Systemic Size, Bank Risk and Systemic Crises

Jens Hagendorff
University of Edinburgh

Kevin Keasey
Francesco Vallascas
University of Leeds

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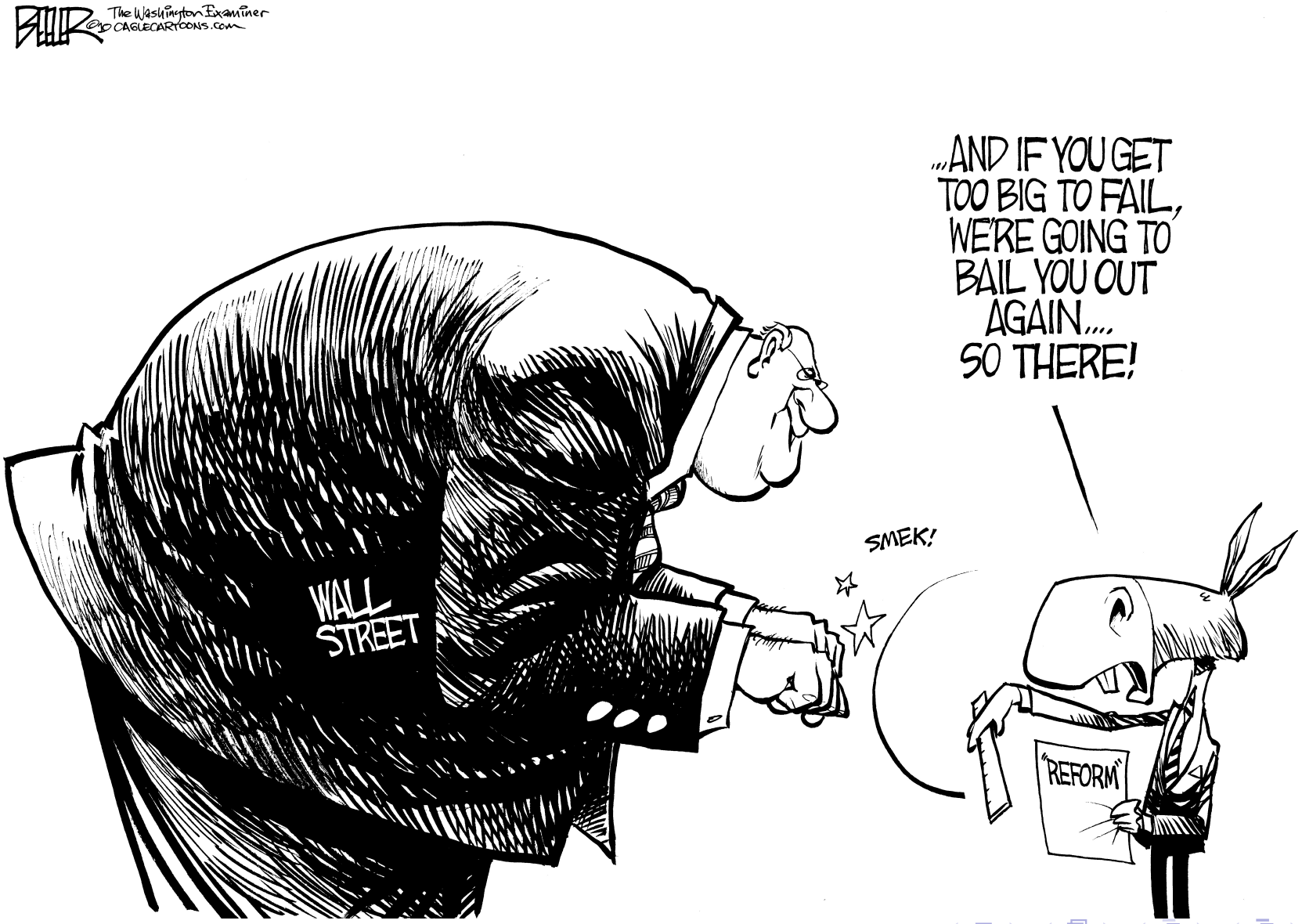
UNIVERSITY OF EDINBURGH
Business School

Systemic Bank Size



Systemic Bank Size

- Banks have rapidly grown in systemic size over recent decades.
- The banking industry has seen increasing scale and concentration. Partly in response to deregulation, many banks engaged in mergers and acquisitions, thus, causing a rapid growth in bank asset size.
- For many banks, the book value of their assets now exceeds the GDP of the economy in which they are charted.

