<u>Are Insurance Firms Systemically Important?</u>

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Based on vlab.stern.nyu.edu and Chapter 9

"Is the Insurance Industry Systemically Risky?" with Matt Richardson in

Modernizing Insurance Regulation, John Biggs and Matth Richardson, eds,

John Wiley and Sons, Inc., forthcoming

What is "systemic risk"?

- Micro-prudential view: Contagion
  - Failure of an entity leads to distress or failures of others
- Macro-prudential view:
  - Common factor exposures + Inability to rollover/honor liabilities
  - Several entities fail together as
    - Maturing liabilities demand immediacy
    - Against long-term assets
    - But the system has limited capacity (capital?) to provide immediacy

- The micro-prudential and macro-prudential views are not necessarily mutually exclusive

Tsunami vs Domino view of systemic risk

- Macro-prudential view: Contagion can amplify problems *provided* rest of the system cannot
  - Withstand the distress or failures of others, e.g., because it is under-capitalized too due to a common shock (AIG FP failure)
  - Re-intermediate the liquidated assets of distressed firms (Lehman)

- Contagion can arise *without* inter-connections
  - Information contagion
    - Learning about common assets (Great Depression "runs")
  - Flow of funds or re-intermediation contagion
    - If insurance firms withdraw from supplying bonds, would that induce runs on bank lines of credit?

Can we predict tsunamis?

- **Refine. Two separate questions in fact:**
  - Can we predict tsunamis?
  - Can we say which firm are exposed to the risk of tsunamis?

- Aggregate evidence: Giglio, Kelly, Pruitt (2014)
  - Using data on leverage and market prices
    1. Systemic risk indexes are related to macro tail risk
    2. Financial volatility is informative, non-fin is not
  - *Too little, too late:*
    - Some predictive power, but not very large, and too late for significant action

Systemic risk at the firm level

- **Cross-Sectional Evidence**

  - Which firms are more exposed?

- *Significant information in relative market prices*

  - Traders might not be very good at predicting aggregate risk, but conditional on an aggregate crisis they seem able to figure out who is exposed and who is not

Predictive power of MES (equity)
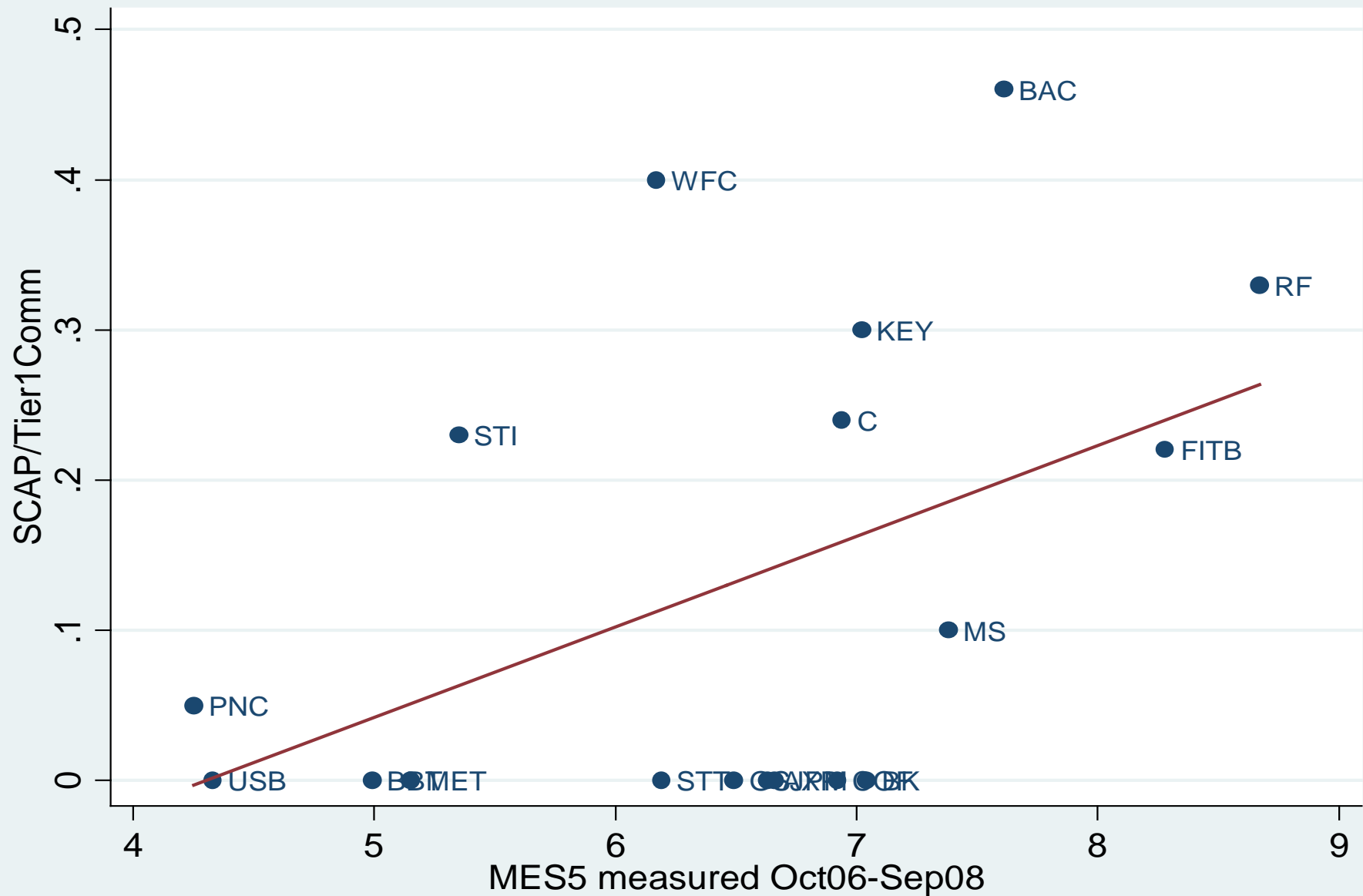
Source: Acharya, Pedersen, Philippon and Richardson (2010)

Our preferred question on systemic risk

- "Suppose firm X fails, would this, <u>by itself</u>, create systemic risk?"
  - Answer no for almost all firms
  - *Not the right question in our view*
  - Central clearing?
- "Suppose there was a large negative shock, will X make things significantly worse?"
  - *Right question in our view*
  - In a crisis, you are either part of the problem or part of the solution.

NYU Stern view of Systemic Risk

- When the failure of an institution to meet its obligations has serious consequences for the real economy

- Failure of one institution will be much more dangerous for the real economy if other institutions are also in a weak position

Regulatory Challenge

- Ensure that financial institutions have sufficient capital so that they can <u>not only survive</u> a crisis, but <u>continue to provide financial intermediation services</u> at reasonable prices to the real economy.

- Good financial regulation is not about rescue or survival on the death-bed but prevention or ensuring of good health.

SRISK: Capital shortfall in a crisis

- *How much capital would a financial institution need to raise in order to function normally if we have another financial crisis?* We call this *SRISK*.

- We measure this econometrically based on market data on equities and balance sheet data on liabilities. We update weekly on V-LAB for US and Global financial firms.

- Principle investigators: Viral Acharya, Rob Engle and Matt Richardson at the Volatility Institute at NYU's Stern School. Collaboration with HEC Lausanne and the Institute for Global Finance at University of New South Wales. Contributions by Christian Brownlees, Rob Capellini, Diane Perriet, Emil Siriwardane.

