

THE TRANSFORMATION OF FINANCE

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January 2011

American Finance Association

A Narrative of the Financial Crisis

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1. A housing bubble inflates in the mid 2000's. Homes are financed by mortgages that are increasingly securitized. Although the quality of mortgages deteriorates, the securities into which these mortgages are packaged (mortgage backed securities or MBS) are perceived to be safe and receive AAA-ratings.
2. Financial institutions such as banks and dealer banks retain substantial exposure to the real estate market, through direct holdings of commercial real estate, direct holdings of MBS, but also implicit guarantees of special investment vehicles they organize, which hold MBS and finance them with commercial paper.

A Narrative of the Financial Crisis (cont'd)

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3. Bad news about the housing market in the summer of 2007 surprises investors in AAA-rated MBS and precipitates a sequence of substantial disruptions in financial markets, such as the collapse of the asset backed commercial paper market. Aggressive liquidity interventions from the Federal Reserve, including lending to market participants against risky collateral, stabilize markets through the summer of 2008 despite continued bad news about housing.
4. In September 2008, several events, including a run on money market funds, nationalization of AIG, Fannie Mae, and Freddie Mac, and particularly the collapse of Lehman Brothers, precipitate a massive financial crisis. Banks balance sheets contract because of massive losses on assets and withdrawal of short term financing, which prompts banks to liquidate assets in fire sales. The consequences of fire sales are exacerbated by uncertainty about bank solvency and government policy.

A Narrative of the Financial Crisis (cont'd)

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5. In response to their losses and to reduced availability of financing, banks cut lending to firms. The economy slides into a major recession.
6. Starting in October 2008, the government begins massive interventions in financial markets, including equity injections in banks, expansion of lending against risky collateral, but also direct purchases of long term agency bonds, which sharply reduce the supply of risky bonds in the market. The combination of government interventions eventually stabilizes the financial markets by the Spring of 2009, although the real economy remains sluggish.

Although the narrative is standard, these are four broadly different interpretations

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- A hundred year flood
- Too big to fail
- Agency problems and risk taking inside banks (Rajan)
- Neglected risks / wrong models

Outline of the Agency Model

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- Traders in banks have compensation tilted to current profits; do not pay enough for losses
- Superiors do not fully understand risks
- Hence traders have a strong incentive to knowingly take exposure to such risks
- Risk taking by traders creates risk for the institutions. Risk taking by institutions creates systemic risk.

Outline of the Neglected Risk Model

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- Investors assess risk historically and neglect low probability non-salient events
- As a consequence they see investments that by historical record have attractive risk/return profiles as attractive
- There are powerful incentives for financial engineers to create securities with such characteristics
- When investors believe securities are safe enough they will lever up these investments
- This again creates risk for institutions and systemic risk

Which risks were neglected and why?

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- Magnitude of decline in home prices
- Sensitivity of security prices to home prices (the diversification myth)
- Magnitude of bank exposure
- Failures of insurance (counterparty risk)

Historical tranquility, extrapolation, leads to neglect of risks. The risks are typically new and different.

Titanic: a AAA-rated ship

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- When built, described as the safest, largest ship ever
- Insiders and financiers were on board: they believed it was safe
- Many lifeboats on board, enough for 1 / 3 of passengers. Consistent with regulation
- Sailed further south because of icebergs, but radio operators ignored warnings of icebergs nearby
- 1500 people died. Some rescue boats were not full. Almost all the crew died.

- In this lecture, I will go through the standard narrative, focusing on some of the conceptual issues it raises
- Will particularly focus on the four theories, arguing that the first two are implausible
- But comparing the last two raises many interesting issues for finance
- Stress asset side of bank balance sheets. Problems on liability side (runs) emerge largely after losses become severe.

1. A housing bubble inflates in the mid 2000's. Homes are financed by mortgages that are increasingly securitized. Although the quality of mortgages deteriorates, the securities into which these mortgages are packaged (mortgage backed securities or MBS) are perceived to be safe and receive AAA-ratings.

