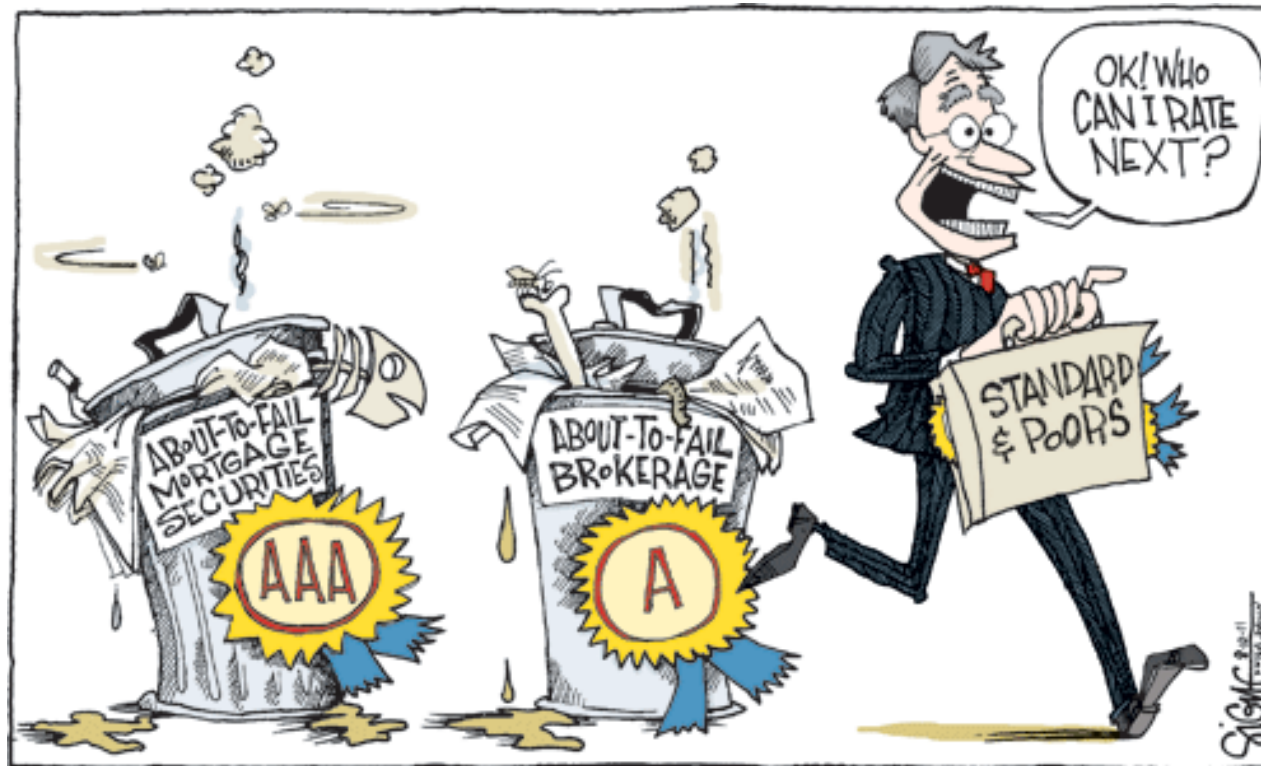


# Bank ratings: What determines their quality?



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# Why look at bank ratings?

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- Annual issuance in Europe: USD600 billion of unsecured bank debt
- Spectacular rating failures in the 2007–08 crisis expression of a general problem?
- Cornerstone of bank regulation, determine capital requirements for interbank exposure
- Ratings set investability thresholds for many institutional investors (segment markets)

# Literature

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- **Bank rating inherently difficult:**
  - Opacity of banks, increased complexity: Rating disagreement more frequent for banks (Morgan, 2002)
  - Bank business model should matter for rating quality
  - Rating agencies may find it too costly to produce high quality bank ratings
- **Conflicts of interest:**
  - “Issuer pays model” may lead to complacent ratings (Pagano and Volpin, 2010; White, 2010)
  - Rated firm can “shop for better ratings”
  - Rating agencies can undertake unsolicited ratings
  - Buy side is misled by flawed ratings
- **Buy side collusion with issuers and rating agencies**
  - Capital requirements and investability conditioned on ratings
  - Rating inflation is a collusion with buy side to evade regulatory requirements (Calomiris, 2009; Eving, 2012)
  - Why were so many ABSs on bank balance sheets?