- References: Acharya, Pedersen, Phillipon, Richardson "Measuring Systemic Risk (2010); Acharya, Engle, Richardson "Capital Shortfall, A New Approach to Ranking and Regulating Systemic Risks, AEAPP (2012), Brownlees and Engle, "Volatilities, Correlations and Tails for Systemic Risk Measurement",2010

Formal definition of *SRISK*

- SRISK is computed from:

$$SRISK_{i,t} = E_t \left(Capital\ Shortfall_i \middle| Crisis \right)$$

$$= E_t \left(k \left(Debt_{t+n} + Equity_{t+n} \right) - Equity_{t+n} \middle| Crisis_{t+n} \right)$$

$$= \left[kDebt_{i,t} - \left(1 - k \right)\left(1 - LRMES_{i,t} \right) Equity_{i,t} \right]$$

- Where *k* is a prudential level of market equity relative to quasi-market value of assets.

- *LRMES* is the decline in equity values to be expected if there is another financial crisis.

- ***SRISK depends upon size, <u>leverage and risk</u>.***

Example

- Suppose Bank of America has a market cap of $141billion. Its accounting liabilities are $2.0 trillion for a leverage ratio of 14.9
- If we have another financial crisis which is assumed to be a fall of 40% in broad US equities over six months, then we estimate shares in BAC will fall by 50%.
- This is based on an estimate of Dynamic Conditional Beta today that will move in the future due to mean reversion in volatilities and correlations and also will rise with downside returns.

- SRISK = $91 billion.
  - It is undercapitalized somewhat today and this will be more severe under the stress of an equity decline.

SRISK is a market-based stress test

- The stress scenario is a 40% collapse in the global equity market over six months.

- The capital requirement is that, under stress, equity exceed 8% of total assets

- Total Assets are measured as Quasi Assets which are accounting liabilities plus market equity

- All econometrics of SRISK are in estimation of LRMES using Dynamic Conditional Beta

- The implied "risk weight" from SRISK $<= 0$ is increasing in *LRMES* of the financial firm

SRISK based on Equity (Aug 21, 2015)
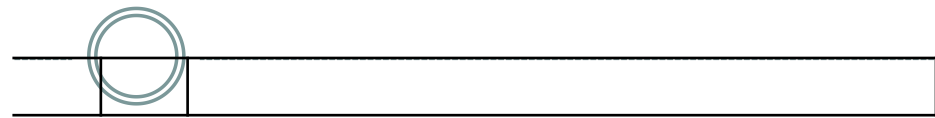
US Financials Systemic Risk Top Ten

TOP 10	SRISK	MES	LVG
Bank of America Corp	50,954	2.37	12.29
JPMorgan Chase & Co	40,610	2.60	10.35
Prudential Financial Inc	39,808	3.14	21.07
Citigroup Inc	39,041	2.79	10.98
MetLife Inc	37,731	3.22	15.97
Morgan Stanley	25,798	3.25	12.23
Goldman Sachs Group Inc/The	16,539	2.90	10.35
Lincoln National Corp	12,651	3.63	19.42
Principal Financial Group Inc	7,260	2.25	14.37
Genworth Financial Inc	6,577	4.72	41.92

Jan 31, 2007 to Aug 21, 2015

| Institution	SRISK (t)	SRISK (t - 1)	Δ SRISK	Δ(DEBT)	Δ(EQUITY)	Δ(RISK)
Bank of America Corp	69,365.4	-41,273.2	110,638.5	45,832.8	37,108.3	27,697.5
Citigroup Inc	41,170.7	-23,491.2	64,661.9	-12,368.4	63,051.5	13,978.8
Prudential Financial Inc	40,021.9	6,176.3	33,845.7	24,495.7	3,507.0	5,843.0
MetLife Inc	39,247.3	20,087.6	19,159.7	26,872.2	-3,641.2	-4,071.3
JPMorgan Chase & Co	36,517.1	-24,215.2	60,732.2	77,813.1	-38,709.9	21,629.0
Morgan Stanley	27,068.5	56,162.3	-29,093.8	-26,803.6	8,477.3	-10,767.5
Lincoln National Corp	12,714.3	2,877.3	9,837.0	5,437.7	3,052.1	1,347.2
Goldman Sachs Group Inc/The	12,301.2	32,859.6	-20,558.4	-2,503.8	2,508.9	-20,563.6
Principal Financial Group Inc	7,095.2	458.7	6,636.5	6,142.4	452.6	41.5
Genworth Financial Inc	6,580.4	-2,550.0	9,130.4	-328.3	7,072.1	2,386.5
State Street Corp	5,973.1	-2,991.0	8,964.1	13,822.2	-3,238.4	-1,619.7
Hartford Financial Services Group Inc/The	4,494.5	7,026.3	-2,531.8	-7,034.5	6,732.4	-2,229.7

Aug 31, 2009 to Aug 21, 2015

Institution	SRISK (t)	SRISK (t - 1)	Δ SRISK	Δ(DEBT)	Δ(EQUITY)	Δ(RISK)
Bank of America Corp	69,365.4	102,499.0	-33,133.7	-8,149.4	-6,889.8	-18,094.5
Citigroup Inc	41,170.7	114,845.2	-73,674.5	-6,754.8	-47,508.9	-19,410.8
Prudential Financial Inc	40,021.9	24,637.2	15,384.8	24,922.3	-6,132.1	-3,405.5
MetLife Inc	39,247.3	27,905.0	11,342.3	27,726.0	-10,170.6	-6,213.1
JPMorgan Chase & Co	36,517.1	72,134.0	-35,616.9	26,921.4	-34,222.4	-28,316.0
Morgan Stanley	27,068.5	32,592.6	-5,524.1	10,017.8	-12,865.5	-2,676.4
Lincoln National Corp	12,714.3	10,448.3	2,266.0	6,103.6	-1,938.0	-1,899.6
Goldman Sachs Group Inc/The	12,301.2	22,174.4	-9,873.2	-4,754.7	1,442.6	-6,561.1
Principal Financial Group Inc	7,095.2	7,055.4	39.8	7,011.8	-3,241.0	-3,731.0
Genworth Financial Inc	6,580.4	6,656.2	-75.7	-113.5	682.4	-644.6
State Street Corp	5,973.1	582.6	5,390.5	10,524.9	-1,972.4	-3,161.9
Hartford Financial Services Group Inc/The	4,494.5	19,217.8	-14,723.3	-4,520.1	-6,063.9	-4,139.3

