercapitalized			-0.1401	***	-0.1329	***	-0.1354	***
				(0.021)		(0.016)		(0.031)	
Asset structure and securitization	Size	0.1144	***	0.1382	***	0.1337	***	0.1309	**
		(0.007)		(0.003)		(0.002)		(0.061)	
	Loan to total assets	0.0182	***	0.0158	***	0.0149	***	0.0145	**
		(0.003)		(0.004)		(0.005)		(0.006)	
	Securitization	-0.0408	***	-0.0348	***	-0.0352	***	-0.0584	***
		(0.004)		(0.002)		(0.002)		(0.013)	
Funding structure	Short-term market funding	0.0267	***	0.0241	***	0.0236	***	0.0227	***
		(0.004)		(0.004)		(0.005)		(0.008)	
	Deposit funding	-0.0379	***	-0.0347	***	-0.0342	***	-0.0327	***
		(0.003)		(0.004)		(0.004)		(0.006)	
Loan growth and income	Excessive loan growth	0.1330	***	0.1302	***	0.1281	***	0.1324	**
		(0.023)		(0.021)		(0.022)		(0.055)	
	Non-interest income	-0.0108	***	-0.0116	***	-0.0124	***	-0.0093	**
		(0.002)		(0.001)		(0.001)		(0.004)	
	Profitability					0.0957	*	0.0433	
						(0.058)		(0.214)	
	GDP growth							0.8208	***
								(0.221)	
	No. of observations	852		852		852		863	
	Pseudo R2	0.0995		0.1113		0.1121		0.1195	

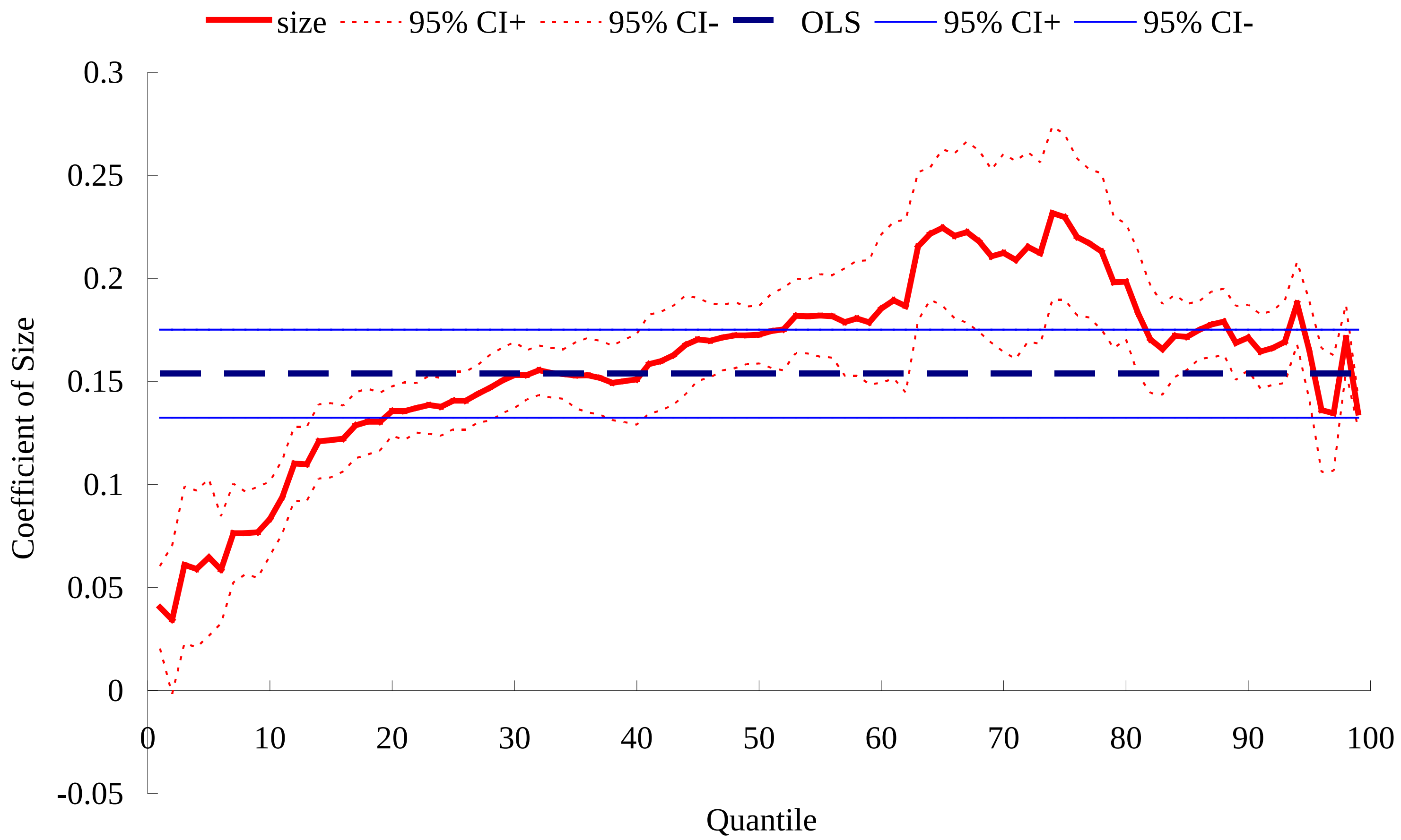
Systematic risk *(only partial results shown)*