# How to measure credit rating (CR) quality?

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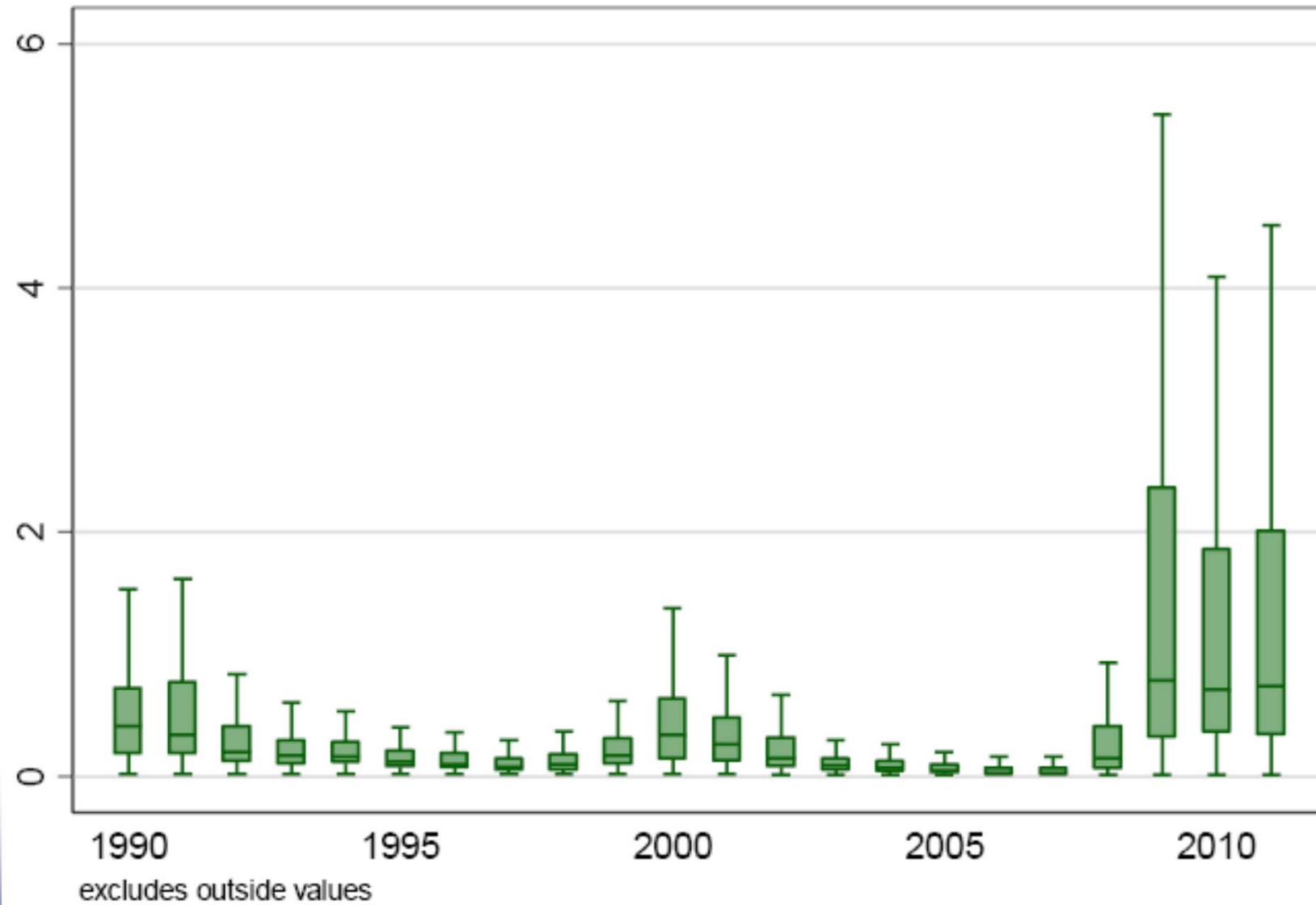
- Our measure of bank distress:

## **EDF: Expected default frequency**

Use KMV data from Moody's

- Obtained from a structural model predicting default once the bank asset value hits a default boundary
- Rating quality: How well do bank ratings predict expected default frequencies two years later?

# Expected default frequencies (EFDs)



## EDF data features

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- EDFs' distribution dramatically changes in crisis
- Interpretation of credit ratings:
  - Cardinal: CRs correspond to absolute EDF → ratings need to forecast the crisis
  - Ordinal: CRs provide ranking of EDFs  
→ only judge relative rating quality or rating consistency
- Ordinal approach is the weaker standard:
  - Error defined as the non-parametric difference of the EDF ranking and CR ranking

## Rating error as rank change

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- Perfect Rating: Ordering of bank CR corresponds perfectly to ordering of future EDFs
- Arbitrary Rating: No relationship between CR rank and future EDF rank
- *Non-Directional Error (ORQS)*

$$ORQS(a, i, t, k) = \frac{|EDF \text{ rank}(i, t + k) - \text{Credit Rating rank}(a, i, t)|}{N}$$

- *Directional Error (DORQS)*

$$DORQS(a, i, t, k) = \frac{EDF \text{ rank}(i, t + k) - \text{Credit Rating rank}(a, i, t)}{N}$$

# How to measure rating error?

---

- High rating quality:
  - CR rank and EDF rank are strongly related
  - Scattered along the 45 degree line in a CR-rank EDF rank plot
- Low rating quality:
  - CR rank and EDF rank shows no correlation
  - Uniform distribution in the CR rank – EDF rank plot

