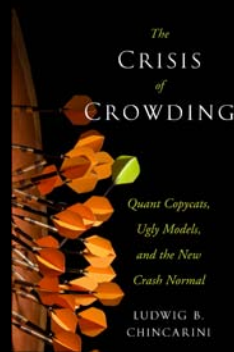


The Crisis of Crowding

Tales from the Financial
Crisis and the Ongoing
Risks of Crowded Trades
February 21, 2013

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NERA



What is the book about?

- The book tells the real stories of the financial crisis of 2008 and beyond how they are all connected by **elements of crowding**.
- The book is easy to read and informative with lots of interviews with insiders, including Goldman Sachs executives, Jimmy Cayne, Myron Scholes, John Meriwether, Vice Chairman of Citibank, government regulators, and others.

Definition

Crowding takes place when multiple market participants begin to follow the same trade altering the risk and return dynamics of the trade.

- Not always easy to detect – **holders matter**
- Risk will be **incorrectly** measured if not accounted for, both market and liquidity risk.
- Can lead to levered firms failing rapidly.

Examples of Crowding

- Portfolio Insurance in the 1980s
 - Dynamic put option replication
 - Works fine if small number of investors do it.
 - Too many can lead to spiral effect as stock prices plunge...

Examples of Crowding

- LTCM in 1998
- Sophistication to bond markets brought lots of profits
- Hedge funds, bank prop desks, and others began **copying**
- Space saturated (**crowded**) and opportunities vanished...but risk was higher than thought

Examples of Crowding

- Internet Bubble of 2000

- Everyone and their cab driver was buying internet stocks, even liberal arts college professors
- Valuation out of whack, space saturated, prices had to go up...
- Crowd runs for the exits, market collapses...

Examples of Crowding

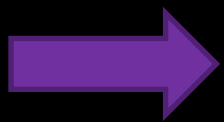
- Internet Bubble of 2000: PALM Mystery

March 2, 2000 3COM sold part of it's stake in PALM (about 5%).

Issued at \$38 and rose to \$165 on first day of trading, closing at \$95.06.

An owner of 1 share of 3COM owned 1.5 shares of PALM (by relative share issuance).

3COM held 95 % of PALM and had cash/securities worth about \$10 per share



Thus, we would expect 3COM to trade at somewhere greater than
 $1.5 * 95.06 + 10 = 152.59$

Examples of Crowding

- Internet Bubble of 2000: PALM Mystery

Ironically, it traded down that day at \$81.81. This implied a negative value for everything else in 3COM...not possible?

The **crowds** were racing for anything internet-like regardless of valuation.