		(I)	(II)	(III)	(IV)
Capital structure	Tier I capital	0.0040	-0.0097	-0.0233 ***	-0.0207 ***
		(0.007)	(0.007)	(0.008)	(0.008)
	Undercapitalized		-0.0811 ***	-0.0733 ***	-0.0740 ***
			(0.017)	(0.017)	(0.017)
Asset structure and securitization	Size	0.1039 ***	0.1090 ***	0.1114 ***	0.1041 ***
		(0.031)	(0.032)	(0.033)	(0.036)
	Loan to total assets	0.0083 ***	0.0061 ***	0.0058 **	0.0053 **
		(0.002)	(0.002)	(0.002)	(0.003)
	Securitization	-0.2073 ***	-0.2076 ***	-0.1885 ***	-0.2055 ***
		(0.057)	(0.054)	(0.055)	(0.063)
Funding structure	Short-term market funding	0.0119 ***	0.0097 ***	0.0102 ***	0.0097 ***
		(0.003)	(0.003)	(0.003)	(0.003)
	Deposit funding	-0.0217 ***	-0.0201 ***	-0.0191 ***	-0.0179 ***
		(0.003)	(0.003)	(0.003)	(0.003)
Loan growth and income	Excessive loan growth	0.1560 ***	0.1597 ***	0.1554 ***	0.1597 ***
		(0.026)	(0.027)	(0.028)	(0.030)
	Non-interest income	-0.0050 ***	-0.0043 **	-0.0064 ***	-0.0053 **
		(0.002)	(0.002)	(0.002)	(0.002)
	Profitability			0.1824 ***	0.1705 ***
				(0.049)	(0.049)
	GDP growth				0.2198 **
					(0.110)
	No. of observations	483	483	483	483
	R2	0.4953	0.5172	0.532	0.5352

Liquidity *(only partial results shown)*

		(I)		(II)		(III)		(IV)	
Capital structure	Tier I capital	-0.1771	***	-0.1814	***	-0.2978	***	-0.3308	***
		(0.062)		(0.053)		(0.026)		(0.043)	
	Undercapitalized			-0.0097		-0.0131		-0.1115	***
				(0.020)		(0.016)		(0.005)	
Asset structure and securitization	Size	-0.2985	***	-0.2979	***	-0.5000	***	-0.5844	***
		(0.025)		(0.023)		(0.042)		(0.042)	
	Loan to total assets	0.0779	***	0.0781	***	0.0559	***	0.0695	***
		(0.004)		(0.004)		(0.001)		(0.004)	
	Securitisation	-0.6003	***	-0.6012	***	-0.4397	***	-0.9080	***
		(0.140)		(0.143)		(0.085)		(0.096)	
Funding structure	Short-term market funding	0.1485	***	0.1483	***	0.1366	***	0.1403	***
		(0.005)		(0.006)		(0.006)		(0.009)	
	Deposit funding	-0.0759	***	-0.0759	***	-0.0621	***	-0.0628	***
		(0.014)		(0.014)		(0.012)		(0.017)	
Loan growth and income	Excessive loan growth	0.4462	***	0.4453	***	0.6182	***	0.7737	***
		(0.006)		(0.008)		(0.015)		(0.022)	
	Non-interest income	-0.2356	***	-0.2350	***	-0.2698	***	-0.2574	***
		(0.002)		(0.001)		(0.005)		(0.010)	
Control variables	Return on assets					2.0872	***	0.7259	
						(0.245)		(0.732)	
	GDP growth							1.6483	***
								(0.487)	

So business models matter, but is the impact the same for all levels of risk?



