

# Global Financial Systems

## Chapter 16

### Failures in Risk Management and Regulations

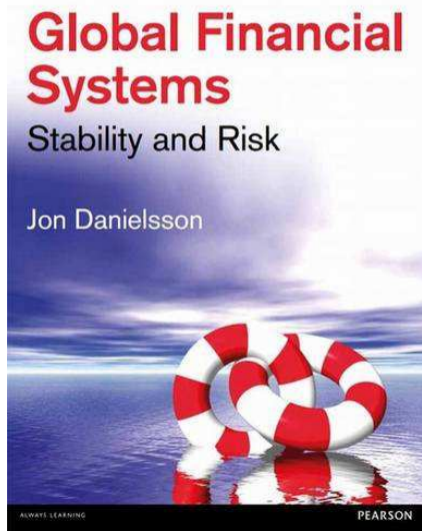
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*Global Financial Systems: Stability and Risk*  
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## Book and slides



- Updated versions of the slides can be downloaded from the book web page [www.globalfinancialsystems.org](http://www.globalfinancialsystems.org)

# Regulatory Failures

## 2007 misperception

- Risk is like *engineering*
- If it is measured and managed correctly
- The system is permanently stable and safe
- “What could possibly go wrong?”

This is incorrect

# The real nature of risk

intelligent buildings don't behave to undermine the engineers

- If we perceive risk as being low, we are incentivized to take more risk
- In a way that is hidden
- “*Stability breeds instability*”

## Was there excessive deregulation?

- During Bretton Woods the financial system was nailed down
  - and banking crises were uncommon — other types more frequent
- Regulations often targeted *broad activities* like capital flows
- With a patchwork of different regulations in jurisdictions that didn't cooperate
- Now regulations are increasingly *micromanaging*
- And are internationally coordinated
- In many ways the system had never been more regulated than 2007
- Crisis did not happen because of a *lack* of regulations, rather regulation *ineffectiveness*

# Was there excessive risk-taking?

yes but the interesting question is why

- *Neither* risk managers nor supervisors thought risk-taking was excessive
- The excess risk passed *unnoticed* because
  1. Regulations and risk management focused on *day-to-day risk* not extreme risk
  2. They ignored endogenous risk, focusing on perceived risk

## Risk target levels

- Basel II (and I) focus on 99% 10 day Value-at-Risk (VaR), but it is really a 1 day VaR
- This event happens 2.5 times a year — hardly extreme or systemic
- Extreme risk or tail risk might refer to the worst event in 10, 20 or 100 years
- The problem is, it's *much harder to model and manage extreme risk*
- So risk managers and supervisors preferred to *work with what they could easily manage*
- Old joke about policeman, drunk and keys
- Blinded by the “Great Moderation”



# (Non) normality and (non-)linear dependence

- An assumption of (conditional) normality and linear dependence was common
- Even though neither is true
- Really hit the quant funds in the summer of 2007

# Goldman Sachs's flagship Global Alpha fund

“We were seeing things that were 25–standard deviation moves, several days in a row,” said David Viniar, Goldman’s chief financial officer. “There have been issues in some of the other quantitative spaces. But nothing like what we saw last week.”