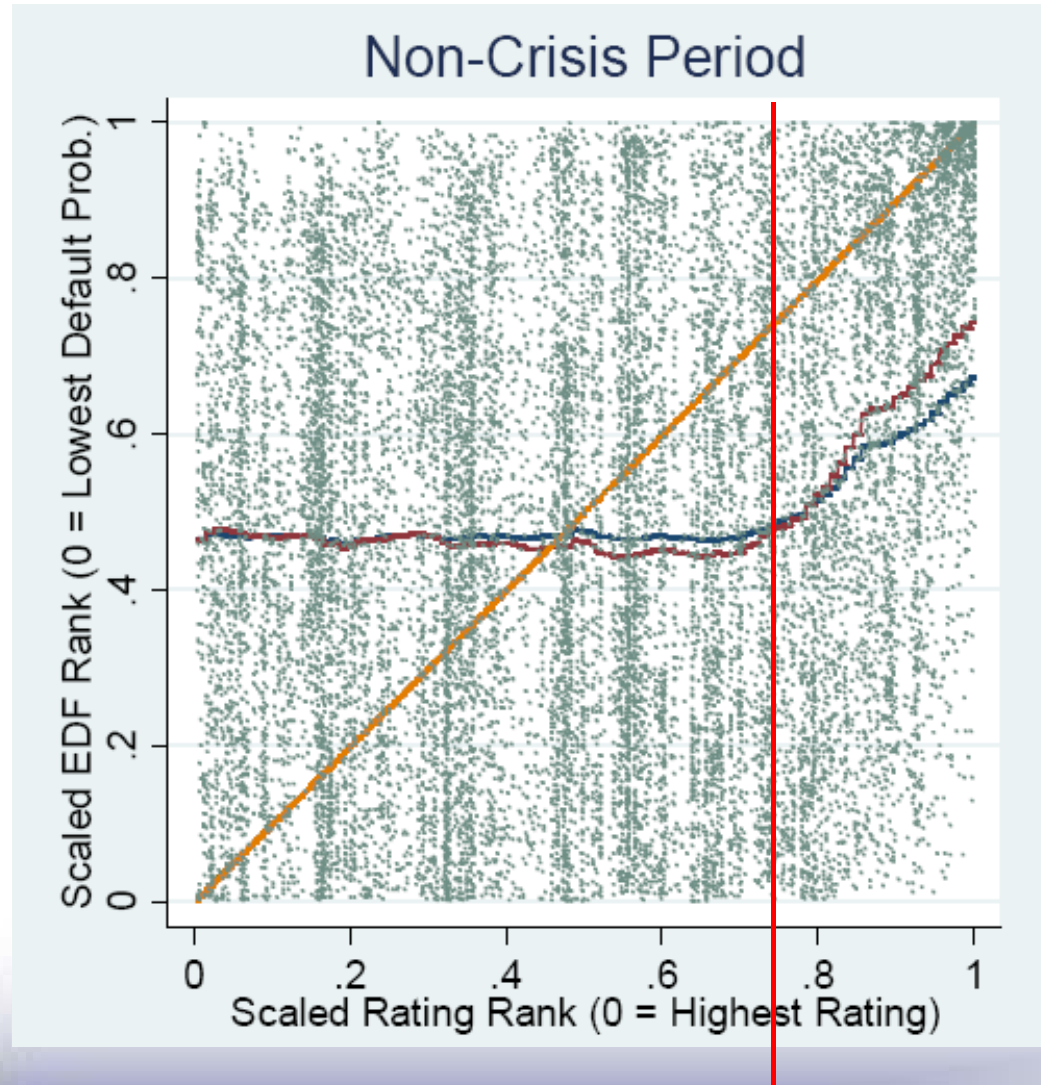


# Bank rating data

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- End quarter bank rating data from Moody's, S&P and Fitch for 1990-2011 on 369 banks headquartered in the US and EU15; ignore subsidiary ratings
  - Uniform rating scale across agencies
  - Further subdivide each grade by rating outlook (if possible)
- Use EDF data from Moody's (measured two years later)
  - EDF calculations are based on the Merton model
  - Drawing on Moody's data spares us any parameter choices
- Obtain 21,131 ORQS observations; 75% fall into 2000-2011