Quantile regression for systematic risk

		Q10	Q25	Q50	Q75	Q90
Capital structure	Tier I Capital	0.0135 ***	0.0065	0.0049	-0.0082	-0.0047
		(0.005)	(0.006)	(0.007)	(0.010)	(0.017)
	Under-capitalised	-0.0473 ***	-0.0440 ***	-0.0426 **	-0.0728 ***	-0.0579 *
		(0.013)	(0.013)	(0.018)	(0.026)	(0.035)
Asset structure	Size	0.1209 ***	0.1141 ***	0.1093 ***	0.1170 **	0.1978 **
		(0.027)	(0.027)	(0.038)	(0.057)	(0.084)
	Loan to Total Assets Ratio	0.0004	-0.0033	0.0042	0.0090 **	0.0102
		(0.002)	(0.002)	(0.003)	(0.004)	(0.007)
	Securitisation	0.0336	0.0008	-0.1013	-0.1346 *	-0.1829 ***
		(0.026)	(0.029)	(0.064)	(0.070)	(0.055)
Funding structure	Marketable securities	0.0020	-0.0011	0.0080 ***	0.0132 ***	0.0105
		(0.002)	(0.002)	(0.003)	(0.004)	(0.006)
	Short term deposits	-0.0137 ***	-0.0124 ***	-0.0211 ***	-0.0290 ***	-0.0354 ***
		(0.004)	(0.003)	(0.003)	(0.004)	(0.006)
Income	Excessive Loan Growth	0.0561 **	0.0803 ***	0.1456 ***	0.1633 ***	0.0899
		(0.022)	(0.024)	(0.033)	(0.051)	(0.079)
	Non-interest income to Total Incom	0.0004	-0.0010	-0.0030	-0.0053	-0.0001
		(0.002)	(0.002)	(0.002)	(0.003)	(0.004)
	Intercept	-1.1578 ***	-0.7387 ***	-1.3841 ***	-1.2859 ***	-1.2710 *
		(0.214)	(0.232)	(0.317)	(0.449)	(0.734)

Anglo Irish Bank is world's top performer

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Friday January 27 2006

ANGLO Irish Bank has emerged as the world's top performing bank over the past five years. The Irish business lender just shaded United Health Group, a $70bn capitalised American health company, at the head of the global rankings for the period 2001-05.

Cyril Hardiman

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The Irish business lender just shaded United Health Group, a $70bn capitalised American health company, at the head of the global rankings for the period 2001-05.

The rankings are compiled by Mercer Oliver Wyman (MOW), a consultant in financial services strategy and risk management consulting as part of its annual assessment of the world's financial services industry, 'State of the Financial Services Industry' launched yesterday at the World Economic Forum in Davos.

On MOW's shareholder performance index (SPI), Anglo headed the global five-year list, while the bank also ranked third-highest in the 2005 ratings of mid-cap companies, those with a market value of less than $10bn. This is not the first time Anglo has shone in global rankings.

Global

The bank's share price increased by more than 300pc from €3.14 to €12.90 in the 2001-05 period, but this increases to a hugely-impressive 800pc if dividends earned in the period were reinvested in the stock.

According to MOW "the global financial services industry grew by 15pc in 2005 to reach a new record high of $8.7trillion and the sector remains on track to triple in value within a decade".

The report revealed that over three-fifths of financial services ceos expect an upturn in strategic, selective M&A activity this year, and there has been a substantial shift towards new markets to provide opportunities for future growth. European ceos in particular show a relatively high interest in cross-border acquisitions, as opportunities for consolidation in more mature markets become increasingly limited.