SRISK based on CDS

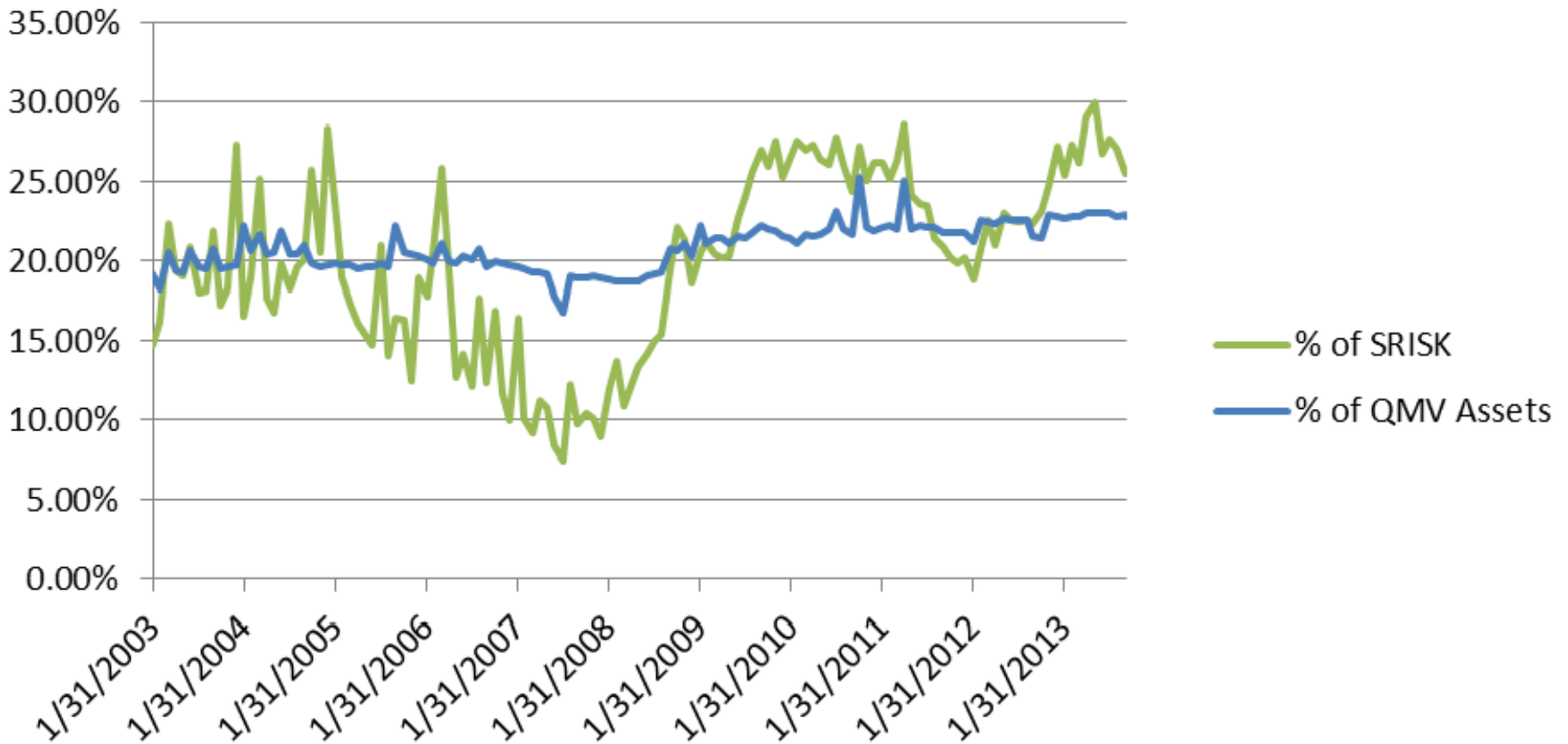
US SRISK
Total vs. Insurers (US$ Billion)

Legend: Total CS, Insurer's CS
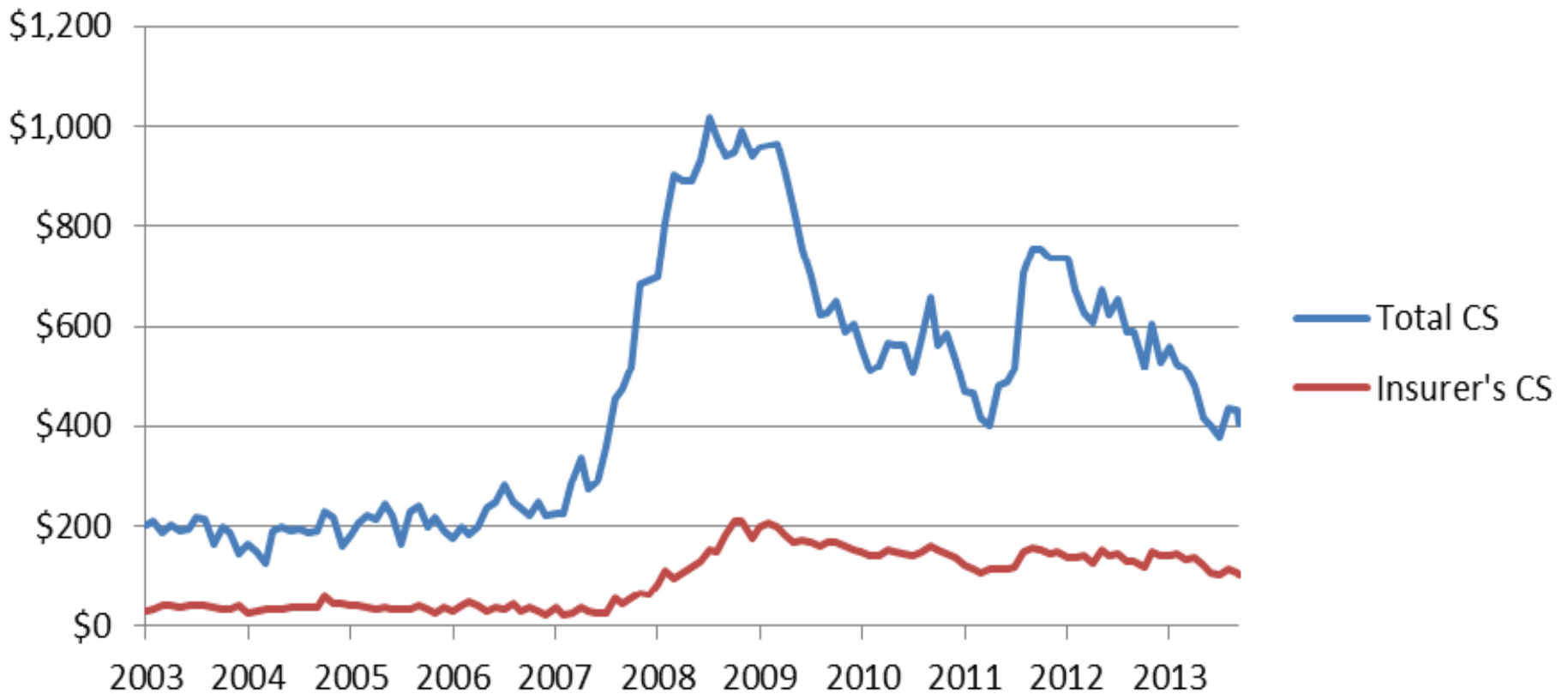
SRISK Based on CDS

Insurers % of Total SRISK

Insurance and systemic risk

Common wisdom :

- Traditional insurance model is *not* systemic

- True, under "domino" view of systemic risk
- False, under "tsunami" view of systemic risk

- But less traditional model *might be* systemic under both views

Traditional insurance model is *not* systemic

- No maturity transformation
- Not very interconnected
- Not too much leverage
- No liquidity risk

Cummins & Weiss (2014)

Evolution of Traditional Model?

- No maturity transformation?
  - OK, but insurance can build in financial guarantees (Hartford).

Evolution of Traditional Model?

- ~~No maturity transformation.~~
- Not very interconnected?
  - Interconnections come from reinsurance.
    - This has not created systemic risk so far.
  - Interconnections are not explicit and come through flow-of-funds chain.
    - Drying up of corporate bonds would put strain on bank lines of credit.
- Exacerbated by:
  - Concentration in supplying finance (Corporate bonds)?
  - Search for yield? (Life Insurers)
  - Shadow reinsurance? (Life Insurers)
  - Derivatives? (AIG FP)
  - Securities lending? (AIG FP)