Why perception of safety?

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- AAA ratings based on incorrect models (see Jarrow et al., Coval et al.)
- Historical measures of volatility, risk point to safety of MBS, CDO's
- Market price of risk in Summer 2007 is low
- In expectations data, no one seems to expect the collapse of home prices
- Evidence supported by theory (diversification myth)

All points to a systematic mistake by both intermediaries and investors

Alternative theory: a hundred year flood

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Investors imagined the crisis, but did not think it to be likely

However,

- Similar cycles of growing leverage, deterioration of quality of credit, and subsequent crashes, are common.
- Junk bonds, CMO's in the 1990s
- Systematic evidence of Greenwood and Hanson
- Crises from leveraged risk taking even more common if we look outside US (Reinhart-Rogoff)

2. Financial institutions such as banks and dealer banks retain substantial exposure to the real estate market, through direct holdings of commercial real estate, direct holdings of MBS and CDO's, but also implicit guarantees of special investment vehicles they organize, which hold MBS and finance them with commercial paper.

Why were financial institutions over-exposed to AAA-rated ABS?

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- Gigantic share of risk stayed with banks (the Stern Gang). Why?
- Avoid Basel regulations, but must want to do it.

Possible answers:

- ▣ Had to hold it as skin in the game and inventories (but sold much to their own proprietary desks – must have thought securities were safe)
- ▣ Counted on bailout (inconsistent with evidence: see below)
- ▣ Did not believe it was so risky (neglect of risk)
- ▣ Believed it was risky but had short horizons (agency)

The last two theories both consistent with massive bank exposure and top management ignorance about risk.

Alternative Theory: Too Big to Fail

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Management knowingly gambled, expecting a bailout

However:

- ❑ Management seems unaware of exposures (UBS report, Citi Q3 2007 accounting litigation)
- ❑ Inconsistent with evidence on CEO incentives and behavior (Fahlenbrach and Stulz)
- ❑ Inconsistent with Goldman, JP Morgan getting out in 2007
- ❑ Inconsistent with basic misery of what happens when you fail

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3. Bad news about the housing market in the summer of 2007 surprises investors in AAA-rated MBS and precipitates a sequence of substantial disruptions in financial markets, such as the collapse of the asset backed commercial paper market. Aggressive liquidity interventions from the Federal Reserve, including lending to market participants against risky collateral, stabilize markets through the summer of 2008 despite continued bad news about housing.

The Mystery Period: Summer 2007- Summer 2008

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- ❑ Bad news about housing and AAA-rated MBS starts to appear in Summer 2007
- ❑ There are several bankruptcies of hedge funds and banks
- ❑ ABCP market collapses
- ❑ Some banks sharply reduce their MBS and CDO holdings but others largely stay put
- ❑ Banks raise capital but slowly
- ❑ Fed lends aggressively against risky collateral

The Mystery Period: Summer 2007- Summer 2008

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Why was the response so timid?

- ❑ Home prices continue falling, they are not all the way down yet in Summer 2007
- ❑ Bank accounting – with Fed complicity – hides losses
- ❑ Banks and regulators do not understand the exposure (UBS report)
- ❑ Biggest losses are in securities (CDO's) understood least well
- ❑ Hard to believe, at this point, management could not figure out risks if it believed traders were hiding them
- ❑ Points to neglected risks and not just agency

4. In September 2008, several events, including a run on money market funds, nationalization of AIG, Fannie Mae, and Freddie Mac, and particularly the collapse of Lehman Brothers, precipitate a massive financial crisis. Banks balance sheets contract because of massive losses on assets and withdrawal of short term financing, which prompts banks to liquidate assets in fire sales. The consequences of fire sales are exacerbated by uncertainty about bank solvency and government policy.