Examples of Crowding

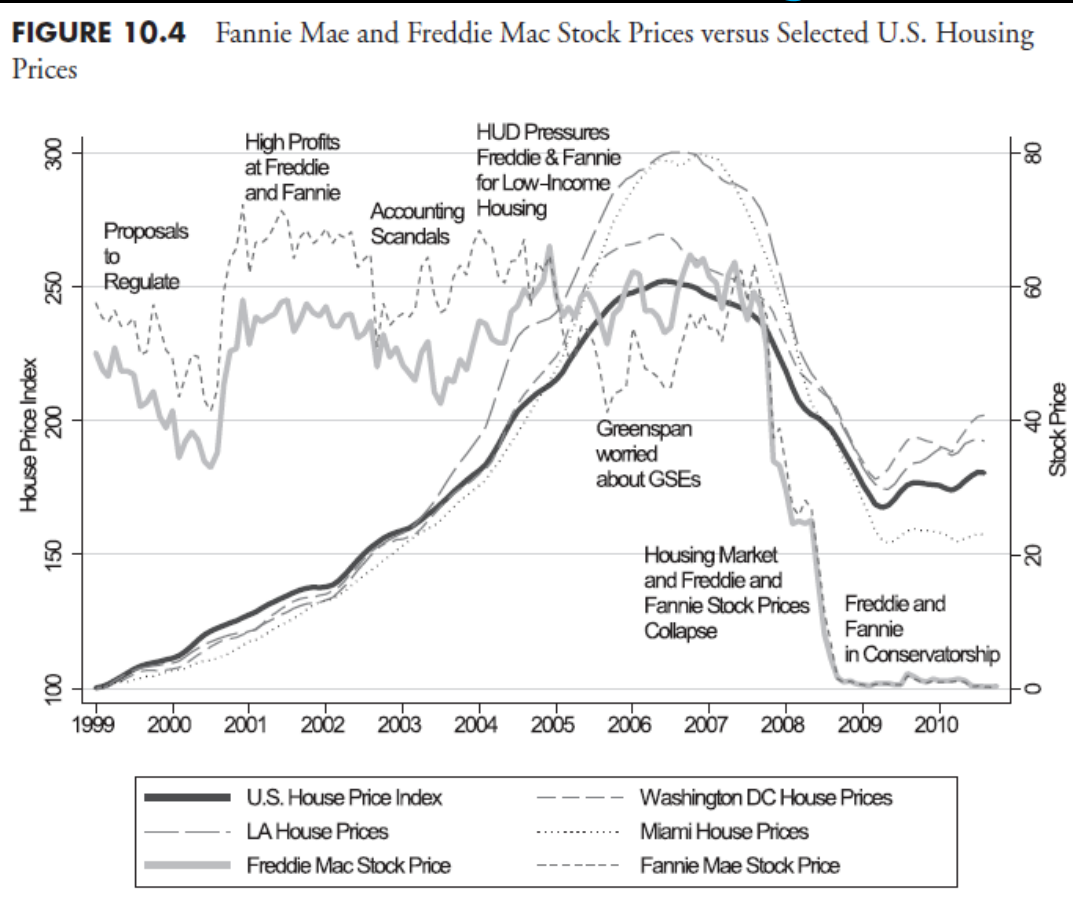
- Financial Crisis of 2008 and Beyond
 - Crowded spaces and their problems, including mis-measurement of risk were everywhere in the crisis of 2008.

Story 1:

- Freddie, Fannie and Housing Bubble (real crowd)
 - Why did the world like Freddie and Fannie? Implicit government bailout.
 - They were the gigantic hedge fund, making Lehman's 33 to 1 leverage look like child's play...81 to 1.
 - Huge profits, \$2 million per employee in 2002, versus Goldman and Citi of \$108K and \$60K
 - Fannie and Freddie keep buying sub-prime, but why? In 2000, \$50B, in 2005, almost \$500B.

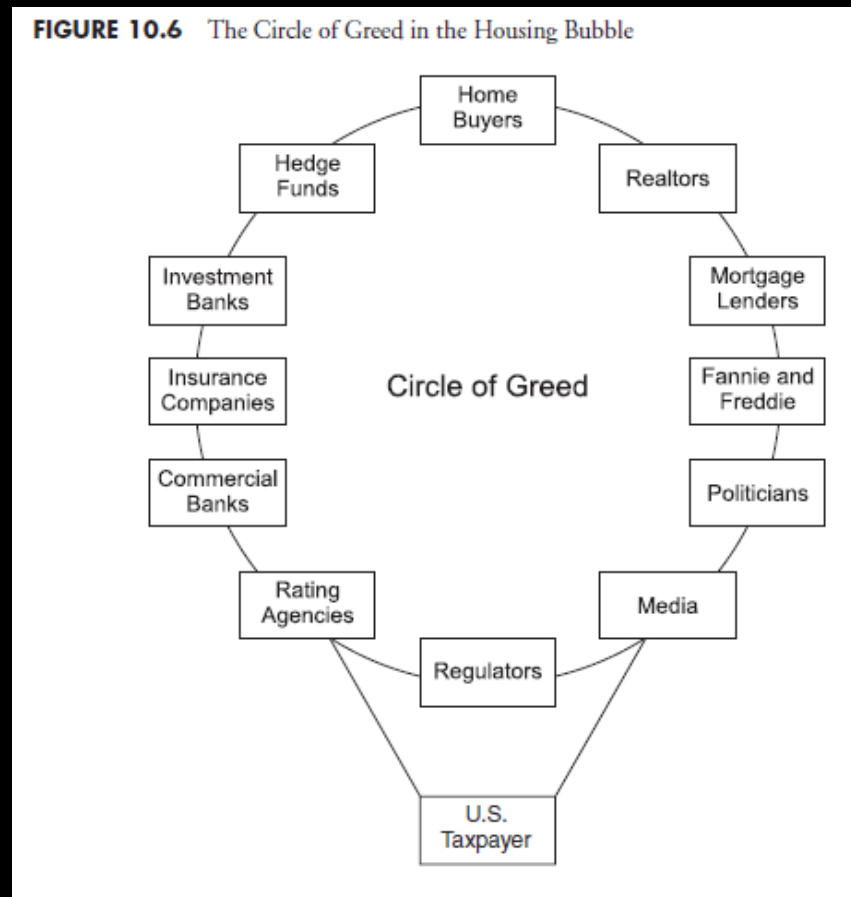
Story 1:

■ Freddie, Fannie and the Housing Bubble



Story 1:

■ Freddie, Fannie and the Housing Bubble



Story 1:

- Freddie, Fannie and the Housing Bubble
 - **Home Buyers:** Second mortgages, buying homes they could not afford, home equity loans to consume – 2005, of \$750billion in HE, **2/3 used for personal consumption**, home improvements, credit card debt. Zero down with zero responsibility. 2005, 30% home equity used to buy 2nd place.
 - Some ignorance, but usually greed w/ free option.

Story 1:

- Freddie, Fannie and the Housing Bubble
 - Real Estate Agents & Mortgage Brokers: “Real estate prices are always steady in this area”.
 - Tell story of Long & Foster
 - “Remember me, your buyer’s agent with Long & Foster? How’s California? Just came across an old email and wanted to give you the credit for predicting the market `shedding’. A total shed...”
May 12, 2010.
 - Realtors get 6% on house prices and had incentives to inflate.

Story 1:

- Freddie, Fannie and the Housing Bubble
 - Real Estate Agents & Mortgage Brokers:
 - Also peripheral players associated with them. In 2003, 55% of appraisers felt pressed to inflate the values of homes. By 2006, it rose to 90%. Who's side are they on anyway? New rules?
 - Mortgage Brokers designed clever schemes to make housing "appear" affordable. GPM, ARMS, etc. Mortgage of \$3500 to \$500 with the sign of paper.

Story 1:

■ Freddie, Fannie and the Housing Bubble

➤ Politicians:

- Pushed low-income housing – why? To get votes, to appear compassionate. Clinton and Bush. And even used “BS” justifications: “those who argue that housing prices are now at the point of a bubble seem to be missing a very important point. Unlike previous examples, where substantial excessive inflation of prices later caused some problems, we are talking here about an entity, home ownership, homes, where there is not the degree of leverage that we have seen elsewhere. This is not the dot-com situation. **Barney Frank**, June 27, 2005

Story 1:

■ Freddie, Fannie and the Housing Bubble

➤ Rating Agencies:

- Conflicts of interest, 1970s. Issuer-pays model. Complex and complicated CDOs. Moody's revenue grew from \$199 million (2000) to \$887 million in 2006 from CDO ratings.
- "When I joined Moody's in late 1997, an analyst's worst fear was that he would...[give an incorrect rating and ruin Moody's reputation]...When I left in 2007, an analyst's worst fear was that he would do something to impairing Moody's profits by damaging relationships and get fired...**Mark Froeba**, SVP of Moodys

Story 1:

- Freddie, Fannie and the Housing Bubble

MARKETS | Updated February 5, 2013, 12:37 a.m. ET

U.S. Sues S&P Over Ratings

Justice Department Says Endorsements of Risky Mortgage Bonds Fueled Crisis

By JEAN EAGLESHAM, JEANNETTE NEUMANN and EVAN PEREZ

The Justice Department sued Standard & Poor's Ratings Services late Monday, alleging the firm ignored its own standards to rate mortgage bonds that imploded in the financial crisis and cost investors billions.

Story 1:

- Freddie, Fannie and the Housing Bubble

- Banks, Investment Banks:

- Leverage, more home mortgages, securitization, and short-term financing.
- **Crowds Exited** – suddenly as house market halted and defaults rose, everyone dumped it and ran for the exits. Freddie and Fannie were bailed out by US government and still owe the US taxpayer \$151 Billion, all investment banks have paid with interest.