Average Systemic Size of Listed Banks

Rank	Country	Average Systemic Size (%)
1	Switzerland	112.81
2	Sweden	74.209
3	Ireland	70.478
4	Singapore	70.317
5	Jordan	58.139
6	Austria	52.454
7	France	30.462
8	United Kingdom	29.378
9	Israel	25.152
10	Portugal	24.995
12	Germany	21.715
26	Italy	7.093
34	China	3.246
44	USA	0.199

Systemic Size and Risk-taking

- Frequently raised concerns about systemic size in banking include:
  - that systemic size tempts banks to maximise the value of the financial safety net by taking on more risk, and
  - the potentially disastrous fiscal costs of a bailout (Iceland, Ireland).
- The performance of many of the systemically largest banks during the recent crisis has not dispelled such concerns. Many of the systemically largest banks were forced to turn to taxpayers to fund their recapitalization efforts to some extent during the crisis.

Systemic Size and Risk-taking during the Crisis

10 Systemically Largest Banks in 2007

Rank	Name	Assets/GDP
1	UBS AG	466%
2	Ageas	279%
3	Credit Suisse	278%
4	Danske Bank	212%
5	Dexia	194%
6	Arab Bank	175%
7	RBS Group	135%
8	Nordea Bank	124%
9	Depfa Bank	123%
10	Bank of Ireland	120%

Systemic Size and Risk-taking during the Crisis

10 Systemically Largest Banks in 2007

Rank	Name	Assets/GDP
1		
2		
3	Credit Suisse	278%
4		
5		
6	Arab Bank	175%
7		
8	Nordea Bank	124%
9		
10		

Current Policy Debates

- Partly in response to concerns over bank risk-taking, policymakers are currently considering initiatives aimed at imposing restrictions on the size, capital structure and income mix of banks.
  - There have been calls by policymakers in Belgium, the Netherlands and Switzerland to limit the systemic size of banks.
  - The Basel Committee (2011) advises to raise the capital requirements pertaining to Global Systemically Important Banks (G-SIBs) under Basel III.
  - Dodd-Frank bars U.S. bank holding companies from proprietary trading and certain types of other investments. Similarly, the Liikanen Report has recently proposed that EU banks will need to separate and independently capitalize their retail and investment banking activities.

Questions to be Addressed

- Does systemic size affect risk-taking during normal and crisis times?
- Important question which cannot be addressed using previous evidence on size and risk-taking in banking.
- Previous work has focused on absolute bank size and found some evidence that larger banks take more risks (e.g., Benston, Hunter and Wall, 1995; Penas and Unal, 2004; Gropp at al., 2011; Brunnermeier et al., 2012).
- Absolute vs. systemic size:
  - Banks that are small in absolute terms, may be systemically large when chartered in a small economy.
  - Growth in systemic size affects the risk and return profile of banks differently from growth in stand-alone size.

Systemic Size and Risk in Banking

- Scant literature to date based on systemic size.
- Do banks benefit from growth in systemic size?
  - Yes. Demirgüç-Kunt and Huizinga (DH) (2010) show when systemically large banks increase their share price volatility, they increase their market valuations and decrease their CDS spreads relative to systemically smaller banks.
  - No. DH (2011) show that systemically large banks are subject to greater levels of market discipline (as indicated by higher funding costs).

Systemic Size and Risk *during Crises*

- Is the risk-taking of system. large banks different during crisis periods?
- Systemic risk considerations could motivate more aggressive regulatory interventions (Allen and Gale, 2000).
- Regulatory forbearance. Government decision to intervene in problem banks depends on the financial health of other banks in a country (Brown and Dinç, 2011; Acharya and Yorulmazer, 2007).
- Pre-crisis bank behavior. Bad luck vs. bad behavior. Fahlenbrach and Stulz (2011) and Beltratti and Stulz (2012) show that the type of bank portfolio decisions which were value-creating before the crisis (but caused banks to underform during the crisis) were unlikely to have been anticipated at the the time the decisions were made.

Key Findings and Contributions

- In line with DH (2011), we show that systemically large banks do not take on more risk during non-crisis conditions. Unlike DH (2011), we show that systemically large banks took on more risk during the recent crisis (but not during other crises) and identify some of the drivers of this risk-taking behavior.
- The paper contributes to work on diversification and risk (DeYoung and Roland, 2001; Stiroh, 2004; Brunnermeier et al., 2012) by examining the interaction between systemic size and diversification on bank risk-taking. We find that more diversified systemically large banks display a lower default risk during and outside the recent crisis.