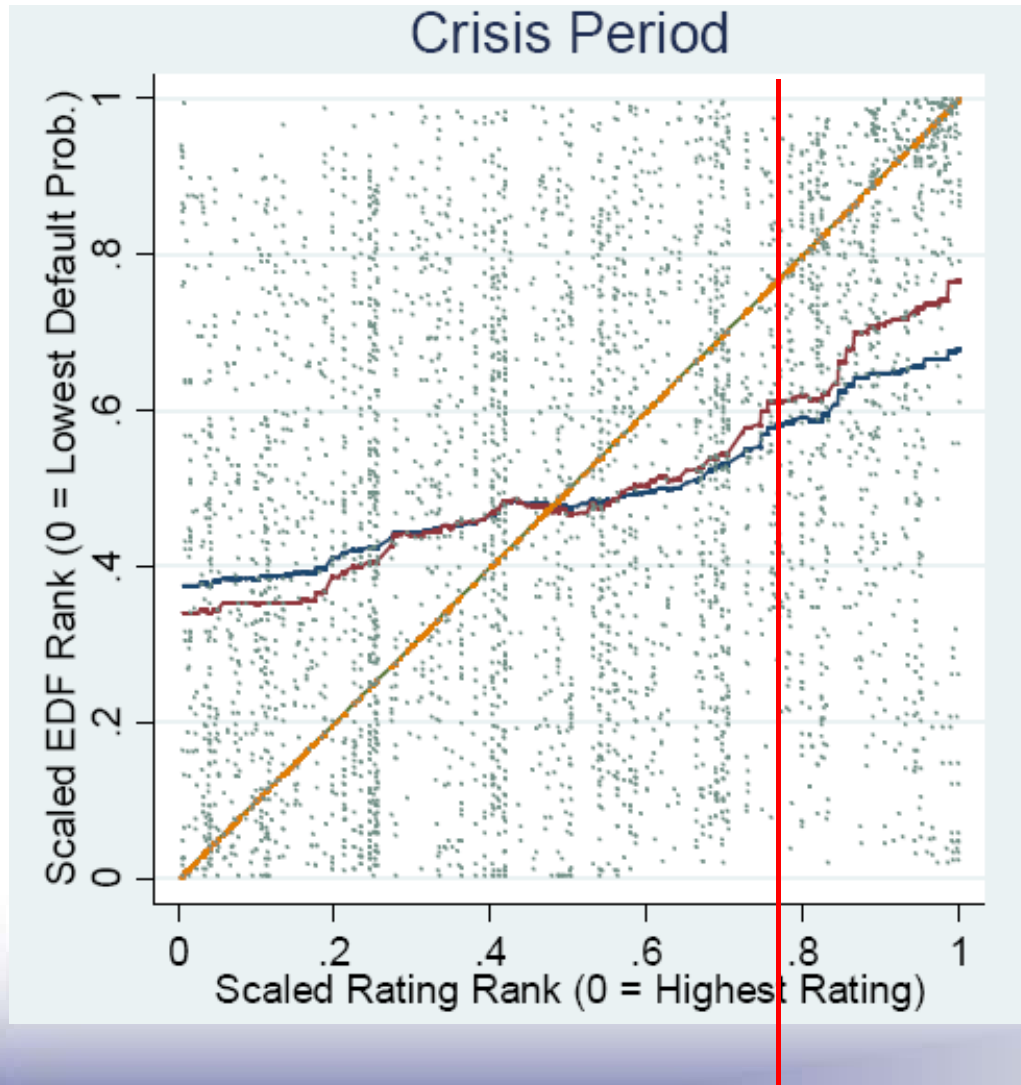
# Credit rating rank and EDF rank



- Uniform distribution in the investment grade range (AAA to BBB-)
- Correlation only for speculation rating range (BB+ to C)
- The ORQS is distance from the 45 degree line

<b>Credit Assessment</b>	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	unrated
<b>Risk Weight</b>	20%	50%	100%	100%	150%	100%

# Credit rating rank and EDF rank



- Weak correlation between rating rank and EDF rank also for investment grade range

# Rank correlations

**Table 3: Rating Quality and Rank Correlation**

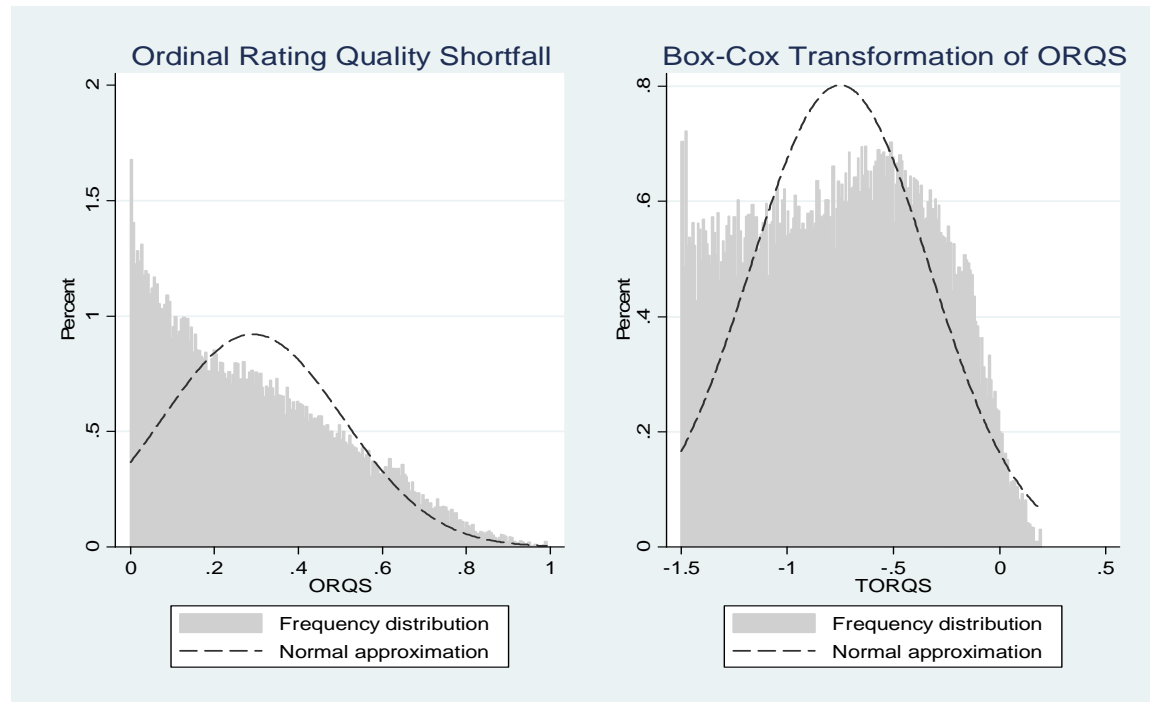
Panel A: Full Sample				
Spearman Correlation between Rating Rank and EDF Rank	Subsamples			Full sample
	Top Tier	Middle Tier	Bottom Tier	
k=0	0.031 ***	0.023 **	0.417 ***	0.283 ***
k=12	-0.004	-0.016	0.378 ***	0.238 ***
k=24	-0.009	-0.036 ***	0.352 ***	0.205 ***
k=36	-0.017	-0.026 **	0.342 ***	0.176 ***