Story 2:

- JP Morgan and the Relative Value HF Community
 - J.P. Morgan had large losses in the 2nd quarter of 2012 due to bad hedges. \$5-7 billion.
 - Losses related to bets on corporate credit indices.
 - Bruno Iksil (aka London Whale) was involved.
 - Fudging marks, lying, and **misunderstanding real risk of instrument** partly due to **crowds** and **holders**

Story 2:

- JP Morgan and the Relative Value HF Community
 - It happened in 2008, but slightly differently.
 - Many relative-value hedge funds and banks were roasted, including Meriwether's new fund.

Story 2:

■ JP Morgan and the Relative Value HF Community

Background:

- CDX – new indices based on corporate bond CDS.
- IG index 125 largest, biggest U.S. companies equal-weighted.
- Tranches 0-3, 3-7, 7-10, ...30-100.
- If companies begin defaulting on debt, 0-3 takes first losses, then 3-7, and so on.
- For 30-100 to lose, about 63% of U.S. companies must default or fail.

Story 2:

- JP Morgan and the Relative Value HF Community

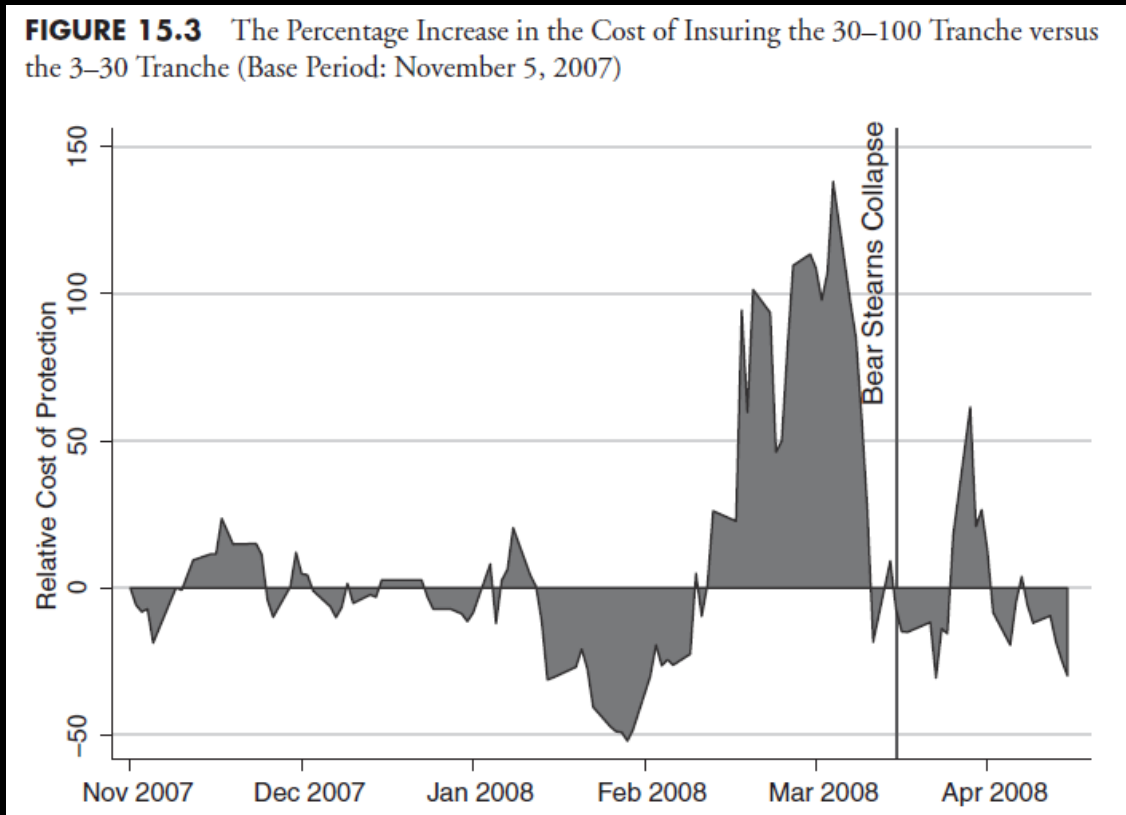
Which trade would you take if you thought 2008 would be a bad year?

Trade 1: Buy insurance 30-100, sell insurance 0-10

Trade 2: Sell insurance 30-100, buy insurance 0-10.

Story 2:

■ JP Morgan and the Relative Value HF Community



Cost of insuring 30-100 rose by **150%** over cost of insuring 0-10 in March 2008!