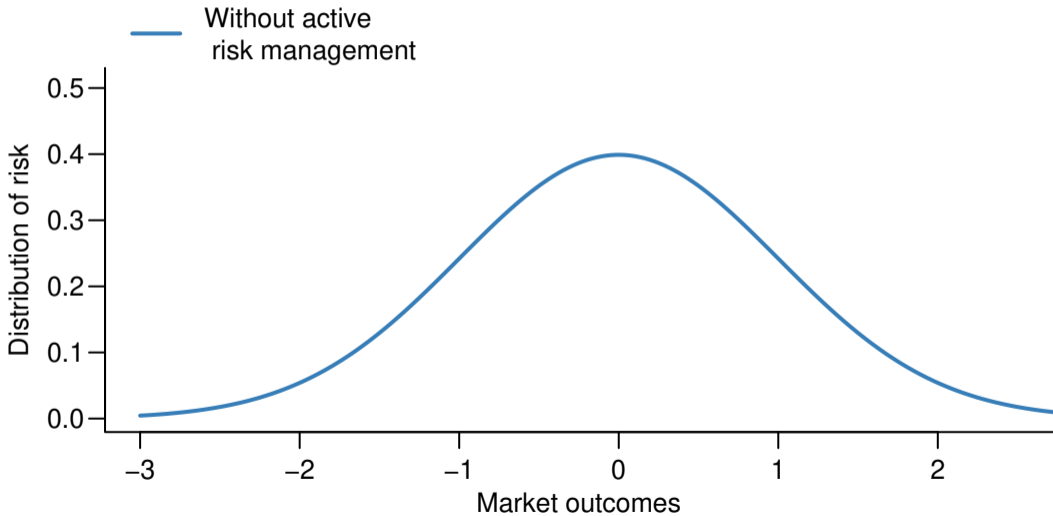
# Lehmans

“Wednesday is the type of day people will remember in quant- land for a very long time,” said Mr. Rothman, a University of Chicago Ph.D. who ran a quantitative fund before joining Lehman Brothers. “Events that models only predicted would happen once in 10,000 years happened every day for three days.”

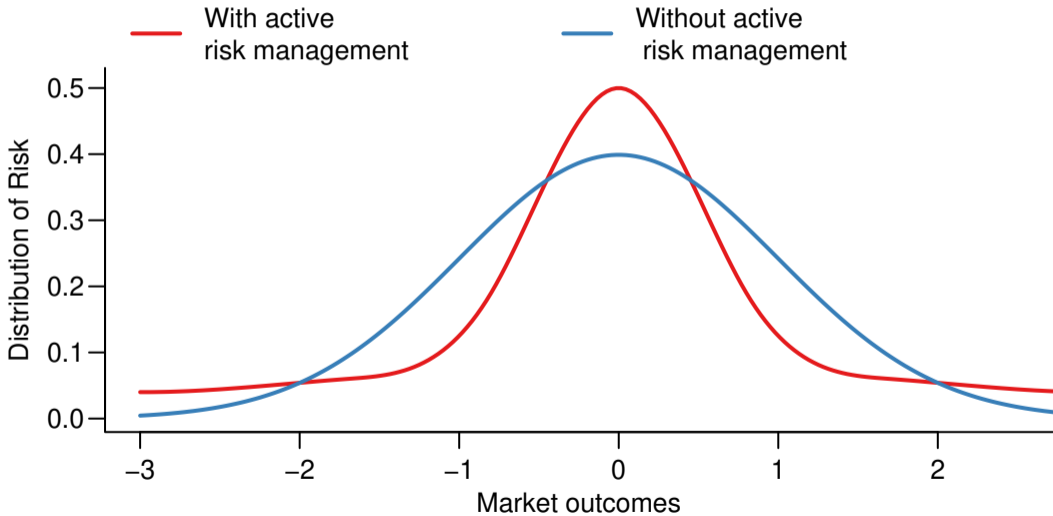
## Volatility and fat tails

- Volatility is a common measure of risk
- It is the only correct *if and only if* the returns are normal
- Goldman's 25 sigma event under the normal has a probability of  $3 \times 10^{-138}$
- Age of the universe is estimated to be  $5 \times 10^{12}$  days whilst the earth is  $1.6^{12}$  days old
- Goldman expected to suffer a one-day loss of this magnitude less than one every  $1.5^{125}$  universes
- Or perhaps the distributions were really not Gaussian