- Investment grades (top and middle tier) contain no information about future EDF
- But Basel II and III impose steep risk weight changes

Credit Assessment	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	unrated
Risk Weight	20%	50%	100%	100%	150%	100%

# Alternative measures: TORQS and DORQS

- Use Box-Cox Transform of ORQS to make data more normal: TORQS
- Use directional measure of rating quality to capture rating bias:



$$DORQS(a, i, t, k) = \frac{EDF \text{ rank}(i, t + k) - \text{Credit Rating rank}(a, i, t)}{N}$$

# Hypotheses about rating quality

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- H1: Different in crisis and after credit booms?
- H2: Different across agencies and countries?
- H3: Do conflicts of interest matter?
- H4: Do bank characteristics matter?

# H1: Rating quality in crisis and after credit booms?

Dependent Variable	Non-Directional Error: TORQS		
	(1)	(2)	(3)
Crisis Dummy	-0.031 *** (0.006)	-0.026 *** (0.007)	-0.025 *** (0.007)
Credit growth		-0.211 *** (0.040)	-0.201 *** (0.040)
Av serial correlation	0.777	0.768	0.768
Country fixed effects	Yes	Yes	No
Bank fixed effects	No	No	Yes
Time fixed effects	No	No	No
No. of observations	21,131	18,218	18,218

- Ratings contain slightly more information (in an ordinal sense) during crisis and after strong credit growth (over the last 12 quarters); STD of TORQS = 0.43

## H2: Rating quality differs across agencies?

Dependent Variable	Non-Directional Error: TORQS			Directional Error: DORQS		
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Size</b>						
Log assets	0.013 ** (0.006)	0.019 *** (0.007)	0.019 *** (0.007)	0.051 *** (0.005)	0.042 *** (0.006)	0.042 *** (0.006)
<b>Securitization</b>						
ASSB		-0.002 ** (0.001)			0.005 *** (0.001)	
ASSB ex-guarantee			-0.002 ** (0.001)			0.005 *** (0.001)
<b>Agency Dummies</b>						
Moody's		-0.017 (0.026)	0.017 (0.026)		0.046 * (0.025)	0.046 * (0.025)
S&P		-0.006 (0.025)	-0.006 (0.025)		-0.083 *** (0.024)	-0.083 *** (0.024)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	17,226	17,226	17,226	17,226	17,226	17,226