Meanwhile, banking group Lloyds TSB announced yesterday

Also in Irish

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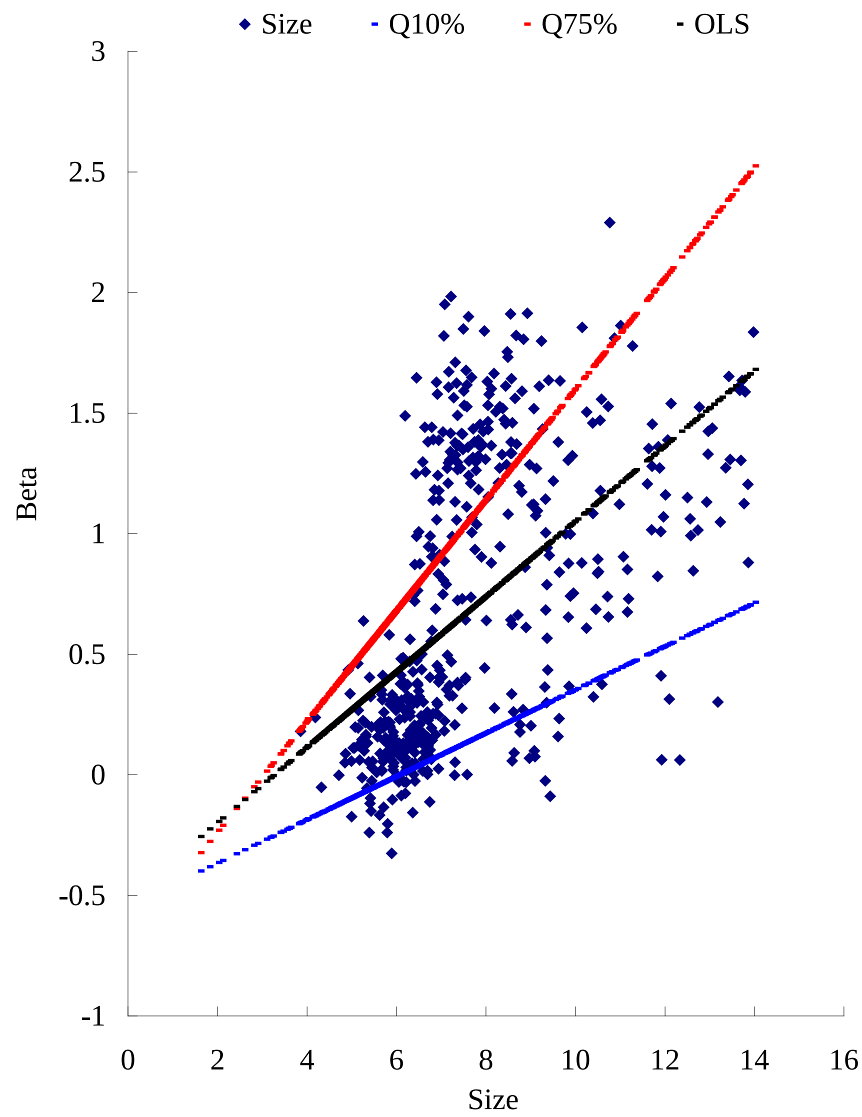
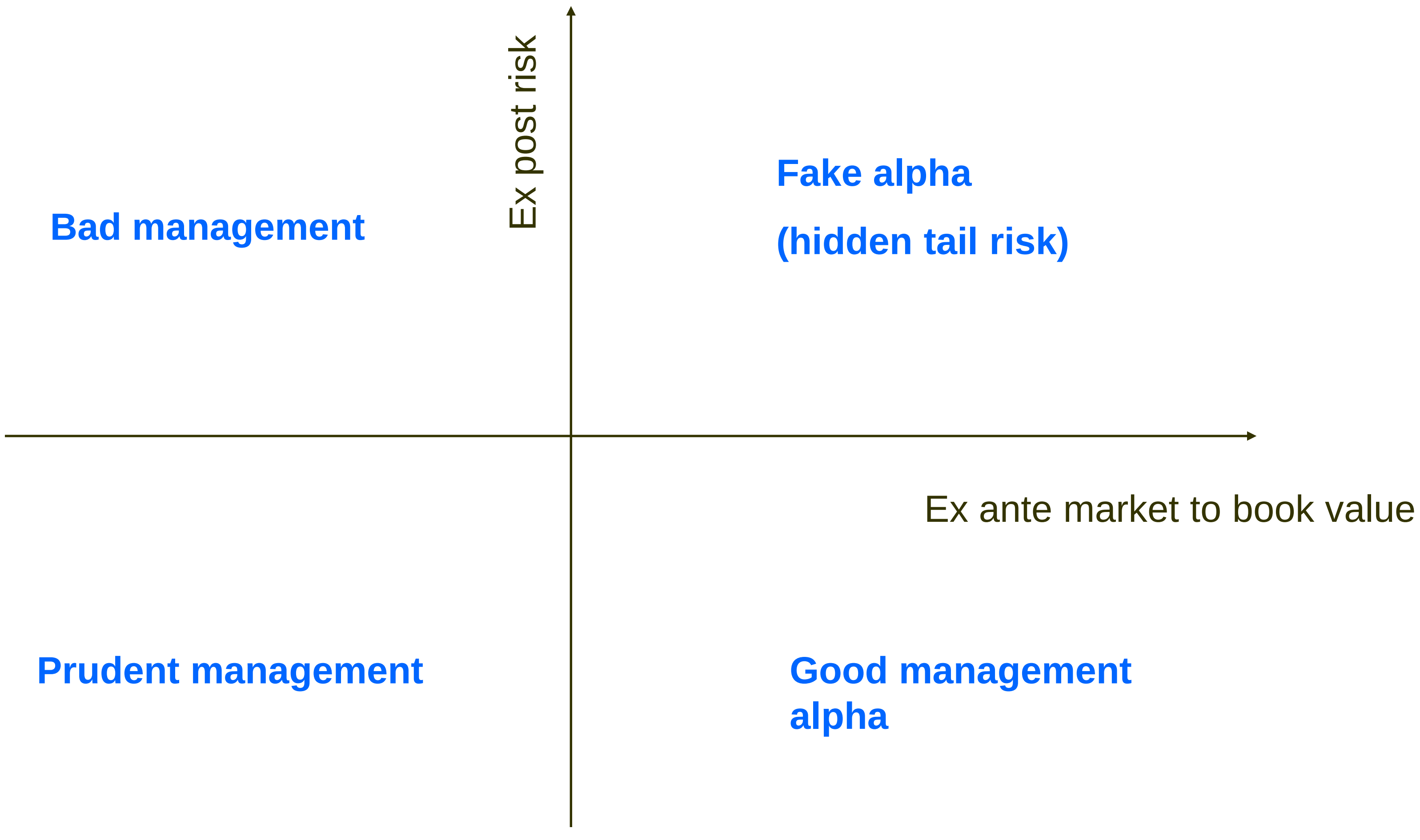
Overall