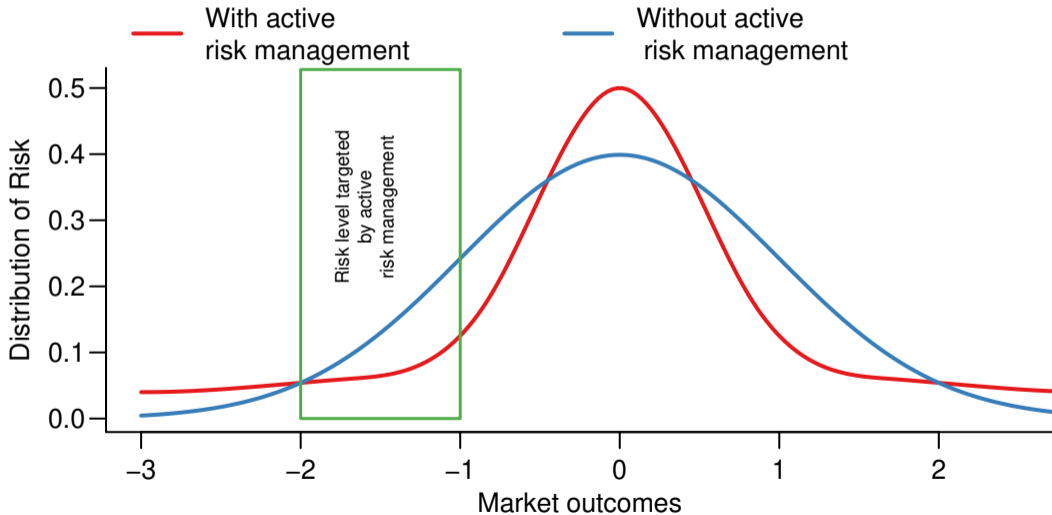
# Impact of active risk management



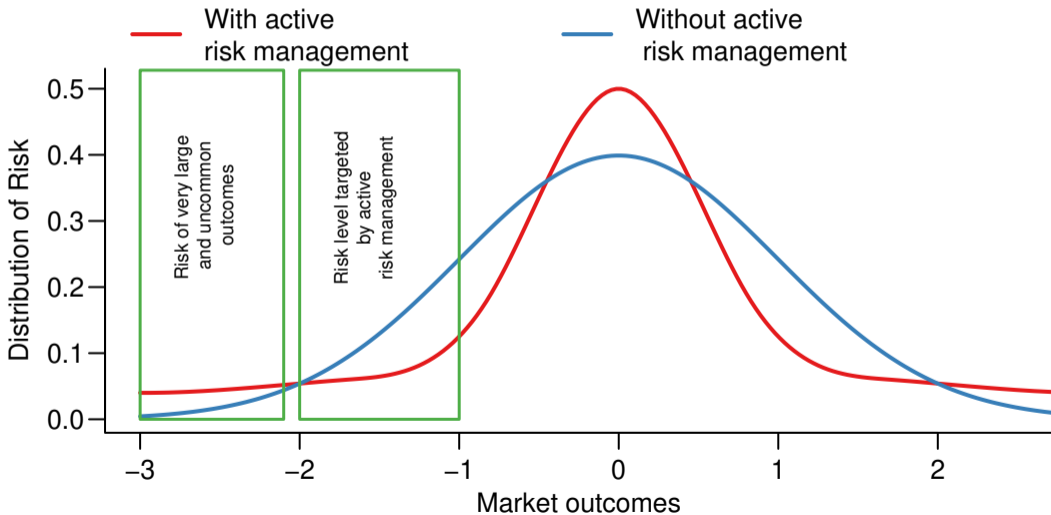
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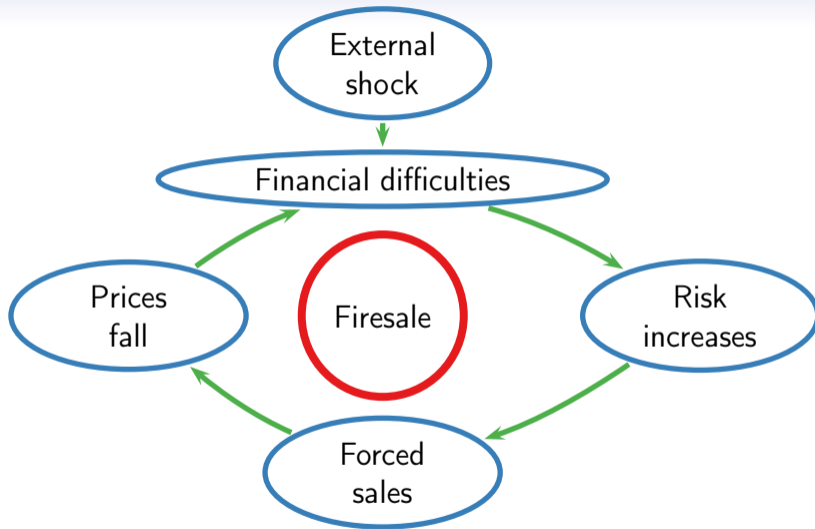
# Impact of active risk management





# Prudential versus systemic regulations

- Prudential regulations — ensuring each individually behaves prudently
- Fallacy of composition
- Ignores systemic risk
- Perhaps because fire sales (next slide)



# Liquidity and asymmetric information

- The first sign of the pending crisis was disappearance of liquidity
- But it was ignored by supervisors before the crisis
- And therefore caught everybody by surprise

# Complexity

- The financial system was becoming ever more complex
- Banks have direct incentives to maximize complexity
  - reduces transparency, increases fees, creates aura of sophistication, helps to become TBTF
- Supervisors at a significant disadvantage
- And mostly opted to ignore the problem, focusing on the output of the system — prices or risk forecasts — missing the big picture

# The Undermining of Capital

## We thought it was OK

- By 2007, most banks were highly capitalized
- Perhaps 12%–13% according to the Basel CAR
- Protection turned out to be illusionary
  1. toxic assets
  2. capital fragility
- Aided by *capital structure optimization*