Key Findings and Contributions

- We contribute to ongoing policy discussions over the capital structure of banks, in particular the issuance of contingent capital (Flannery, 2005; Kashyap et al., 2008) and subordinated debt instruments (Flannery and Sorescu, 1996; Evanoff and Wall, 2002). We find that bank leverage increased bank risk-taking and subordinated debt curtailed risk-taking during the crisis.
- Why are large banks disproportionately affected by systemic crises (e.g., Brunnermeier et al., 2012; Beltratti and Stulz, 2012)? Our findings are consistent with explanations that systemically large banks capitalise on the prospect of regulatory forbearance during a severe crisis.

Sample & Risk Measure

- Bankscope universe from 1998 - 2010 matched with Datastream.
- Excl. OTC-traded banks, government-owned banks, $\prec$5 years of data, illiquid stocks, banks based in countries with $\prec$3 banks.
- Sample contains 823 unique banks, chartered in 45 countries.
- Bank risk is measured via the Merton distance to default (DD) model. Can be computed for all listed banks. Captures default risk as the number of standard deviations that the market value of bank assets is above the default point (market value of assets $\prec$ book value of total liabilities).

$$\mathrm{DD}_t = \frac{\ln\left(V_{A,t}/L_t\right) + \left(r_f - 0.5\sigma_{A,t}^2\right) T}{\sigma_{A,t}\sqrt{T}}$$

Model

$$DD_{i,t} = \alpha_i + \beta_i SYSTEMICSIZE_{t-1} + \gamma_i CONTROLS_{t-1} + \text{YEAR DUMMIES}$$

CONTROLS

SIZE, LOANS, DIVERSIFICATION, EQUITY,
ROA, TOBINQ, ECONDEVELOP, GDPVOL.

- Within Estimator controls for unobserved bank heterogeneity caused by factors that remain constant across the sample period. Captures variations in risk-taking at the level of individual banks over time.

Systemic Size and the Recent Crisis

Regressions on DD

	(1)	(2)	(3)
SYSTEMICSIZE	-0.394	-0.263	0.235
SYTEMICSIZE *CRISIS	-1.248***	-1.063***	-1.253***
SIZE		-0.113	-0.461***
SIZE * CRISIS		-0.054*	-0.05
LOANS	-0.387	-0.391	-0.831**
DIVERSIFICATION	-0.233	-0.267	0.329
EQUITY	5.287***	5.422***	2.412
ROA	24.345***	24.095***	10.336***
TOBINQ	0.581	0.485	-0.058
ECONDEVELOP	1.326***	1.453***	1.573***
GDPVOL	-10.097***	-9.977***	-12.756***
LOANS * CRISIS	-0.866***	-0.978***	-0.465
DIVERSIFICATION * CRISIS	-1.289***	-1.093***	-2.161***
EQUITY * CRISIS	-8.278***	-9.110***	-3.117*
ROA * CRISIS	-8.721**	-7.810**	-4.407
TOBINQ * CRISIS	-0.396	-0.434	-0.461
ECONDEVELOP * CRISIS	-0.550***	-0.539***	-0.333***
GDPVOL * CRISIS	49.514***	51.115***	35.675***
Observations	7,258	7,258	3,693
Bank Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Incl. U.S. banks?	Yes	Yes	No
Number of Banks	823	823	410
Adjusted R-squared	0.55	0.551	0.398

Systemic Size and the Recent Crisis

Regressions on DD

Only true during the **recent crisis**

We also examine the effect of a **domestic crisis** using countries that have experienced a financial crisis prior to 2008 (as identified in Laeven and Valencia, 2008) and **regional crises** using South-East Asian economies between 1998 and 2001. Systemically larger banks did not take on additional risk during either domestic or regional banking crises.

Bad Behavior vs. Bad Luck

Marginal Effects of Regressions on DD

- We interact RETURN with systemic size and the crisis dummy to capture pre-crisis shareholder value maximization (i.e. RETURN*SYSTEMICSIZE*CRISIS). RETURN is defined as calender-year bank returns minus the average return of all sample banks listed in the same country.
- The marginal risk-taking effect of systemic size during the crisis does not differ by bank performance before the crisis.