- S&P ratings show less positive rating inflation

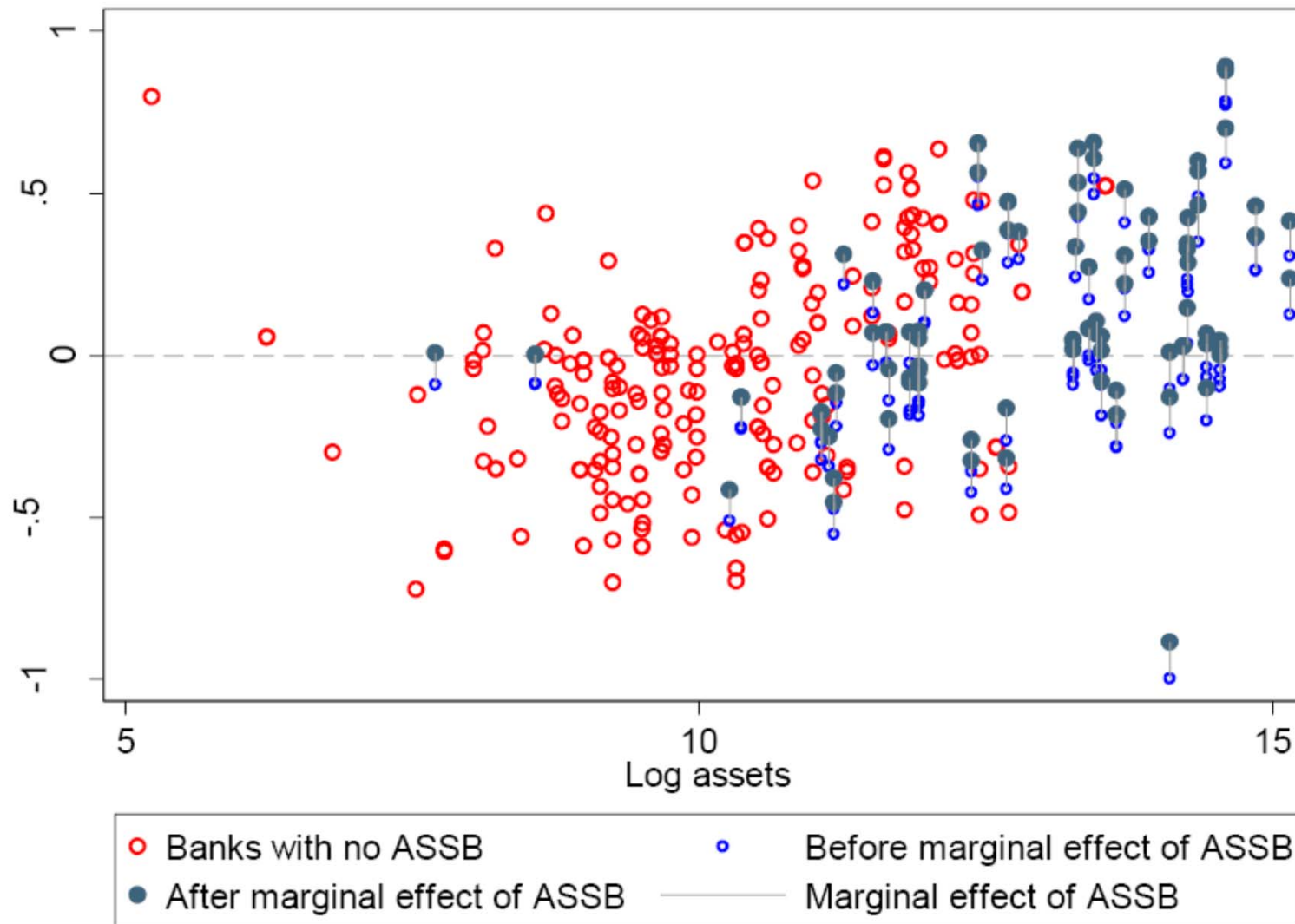


### H3: Is there conflicts of interest?

Dependent Variable	Non-Directional Error: TORQS			Directional Error: DORQS		
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Size</b>						
Log assets	0.013 ** (0.006)	0.019 *** (0.007)	0.019 *** (0.007)	0.051 *** (0.005)	0.042 *** (0.006)	0.042 *** (0.006)
<b>Securitization</b>						
ASSB		-0.002 ** (0.001)			0.005 *** (0.001)	
ASSB ex-guarantee			-0.002 ** (0.001)			0.005 *** (0.001)
<b>Agency Dummies</b>						
Moody's		-0.017 (0.026)	0.017 (0.026)		0.046 * (0.025)	0.046 * (0.025)
S&P		-0.006 (0.025)	-0.006 (0.025)		-0.083 *** (0.024)	-0.083 *** (0.024)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	17,226	17,226	17,226	17,226	17,226	17,226

- ASSB and Size come with rating inflation!
- ASSB ex guarantee ignores issuance volume with guarantees