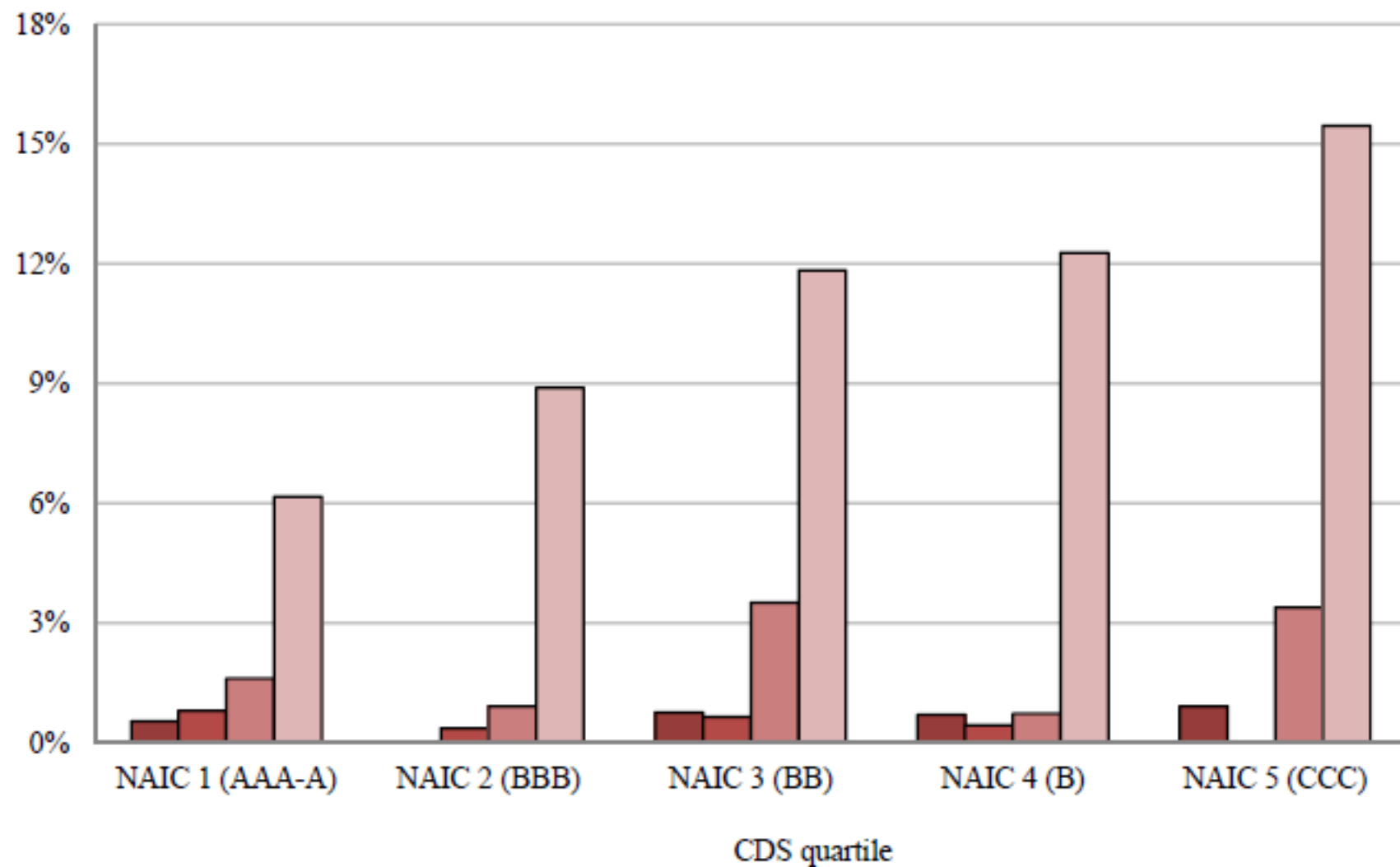# Recent evidence – Insurance firms appear to be seeking risks like banks!

○ Becker-Ivashina (HBS Working Paper, 2013):

○ Insurance firms "search for yield" in corporate bond holdings within a rating class

  ⚔ Regulatory arbitrage subject to risk (ratings)-based capital requirements
  ⚔ Shows "capital efficiency" or in other words "leverage"-building
  ⚔ Behavior akin to that observed in banks
    ○ Greater reaching for yield in economic expansions
   ○ More by insurance firms closer to regulatory capital constraint

NAIC Quarterly Transition Probability by CDS Quartile

ure shows probability of downward (Panel A) and upgrade (Panel B) transition between different NAIC r
es sorted by CDS quartiles. For example, probability of NAIC 2 asset in the highest CDS quartile to be
ded is 9%. However, probability of NAIC 3 asset in the highest CDS quartile to be downgraded is 12%.
owngrade as a change in rating that moves an issuer from one NAIC to any lower NAIC within the quarte
ice.

A. Downgrades

CDS quartile

B.   *Upgrades*

CDS quartile

■ 1 (lowest)   ■ 2   ■ 3   ■ 4 (highest)
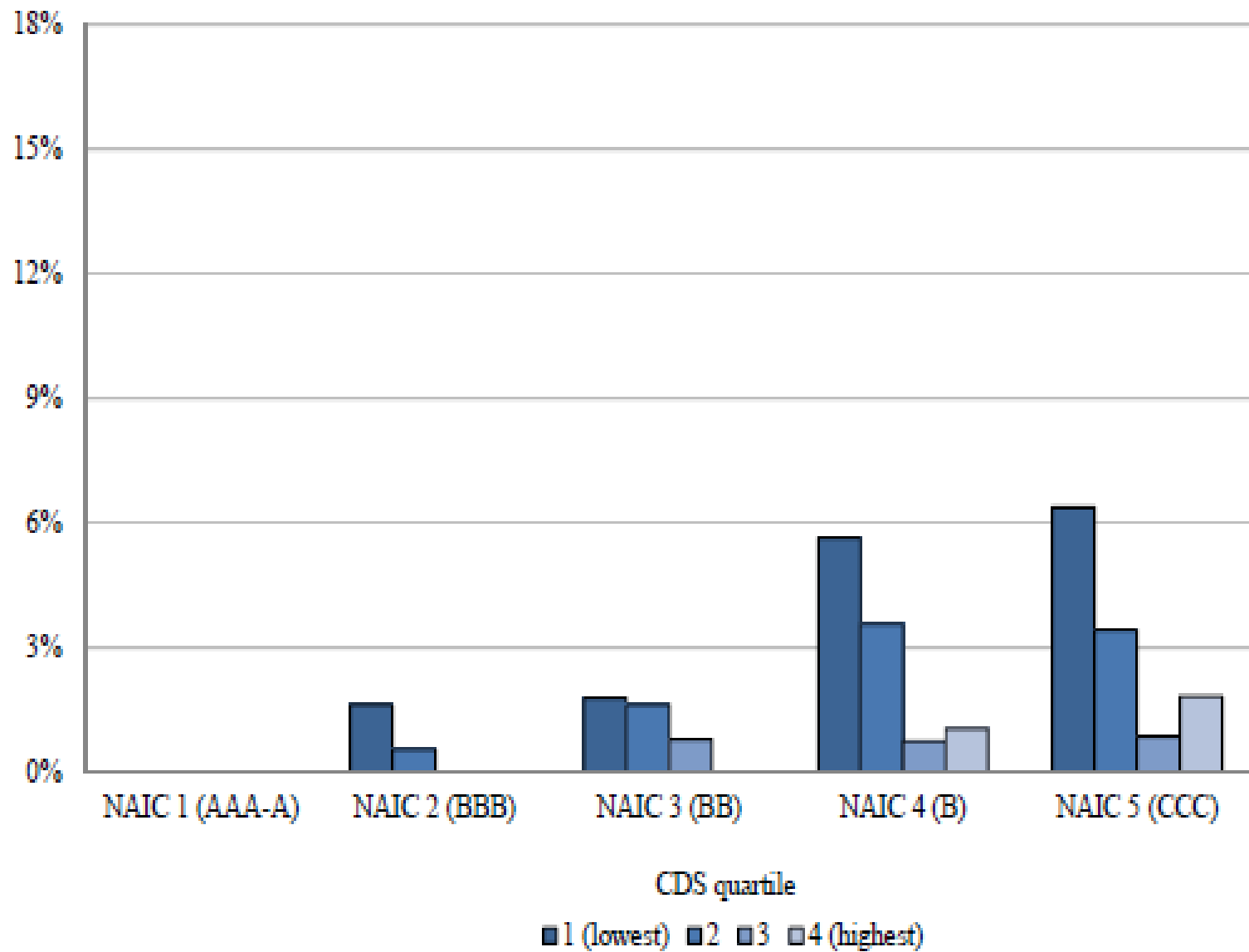
Recent evidence – Insurance firms appear to be seeking risks like banks!