Mechanism of crisis: massive losses on ABS, short term finance, and fire sales

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- Losses on ABS, especially CDO's, are gigantic. Losses on ABS CDO's eventually account for 42% of total bank writedowns (Benmelech and Dlugosz)
- Short term finance is withdrawn
- Withdrawal leads to fire sales, liquidity dry-ups, which are the mechanisms of creation of systemic risk

Role of short term debt

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- Surely made things worse, but largely because MBS/CDO losses were so massive
- What kind of short term debt withdrawal?
 - ▣ Repo
 - ▣ CP
 - ▣ Prime brokerage accounts
- Since repo is collateralized, there is no public pool of assets – this is not the usual bank run
- Problems on liability side emerge only after problems on the asset side become severe

5. In response to their losses and to reduced availability of financing, banks cut lending to firms. The economy slides into a major recession.

Why did banks cut lending to firms?

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- Usual credit supply channel
- Banks also hoarding cash
- Invest in projects or in securities oversold in fire sales
- There is a lot of evidence of hoarding cash and investing in securities
- But also reductions in demand for credit (Mian-Sufi)
- Nonetheless, we see recessions also in countries where only banks are hurt

6. Starting in October 2008, the government begins massive interventions in financial markets, including equity injections in banks, expansion of lending against risky collateral, but also direct purchases of long term agency bonds, which sharply reduce the supply of risky bonds in the market. The combination of government interventions eventually stabilizes the financial markets by the Spring of 2009, although the real economy remains sluggish.

What was effective in government policy?

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- Lending against risky collateral?
- Rescuing institutions (vs. failure to rescue Lehman)?
- Buying securities such as agency bonds?
- Guaranteeing money market funds?
- Fiscal policy?

Fire sales strongly favor soft ex post policies

Summary / Score Card

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- We have a good theory of crisis after Lehman, much less good theories of how we got there.
- Agency and neglected risk are two most credible explanations but neglected risk is most parsimonious, consistent with ratings, expectations data, but also bank management and regulator passivity in 2007
- Combination of agency and neglect of risk would lead to massive risk taking by investors failing to appreciate exposure
- This probably is the real story

If neglect of risk is an important feature of reality, there are many analytical problems for finance to address.

- Theory
- Financial Innovation
- Security Prices
- Regulation

Theory

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- Need models of neglected risk – or of perceived risk more generally
- One approach (with Gennaioli): local thinking

People optimize but on a represented state space rather than complete state space. Some states of the world are over-weighted, others neglected, based on what comes to mind. Salience, representativeness, recall from memory shape represented state space

- Can be used to analyze many puzzles, including Allais paradoxes, Linda, etc.
- Can be used to discuss fragility
- Many incredibly exciting questions about how people think

Financial Innovation

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- Usual argument: completes markets
- With incorrect expectations, financial innovation misallocates risks, leads to false insurance and fragility
- Investors end up bearing more risk than they think, sometimes without suspecting it
- Financial innovation also unbundles risks, and hence facilitates speculation and leverage (Simsek)

Security Prices

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- Although efficient markets is no longer an empirically interesting hypothesis, we have much better models of limited arbitrage than of investor sentiment.
- Can local thinking be a viable alternative?
- Helps explain why risks of low probability events in the run up to the crisis were neglected.
- Might help explain why some salient risks such as bankruptcy of value stocks, are over-estimated, leading to undervaluation.
- A more general theory of perception and valuation of risk and return?

Regulation

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- ❑ Neglected risks, but also internal agency problems, provide a powerful case for mark-to-market accounting
- ❑ Usual justification: inform outside investors
- ❑ But in the crisis, problems were internal. Rejection of mark to market enabled banks to delay acknowledgment of risks through 2007 and early 2008, until fire sales set in
- ❑ Mark to market is the critical risk management tool
- ❑ Regulatory forbearance of creative accounting must bear some responsibility for the crisis

Summary

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- Neglect of risk seems to be a key theme in crisis
- If so, improving incentives may not suffice. Maximal transparency might facilitate recognition of risks.
- Fire sales seem to be another key theme, leading to desirability of ex ante hard policies and ex post soft policies

Some references

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