- Partly in line with Basle III:
  - Raising the core capital levels of institutions, in particular of undercapitalized ones.
  - **Reducing the cyclicality** of credit provided by banks and increasing the capital charges for short-term market funding.
  - Aggressive loan growth/ capital charges.

- Intensify supervisory interference.
  - Business models/divergence in the realization of risk across institutions during the crisis, would imply that a **better supervisory understanding of bank** incentives **in real time** (i.e. before they materialize)
  - Also by those banks experiencing rapid increases in their stock market valuations.

The answer is no…




Ex post risk
Bad management
Fake alpha
(hidden tail risk)
Ex ante market to book value
Prudent management
Good management
alpha

Prev Lit: huge

- Prior to the crisis a number of studies focused on individual aspects likely to affect bank risk:
  - Capital (Wheelock and Wilson 2000,
  - Funding sources (Demirgüc-Kunt and Huizinga, 2010),
  - Securitization and connections with financial markets (Boot and Thakor, 2009, Keys et al., 2008, Mian and Sufi, 2009),
  - Corporate governance (Laeven and Levine, 2008), diversification (Stirohl, 2009).

Funding structure

- Banks increased their dependence on **financial markets for funding** at relatively low costs:
  - Financial markets investors were expected to provide more ***market discipline*** (Calomiris and Kahn, 1991). Outsource/Free riding,
  - "Dark side" of wholesale funding: noisy signals could lead to ***liquidation of solvent institutions*** (Huang and Ratnovski, 2011)