# Effects of bank size and securitization business



# Bank Size by Rating Error and Rating Revision

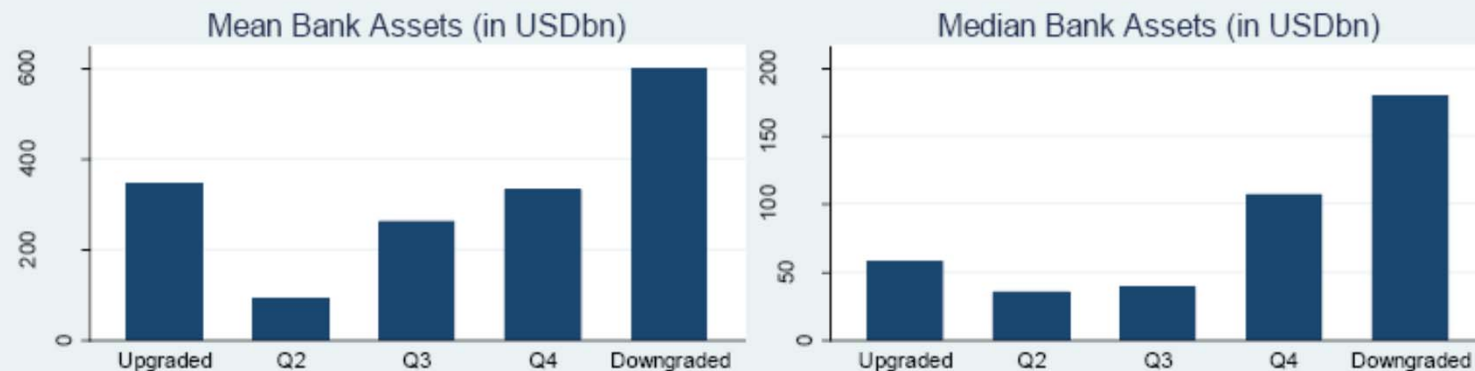
Panel A: Bank Size by DORQS Quintile

Measured Jan 2007 to Jan 2009



Panel B: Bank Size by Downgrade Quintile

Measured Jan 2007 to Jan 2009



## H4: Do bank characteristics matter?

Dependent Variable	Non-Directional Error: TORQS			Directional Error: DORQS		
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Size</b>						
Log assets	0.013 *	0.007	0.013 *	0.046 ***	0.042 ***	0.046 ***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)
<b>Securitisation</b>						
ASSB	-0.003 **	-0.002 *		0.004 ***	0.004 ***	
	(0.001)	(0.001)		(0.001)	(0.001)	
ASSB_ex_guarantee			-0.003 **			0.004 ***
			(0.001)			(0.001)
<b>Agency dummies</b>						
Moody's	-0.009	-0.003	-0.008	0.048 *	0.047 *	0.047 *
	0.027	(0.027)	0.027	(0.026)	(0.026)	(0.026)
S&P	0.001	0.006	0.001	-0.088 ***	-0.089 ***	-0.089 ***
	0.025	(0.025)	0.025	(0.024)	(0.024)	(0.024)
<b>Profitability</b>						
RoA	0.000	-0.002	0.000	0.003	0.003	0.003
	(0.005)	(0.004)	(0.005)	(0.003)	(0.002)	(0.003)
<b>Capital structure</b>						
Leverage	0.009	-0.018	0.009	-0.019	-0.005	-0.019
	(0.071)	(0.070)	(0.071)	(0.043)	(0.042)	(0.043)
<b>Asset structure</b>						
Loans share	-0.002 ***	-0.002 ***	-0.002 ***	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trading share	-4.341 *	-5.261 **	-4.323 *	0.528	0.218	0.528
	(2.257)	(2.255)	(2.256)	(1.299)	(1.291)	(1.299)
<b>Funding structure</b>						
Short-term funding share	-0.008	0.039	-0.012	-0.072 **	-0.058 *	-0.072 **
	(0.050)	(0.048)	(0.050)	(0.033)	(0.032)	(0.033)
<b>Rating Competition</b>						
Multiple rating dummy		0.001			-0.029 ***	
		(0.018)			(0.011)	
HH index		0.455			-0.145	
		(0.420)			(0.249)	

- Traditional banks with higher **Loan share** (relative to assets) have lower rating error (bank complexity matters?)
- Higher **trading share** in revenue reduced rating error (trading revenue as a crisis hedge?)

# Robustness I: What role for agency competition?

Dependent Variable	Non-Directional Error: TORQS			Directional Error: DORQS		
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Size</b>						
Log assets	0.013 *	0.007	0.013 *	0.046 ***	0.042 ***	0.046 ***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)
<b>Securitisation</b>						
ASSB	-0.003 **	-0.002 *		0.004 ***	0.004 ***	
	(0.001)	(0.001)		(0.001)	(0.001)	
ASSB_ex_guarantee			-0.003 **			0.004 ***
			(0.001)			(0.001)
<b>Agency dummies</b>						
Moody's	-0.009	-0.003	-0.008	0.048 *	0.047 *	0.047 *
	0.027	(0.027)	0.027	(0.026)	(0.026)	(0.026)
S&P	0.001	0.006	0.001	-0.088 ***	-0.089 ***	-0.089 ***
	0.025	(0.025)	0.025	(0.024)	(0.024)	(0.024)
<b>Profitability</b>						
RoA	0.000	-0.002	0.000	0.003	0.003	0.003
	(0.005)	(0.004)	(0.005)	(0.003)	(0.002)	(0.003)
<b>Capital structure</b>						
Leverage	0.009	-0.018	0.009	-0.019	-0.005	-0.019
	(0.071)	(0.070)	(0.071)	(0.043)	(0.042)	(0.043)
<b>Asset structure</b>						
Loans share	-0.002 ***	-0.002 ***	-0.002 ***	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trading share	-4.341 *	-5.261 **	-4.323 *	0.528	0.218	0.528
	(2.257)	(2.255)	(2.256)	(1.299)	(1.291)	(1.299)
<b>Funding structure</b>						
Short-term funding share	-0.008	0.039	-0.012	-0.072 **	-0.058 *	-0.072 **
	(0.050)	(0.048)	(0.050)	(0.033)	(0.032)	(0.033)
<b>Rating Competition</b>						
Multiple rating dummy		0.001			-0.029 ***	
		(0.018)			(0.011)	
HH index		0.455			-0.145	
		(0.420)			(0.249)	

- Banks with **Multiple Rating Dummy** have systematically lower ratings
- No evidence for “shopping for better ratings”