- Becker-Opp (Berkeley Hass Working Paper, 2014):

- Capital requirements for RMBS holdings reduced dramatically while moving from ratings to prop measures
  - Approx 20% of asset holdings of insurers in structured products
  - 2009 reform by the NAIC reducing RMBS capital required by 67%
  - Capital calculation based on expected losses!
    - What about "unexpected losses"? – Flies in the face of basic principles of prudential capital requirements
  - Capital calculation based on book value of asset rather than its risk!
    - Asset held at purchase price in normal market has zero capital
  - A capital relief (for large and perhaps distressed-in-2009 insurers) amounting to over $15 bln relative to the earlier risk-based system
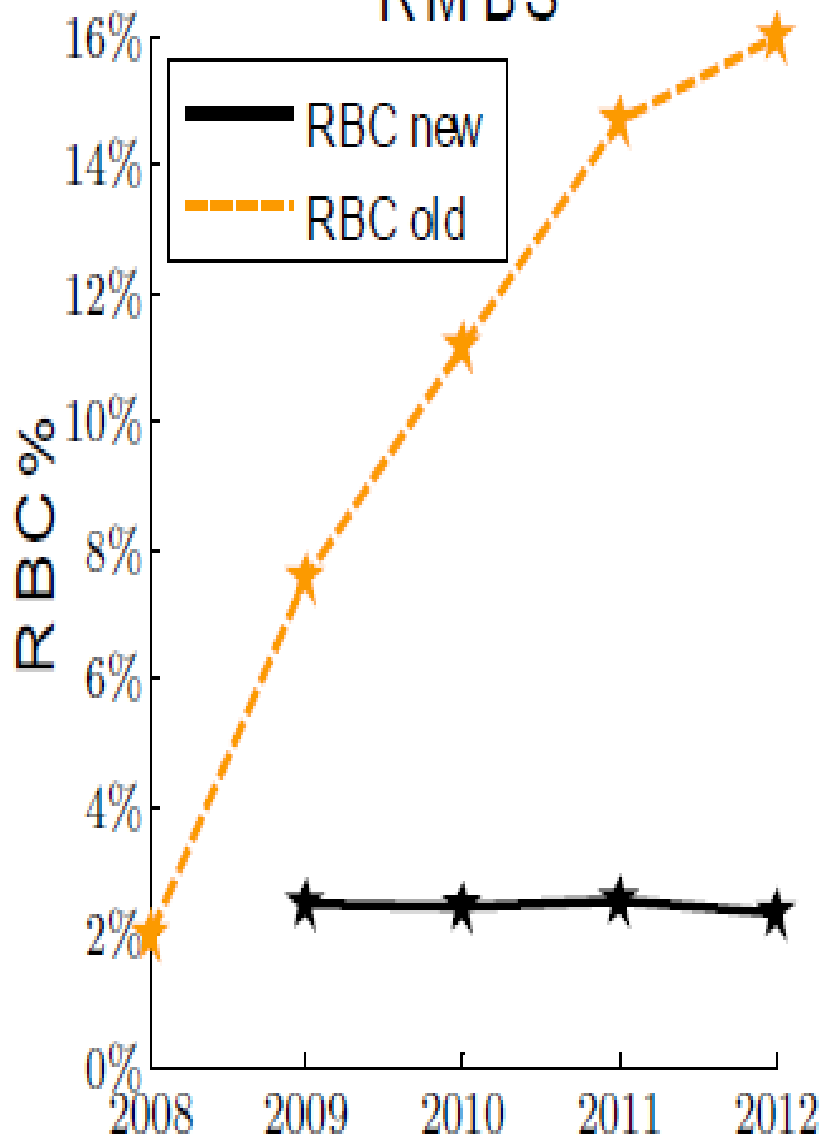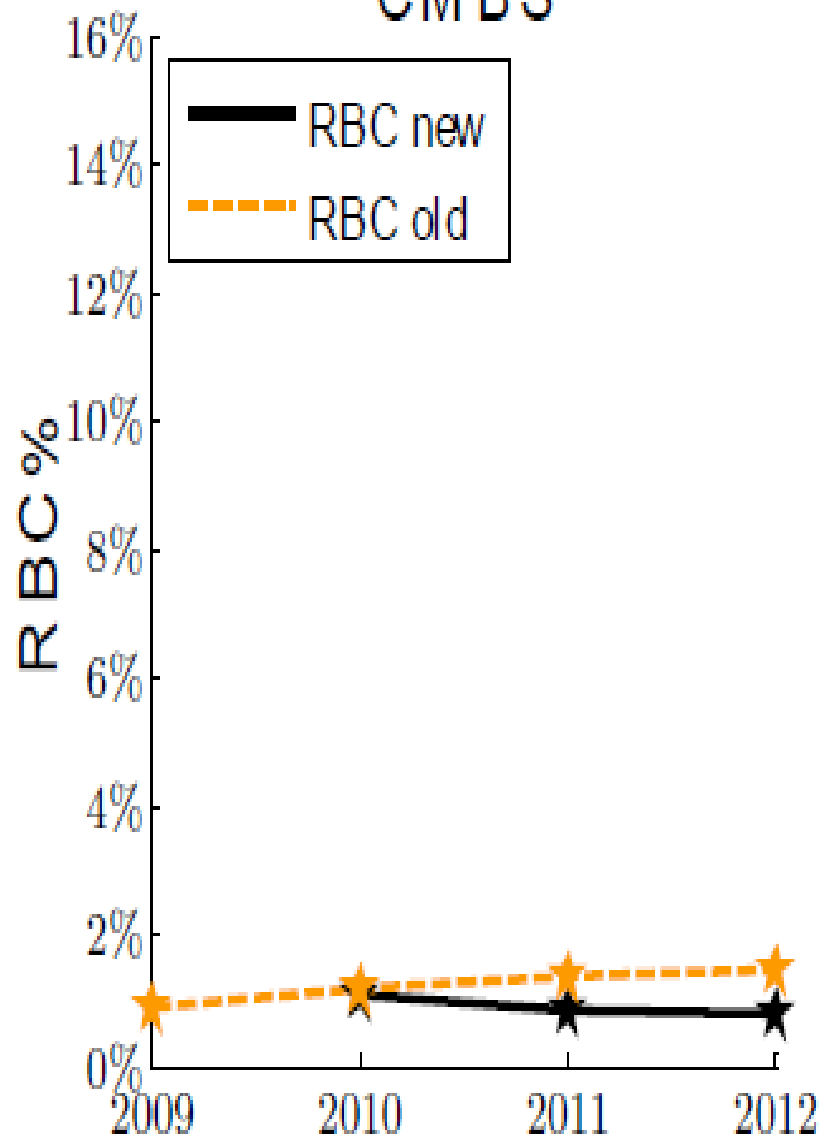
Figure 5 – Risk taking across asset classes as a function of the new system
The figure plots the composition of the insurance industry's purchases of newly issued securities 2008-2012, by asset category. Asset categories are Corporate Bonds, Municipal Bonds, MBS, Other Asset Backed (Federal Government securities are excluded). Only rated securities with a category indicated in NAIC data are included. Each graphs represents the fraction of aggregate purchases in a category (valued at par) that are rated investment grade. For expository clarity, exact values are only displayed for MBS. Total purchases of $980 billion are reflected in the graph.
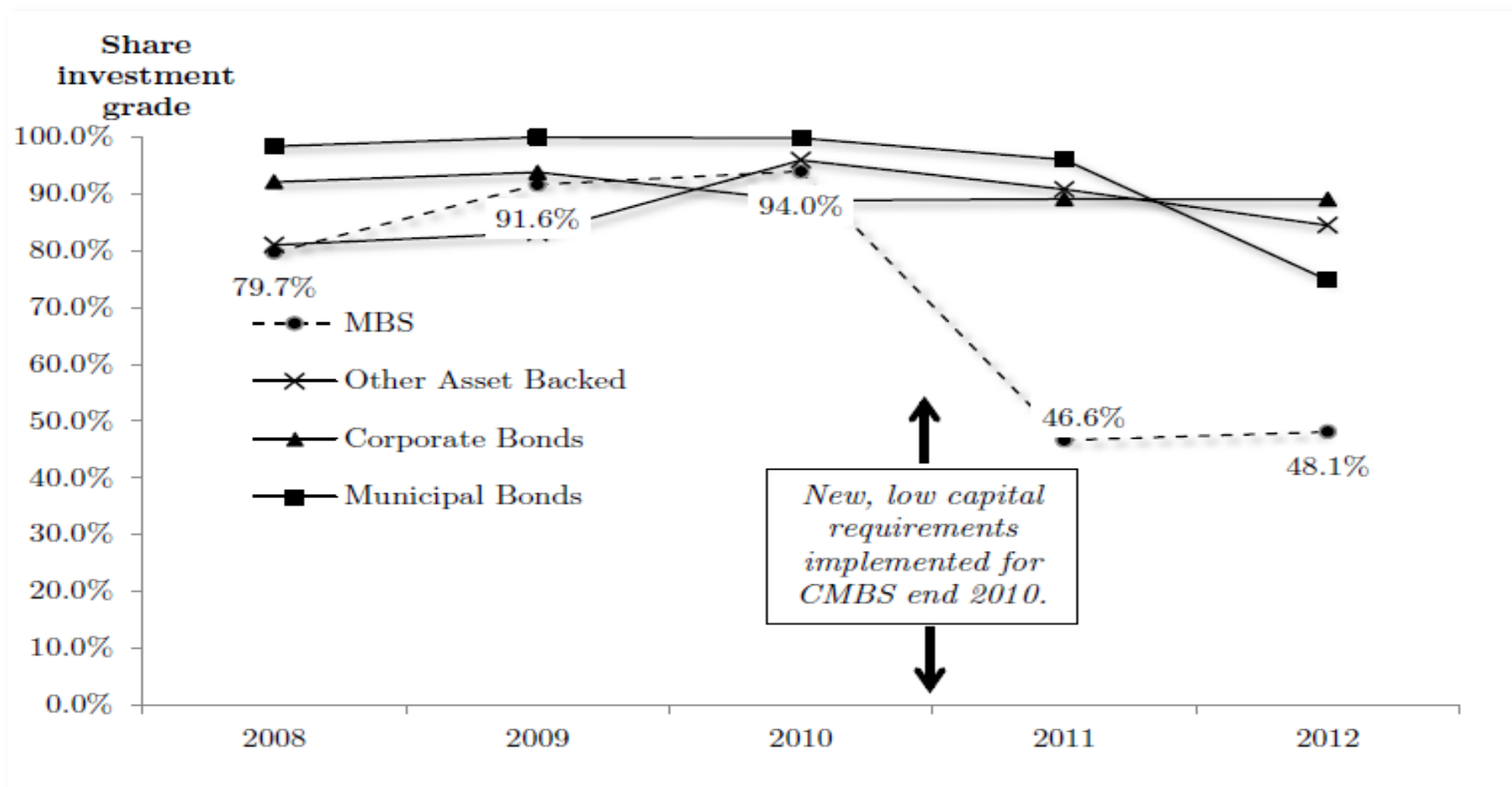
Recent evidence – Insurance firms appear to be retaining risks like banks!