# Basel CAR

$$\text{CAR} = \frac{C = T_1 + T_2}{w_1 \times A_1 + w_2 \times A_2} \geq 8\%.$$

- Maximize numerator
- Minimize denominator

# Denominator and toxic assets

## assets and risk weights

- Assets
  1. can be hard to assess value because of infrequent trading
- Risk weights — even harder
  1. risk cannot be measured — it is a *latent variable*
  2. dependent on a model — every model is incorrect
- Gave rise to the phrase “*toxic assets*”, meaning those that were both priced and risk-assessed by dubious models
- In a crisis we assume the worst



## Toxic structured credit

- A considerable portion of assets held by banks were structured credit
- The equity tranches have turned out to be pretty toxic
- Because each instrument is unique, no good way to get a market value
- *Mark to model* also pretty unreliable (different banks are said to value the same product with more than 50% difference)
- End result is nobody really trusts valuations and risk weights.

# Numerator and capital fragility

- Tier 1
  1. core equity
  2. other stuff
- Tier 2
  1. hybrid capital instruments

## The problem with hybrids

- Meant to provide the same protection as equity but at lower cost
- Sit between equity and senior debt
- Long-term bonds with features enabling conversion to equity or suspension of payments
- In principle, enable loss absorption without liquidity
- A great idea

## But...

- Conversion at the discretion of the bank
- Sold to favored clients
- Reputation risk
- Conversion is dilutive
- Banks had to be forced to convert by supervisors
- Protection was illusionary
- See comparison to *Cocos*

## 4 ways to look at capital

**Tier 1/RWA** This is the more strict Basel ratio, simply tier 1 capital divided by the risk-weighted assets (RWA)

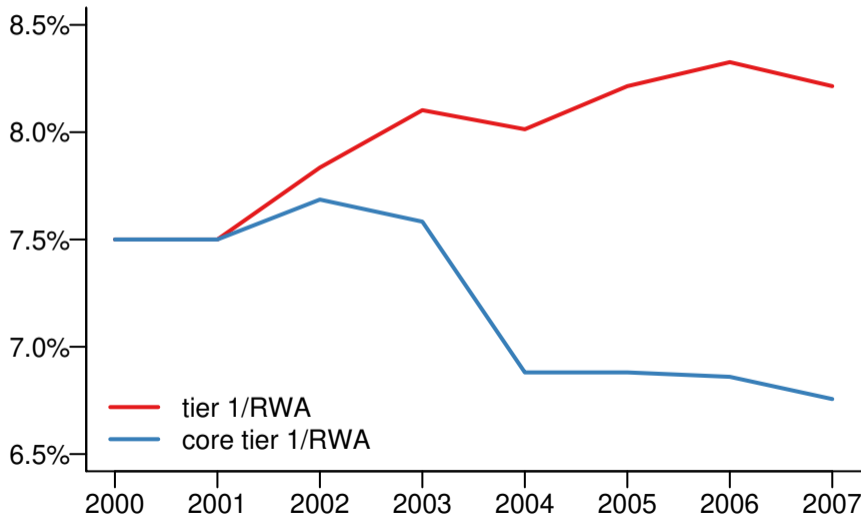
**Core tier 1/RWA** This only focuses on the equity part of tier 1, since core tier 1 is composed of shareholders equity and retained earnings

**Tier 1/TA** This replaces the risk-weighted assets with total assets (TA)

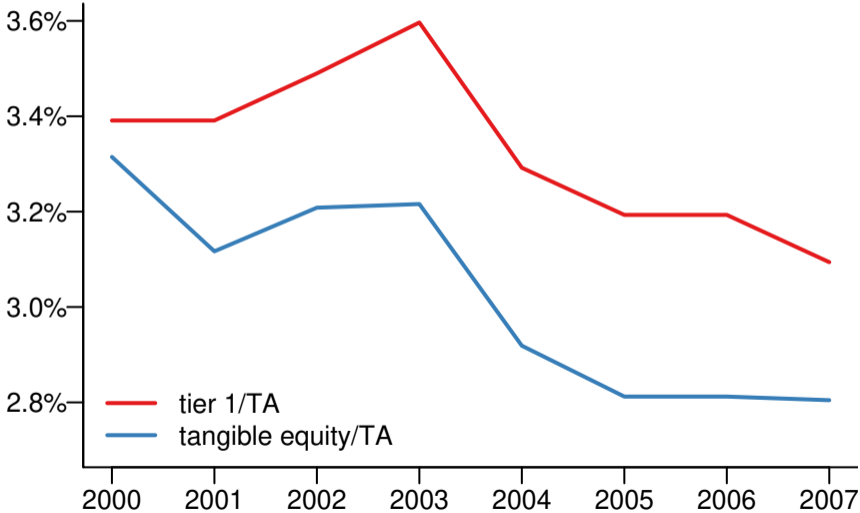
**Tangible equity/TA** This replaces tier 1 with tangible common equity, i.e. the subset of shareholders' equity that is not preferred equity and not intangible assets