During the Recent crisis (2008-2009)	
RETURN (10th percentile) = -0.349	-1.865***
RETURN (median) = -0.040	-1.964***
RETURN (90th percentile) = +0.337	-2.086***

Bank Leverage, Diversification and Risk-taking

- Bank leverage: Studies on bank leverage emphasize the possibility of asset-shifting in favor of riskier assets where moral hazard considerations play a role (Bhattacharya and Thakor, 1993). Therefore, the risk-shifting problem for banks which are both systemically large and more leveraged should be particularly severe during the recent crisis.
- Diversification: Goetz et al. (2011) find that when banks increase their geographic diversity, corporate insiders extract more private benefits. If shareholders find it difficult to monitor managerial risk-taking strategies in more diversified firms, we expect that the risk increasing effect of systemic size declines as banks become more diversified (and shareholders less powerful, Laeven and Levine, 2009).

Bank Leverage, Diversification and Risk-taking

Marginal Effects of Systemic Size on DD, by Leverage and Diversification

	Bank Leverage	Income Diversification
During the Recent Crisis (2008-2009)		
EQUITY (10th percentile) = 0.044	-1.681***	
EQUITY (median) = 0.080	-1.207*	
EQUITY (90th percentile) = 0.122	-0.661	
Outside the Recent Crisis (2008-2009)		
EQUITY (10th percentile) = 0.044	-0.374	
EQUITY (median) = 0.080	-0.206	
EQUITY (90th percentile) = 0.122	-0.021	
During the Recent Crisis (2008-2009)		
DIVERSIFICATION (10th percentile)= 0.103		-3.369***
DIVERSIFICATION (median) = 0.279		-2.624***
DIVERSIFICATION (90th percentile) = 0.497		-1.700***
Outside the Recent Crisis (2008-2009)		
DIVERSIFICATION (10th percentile)= 0.103		-2.277***
DIVERSIFICATION (median) = 0.279		-1.444***
DIVERSIFICATION (90th percentile) = 0.497		-0.414

- Table reports coefficients on SYSTEMICSIZE*CRISIS*EQUITY, etc.
- Bank leverage exacerbates the risk-increasing effect which systemic size has on bank risk-taking during the recent crisis.
- Income diversification mitigates the risk-increasing effect of systemic size. This effect is not restricted to the financial crisis.

Systemic Size, Market Discipline and Risk-Taking

- Subordinated debt has long been advocated as an effective mechanism to enhance the market discipline imposed on banks (Flannery and Sorescu, 1996; Flannery, 1998).
- Like equity investors, investors in subordinated debt are exposed to loss. But unlike equity investors, investors in subordinated debt will not benefit from gains linked to excessive risk-taking.
- Subordinated debt may undermine the ability of regulators to exercise forbearance during a crisis (Kwast et al., 1999).
- Since the prospect of regulatory forbearance is particularly high during a crisis, we expect that subordinated debt exerts a risk-reducing effect for systemically large banks during the recent crisis.

Systemic Size, Market Discipline and Risk-Taking

Marginal Effects of Systemic Size on DD, by Leverage and Diversification

- When subordinated debt represents $\geq$1.05% of bank liabilities, systemic size is not linked to increased risk-taking during the recent crisis.
- During non-crisis conditions, the effect of monitoring by subordinated debtholders is negligible.

During the Recent Crisis (2008-2009)	
NO SUBDEBT	-1.960***
SUBDEBT= median (1.05%)	-1.731***
SUBDEBT= 99th percentile (6.00%)	-0.646
Outside the Recent Crisis (2008-2009)	
NO SUBDEBT	-0.283
SUBDEBT= median (1.05%)	-0.482
SUBDEBT= 99 th percentile (6.00%)	-1.425*

Conclusions

- During the recent crisis, bank default risk has increased with systemic size. However, systemic size has not increased bank default risk during previous crises and there is no general risk-increasing effect linked to systemic size during non-crisis periods.
- Our main conclusion is that with the exception of the recent crisis banks do not take on additional risk as they grow in systemic size.
- The risk-increasing effect of systemic size during the recent crisis is higher if banks are more leveraged, less diversified, and hold less subordinated debt.
- The risk mitigating effect of income diversification for systemically large banks is not confined to the recent crisis. The results show that more diversified systemically large banks display a lower default risk during and outside the recent crisis.

Conclusions

- Three main policy implications
  - The results give little justification for subjecting systemically large banks to stricter and time-invariant capital requirements than less systemically large banks. Instead, hybrid securities such as CoCos?
  - Our results support a more widespread issue of subordinated debt instruments by systemically large banks.
  - Our results demonstrate that income diversification of systemically large banks can play an important role in reducing the riskiness of systemically large banking institutions. Our findings suggest that restricting the type of activities which systemically large banks are permitted to engage in will increase risk-taking unless activity restrictions are accompanied by restrictions on systemic size.

Thank you.