- Koijen-Yogo (FRB Working Paper, 2013):

- Insurance firms deploy riskier, weakly-regulated, off-balance-sheet "shadow insurance" or "captive" vehicles (in South Carolina, Vermont or off-shore):
  - E.g.: MetLife's affiliated firm that "reinsurances" MetLife!
  - $11 bln in 2002 to $363 bln in 2012
  - A benefit of three rating notches in AM Best (ignores shadows!!)
  - Expected losses to state guarantee funds greater by $15bln
  - "Capital efficiency" aka "regulatory arbitrage" has allowed the insurance sector to free up reserves and increase its size
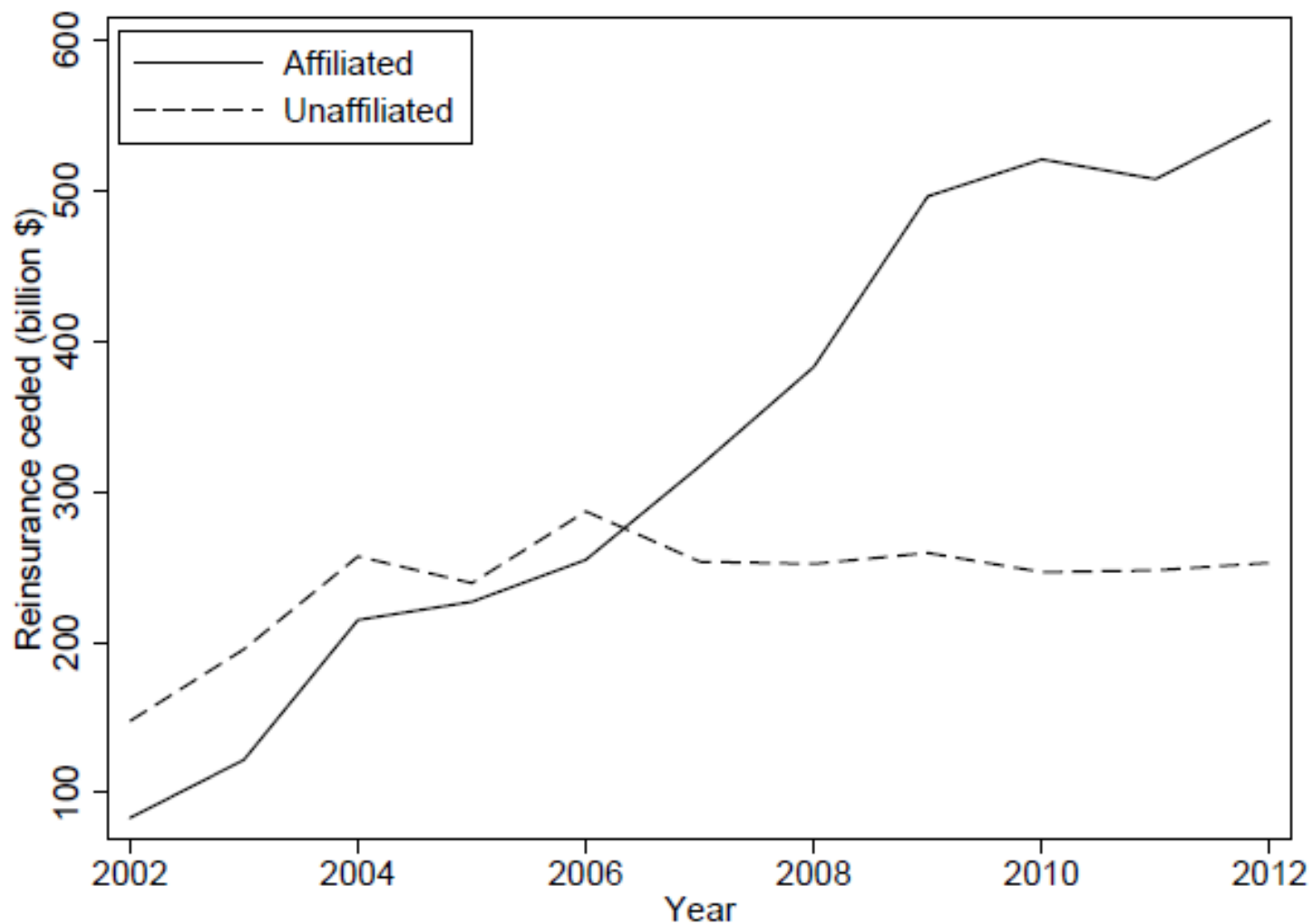   - Akin to bank-sponsored ABCP conduits, first "runs" of 2007?