# Robustness II: Lags of EDF Measurement

Dependent Variable Lag (in quarters)	Non-Directional Error: TORQS			Directional Error: DORQS		
	0 (1)	4 (2)	12 (3)	0 (4)	4 (5)	12 (6)
<b>Size</b>						
Log assets	-0.007 (0.007)	0.001 (0.007)	0.005 (0.008)	0.022 *** (0.005)	0.040 *** (0.005)	0.036 *** (0.006)
<b>Securitisation</b>						
ASSB	-0.001 0.001	-0.001 (0.001)	-0.002 (0.001)	0.004 *** (0.001)	0.005 *** (0.001)	0.005 *** (0.001)
<b>Agency dummies</b>						
Moody's	0.010 0.028	0.018 0.026	-0.021 (0.029)	0.050 ** (0.023)	0.043 * (0.024)	0.056 ** (0.027)
S&P	0.020 0.027	0.016 0.025	-0.008 (0.027)	-0.074 *** (0.022)	-0.090 *** (0.023)	-0.086 *** (0.026)
<b>Profitability</b>						
RoA	0.021 *** (0.004)	0.005 (0.004)	-0.003 (0.005)	-0.010 *** (0.002)	-0.004 * (0.002)	0.002 (0.003)
<b>Capital structure</b>						
Leverage	0.260 *** (0.070)	0.064 (0.066)	0.069 (0.077)	0.111 *** (0.036)	0.083 ** (0.038)	0.069 (0.045)
<b>Asset structure</b>						
Loans share	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 * (0.001)	-0.001 *** (0.000)	0.000 * (0.000)	0.000 (0.000)
Trading share	6.050 *** (2.063)	-4.053 ** (2.009)	-3.569 (2.673)	0.882 (1.000)	-1.096 (1.073)	-4.322 *** (1.507)
<b>Funding structure</b>						
Short-term funding share	0.011 (0.051)	0.033 (0.047)	-0.009 (0.053)	-0.026 (0.029)	0.003 (0.030)	-0.103 *** (0.035)
<b>Rating Competition</b>						
Multiple rating dummy	0.010 (0.019)	-0.014 (0.018)	0.002 (0.019)	-0.025 ** (0.011)	-0.034 *** (0.011)	-0.017 (0.012)
HH index	0.008 (0.461)	-0.341 (0.425)	1.017 ** (0.437)	0.144 (0.239)	0.131 (0.245)	-0.141 (0.251)

- Similar bias for *Bank Size* and for *ASSB* at lags of 0, 4, or 12 quarters
- Same agency biases

- Trading share reduces bias

# Robustness III: Controlling for Government Support

Dependent Variable	Non-Directional Error: TORQS		Directional Error: DORQS	
	(1)	(2)	(3)	(4)
<b>Size</b>				
Log assets	0.013 (0.010)	0.009 (0.010)	0.048 *** (0.008)	0.044 *** (0.008)
<b>Securitisation</b>				
ASSB	-0.002 (0.002)	-0.002 (0.002)	0.004 ** (0.002)	0.004 ** (0.001)
<b>Government support</b>				
Rank difference: 'all-in' minus 'stand-alone'		0.181 *** (0.039)		0.326 *** (0.024)
<b>Profitability</b>				
RoA	-0.008 (0.007)	-0.008 (0.007)	0.004 (0.004)	0.004 (0.004)
<b>Capital structure</b>				
Leverage	-0.071 (0.094)	-0.076 (0.094)	0.009 (0.058)	0.022 (0.057)
<b>Asset structure</b>				
Loans share	-0.002 *** (0.001)	-0.002 *** (0.001)	0.000 (0.000)	0.000 (0.000)
Trading share	-6.424 ** (2.974)	-5.831 ** (2.973)	-1.516 (1.747)	-0.108 (1.725)
<b>Funding structure</b>				
Short-term funding share	0.020 (0.069)	0.033 (0.069)	0.006 (0.047)	0.025 (0.045)
<b>Rating Competition</b>				
Multiple rating dummy	-0.019 (0.028)	-0.020 (0.028)	-0.012 (0.018)	-0.014 (0.018)
HH index	-0.158 (0.723)	-0.021 (0.723)	-0.539 (0.450)	-0.098 (0.444)

- Is the size effect a “too large to fail” effect?
- Examine Rank difference between “all-in” and “stand-alone” ratings available for Fitch ratings
- This extra variable does not absorb the size effect



# Main findings and policy implications

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## ■ Ratings and bank regulation:

- Bank credit ratings contain very little or no information for banks with investment rating
- But Basel II and III impose steep risk weight changes across rating buckets
  - This regulatory privilege has no empirical justification: it looks arbitrary and could lead to market distortions

## ■ Ratings and conflict of interest:

- Rating agencies give large banks and those providing securitization revenue better ratings
- Rating biases are a serious competitive distortion in favour of large banks; reinforcing the “too big to fail problem”
- Competition (Multiple Ratings) correlates with less favourable ratings



# Policy implications

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## ■ Rating agency reform:

- Extending Liability (Dodd-Frank act) seems have failed (SEC withdrew proposal on ABS)
- Low quality of bank ratings make it impossible to create pecuniary incentives for better ratings
- Rating paid by user unlikely to work if buy-side has additional agency problems (Calomiris, 2011, Eving 2012)

## ■ What policy to recommend?

- Improve bank disclosure; thus reduce dependence on rating agencies
- Bloechlinger, Leippold and Maire (2012) show that better ratings can be constructed based only on public data