Going down this list, these are increasingly restrictive or conservative measures of the capital ratio

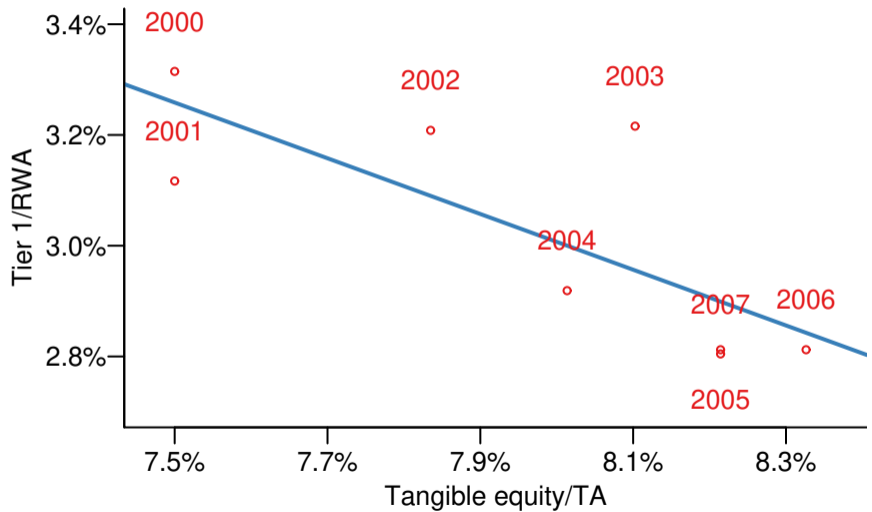
# RWA



# TA

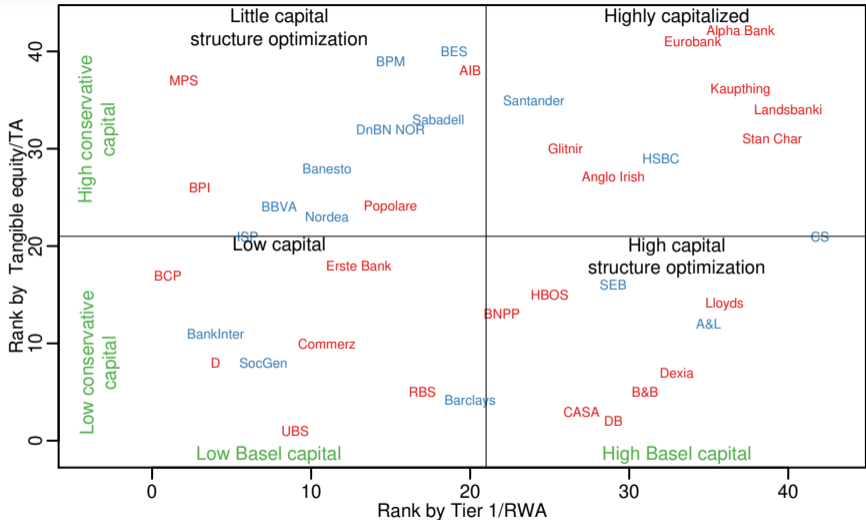


# Trend





	<u>Tier 1</u> RWA	<u>Tangible equity</u> TA	Distress
AIB	7.6% (23)	5.8% (43)	Fatal
CS	11.5% (50)	3.6% (22)	Considerable
DB	8.7% (35)	1.3% (2)	Considerable
HSBC	9.1% (37)	4.2% (33)	Moderate
RBS	7.3% (19)	2.2% (7)	Fatal
Santander	7.77% (28)	5.3% (39)	Moderate
SocGen	6.7% (8)	2.3% (10)	Moderate
UBS	6.9% (10)	0.4% (1)	Considerable



# Financial engineering premium

- The banks who are most active in capital structure *financial engineering*
- Can look best on *loose measures* of capital (like Basel II)
- But bad at *strict measures* (like leverage ratio)
- Enhances profits during good times
- Becomes a problem during crises because of lack of trust