Figure 1: Reinsurance Ceded by U.S. Life Insurers

This figure reports life and annuity reinsurance ceded by U.S. life insurers to affiliated and unaffiliated reinsurers. Reinsurance ceded is the sum of reserve credit taken and modified coinsurance reserve ceded.
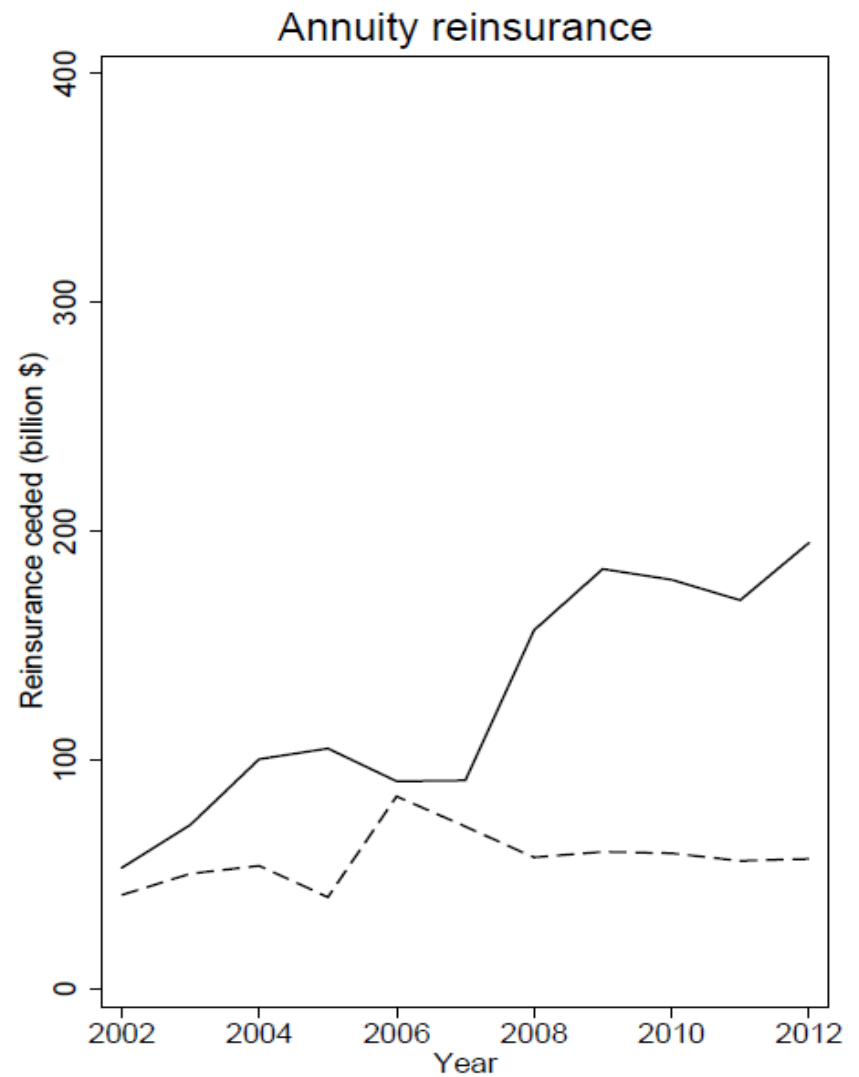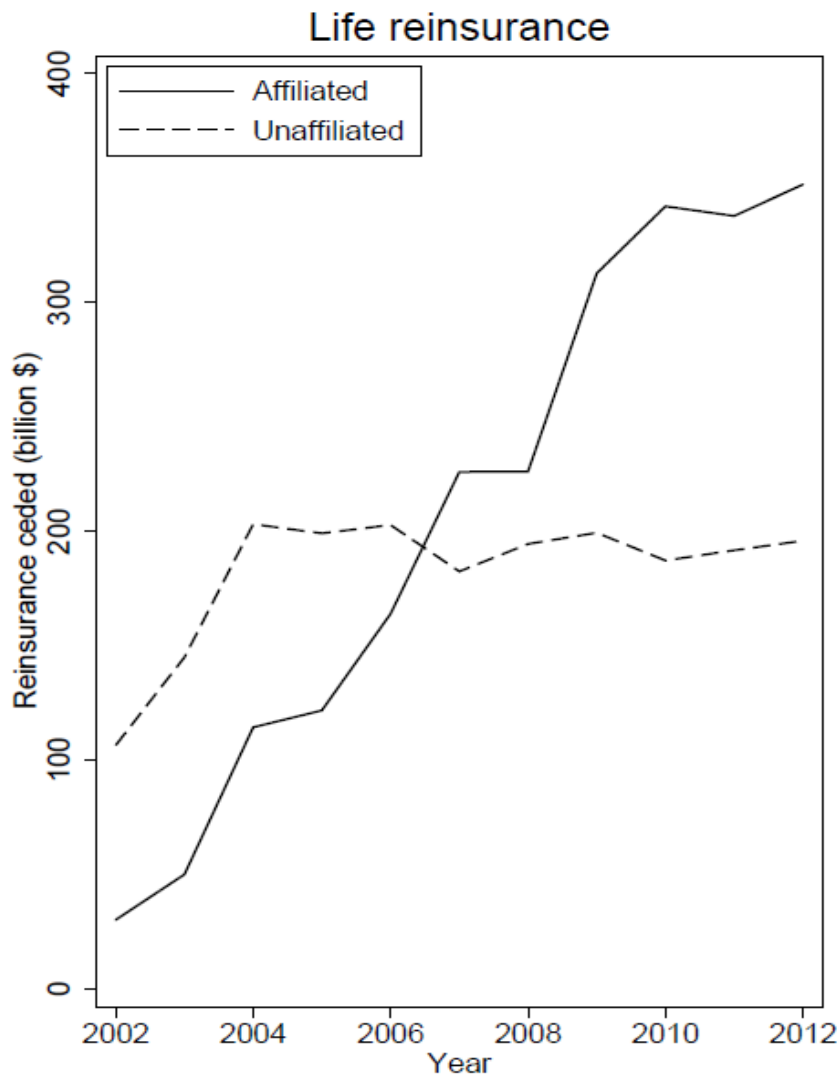
Figure 2: Life versus Annuity Reinsurance Ceded by U.S. Life Insurers

This figure reports reinsurance ceded by U.S. life insurers to affiliated and unaffiliated reinsurers, separately for life and annuity reinsurance. Reinsurance ceded is the sum of reserve credit taken and modified coinsurance reserve ceded.
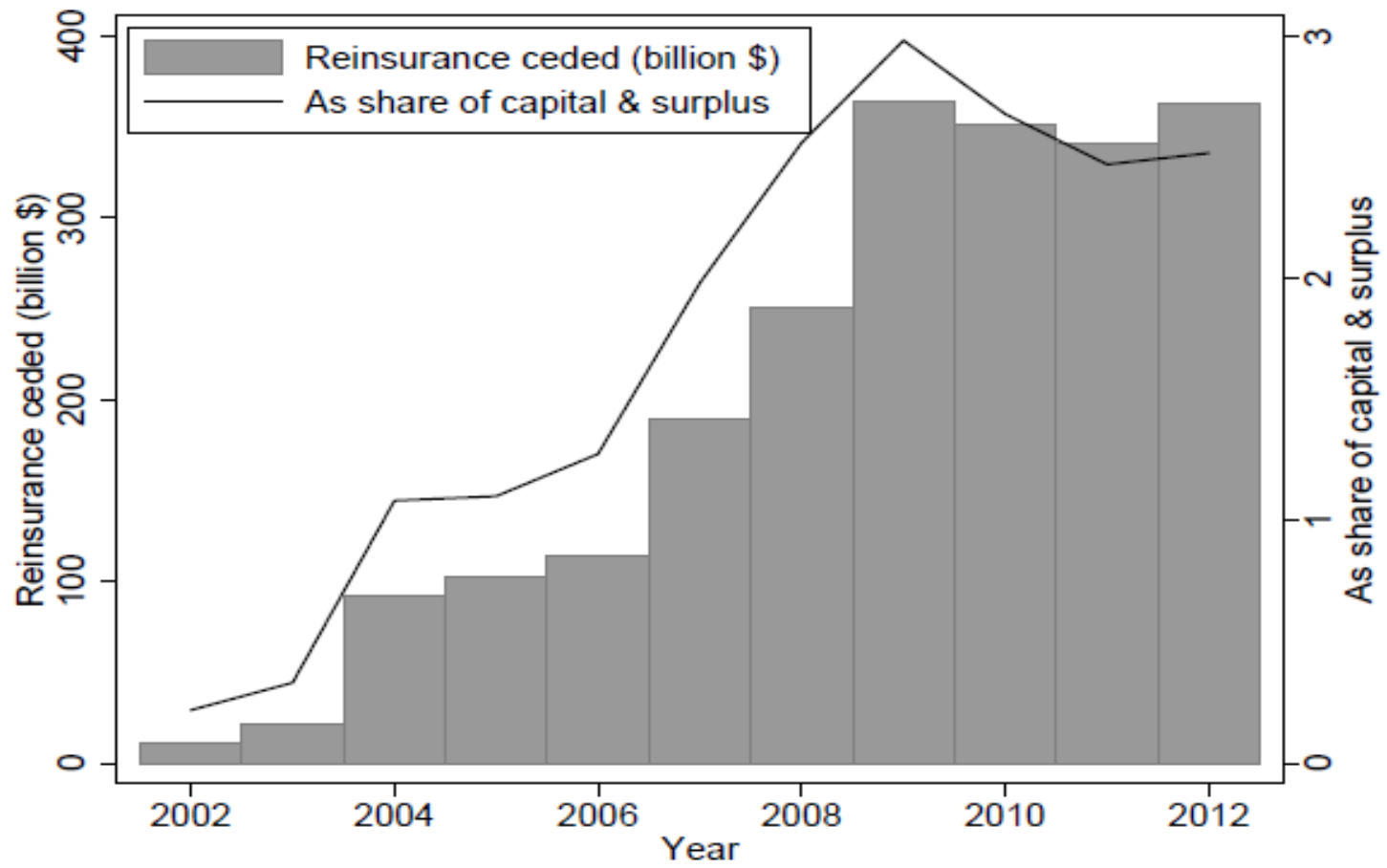
Figure 6: Reinsurance Ceded to Shadow Reinsurers

This figure reports life and annuity reinsurance ceded by U.S. life insurers to shadow reinsurers, both in total dollars and as a share of the capital and surplus of the ceding companies. Shadow reinsurers are affiliated and unauthorized reinsurers without an A.M. Best rating. Reinsurance ceded is the sum of reserve credit taken and modified coinsurance reserve ceded.

Evolution of traditional model?

- No maturity transformation
- Not very interconnected

- Not too much leverage?
- No liquidity risk?

  ➢ Look at recent balance sheets

Less leverage?

US, 2012 Banks   P&C Insurers   Life Insurers

Liabilities and Equity	Dollars	% Liabilities	Dollars	% Non-SA Liabilities	Dollars	% Liabilities
Reserves	852.2	78.9	2,942.75	87.5		
Deposits					10,014.1	84.2
Borrowed funds	11.8	1.1	15.6	0.5	1,141.1	9.6
Subordinated notes					117.5	1.0
All other liabilities (non-SA)	215.6	20.0	405.9	12.1	615.6	5.2
Total liabilities (non-SA)			3,364.3			
Separate accounts			2,067.2			
Total liabilities	1,079.7	100.0	5,431.6	100.0	11,888.4	100.0
Total equity	611.5	56.6	338.4	10.1	1,502.7	12.6
Total liabilities and equity	1,691.2		5,770.0		13,391.1	

Source: Cummins & Weiss (2014).

Leverage and liquidity?

- P&C have a lot more equity, as expected
- Life about same leverage as banks
  - But (likely) less liquidity risk due to "core" nature of liabilities

Take-away so far

- Banks and insurers are not the same.
- Banks have unique features that make *even traditional* banking model systemic.
- Insurance has certain features that possibly make *even traditional* insurance model systemic.
- But *non traditional* growing in insurance, and can certainly increase systemic risk.

Non-traditional model

- ## More exposed to aggregate risk
  - Investment products with non-diversifiable risks
  - Write insurance against macro risks
- ## More exposed to liquidity risk, on A and L
  - A: MBS & Privately placed bonds
  - L: Variable annuities run-proof?
- ## More integrated with financial markets
  - Securities lending

➢ *Implications & Challenges for Future Research?*

Open questions (for Insurance Firms!)

- Why did market values of insurance firms collapse so much in Fall of 2008?

- Why did some of the firms need TARP?

- Why are downside risk (*MES*) estimates of insurance firms as high as those of bank holding companies?

- Why were insurance firms owning banks, making guaranteed financial products, selling CDS, etc.?

- Why does capital shortfall of MetLife and Prudential show increase post 2010 when banks are de-leveraging?

- If a large insurer such as MetLife fails, can it be "resolved" without public support?

Open questions (for Insurance Firms!)

- If insurance firm liabilities are more stable, won't they take advantage of that and keep less equity on balance-sheet a priori?
  - Recent evidence that insurance firms engaging in capital-reducing and risk-enhancing strategies
- When market value of insurance firms collapse, won't that affect their corporate bond market purchases and potentially also result in fire sales, policy lapses, etc.?
  - Insurance sector own $2.5trn of corporate and foreign bonds
- Won't lack of corporate bond market access cause firms to draw down bank lines of credit causing "bank runs"?
  - Is insurance sector really not connected to the financial plumbing?

Conclusion

- The jury is still out on whether insurance firms are systemically risky or not

- Their behavior over past decade does not give us confidence that they are not candidates for being "systemically important financial institutions" (SIFIs)
    - The regulatory and risk-taking practices at insurance sector look as problematic as those at pre-crisis banks

- Crisis always happens in institutions and assets we make the mistake of treating as "fail-safe"!
    - Keep them on "watch list"; level-playing field in stress tests

I am not impressed at all!

"They take one class of securities and change the rules to give insurers capital relief. Let's just hope they aren't picking something out that results in inadequate capital." (Commentary on 2009 NAICS reform)

Large insurance firms are prone to same risk-taking and capital-efficiency games as banks and should be subject to SIFI rules by FSOC and international agencies

SELF-REGULATION IS TO REGULATION AS

SELF-IMPORTANCE IS TO IMPORTANCE! ☺