Source: Chapter 15 **The Crisis of Crowding**

Story 2:

- JP Morgan and the Relative Value HF Community

A market crisis is coming, what trade would you do in the commercial real-estate market?

Trade 1: Buy A rated and short AAA rated.

Trade 2: Short A rated and buy AAA rated.

Story 2:

- JP Morgan and the Relative Value HF Community

The trade **lost them 39%** unleveraged from September to November 2008 (November losses along 26%!).

Why?

1. Post-Lehman behavior was chaotic.
2. New Instrument – CMBX – didn't hedge correctly. Short history, strange holders, AAA held by levered risk averse institutions → **J.P. Morgan found this too.**
3. Became difficult to trade as prices dropped. Value irrelevant...

Story 2:

- JP Morgan and the Relative Value HF Community
Excerpts from the internal JP Morgan Report

the priorities would be simultaneously addressed;¹¹ (2) the trading strategies that were designed in an effort to achieve the various priorities were poorly conceived and not fully understood by CIO management and other CIO personnel who might have been in a position to manage the risks of the Synthetic Credit Portfolio effectively; (3) CIO management (including CIO's

The positions in the Synthetic Credit Portfolio consisted of standardized indices (and related tranches²¹) based on baskets of credit default swaps ("CDS") tied to corporate debt issuers. CIO bought, among other things, credit protection on these instruments, which means

multiple maturities and tranche positions. In the fourth quarter of 2011, the Synthetic Credit Portfolio was in an overall short risk posture (as measured by CSW 10%), with a short risk position in high-yield offset to some extent by a long-risk investment-grade position.

Story 3:

- The Quant Crisis of 2007

- What are Quants?

- Some well known firms: Barclays Global Investors, GSAM, State Street, Morgan Stanley PDT, AQR, Panagora, Mellon Capital, etc.

Story 3:

- The Quant Crisis of 2007
- What are factors?
- Example: The Value Factor.

Story 3:

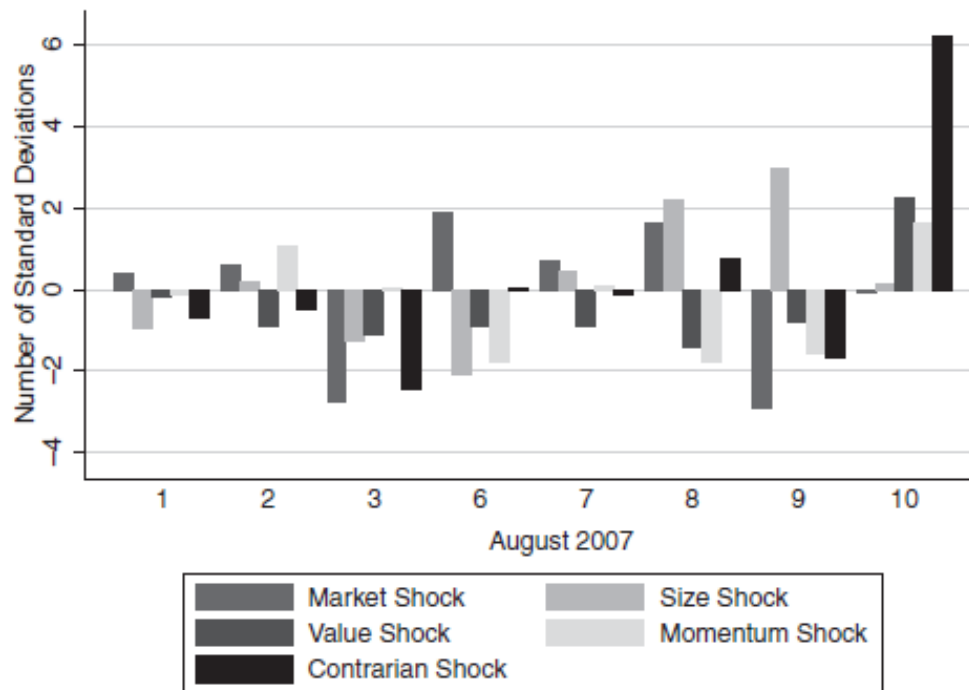
- The Quant Crisis of 2007

- In August 2007, even standard factors behaved erratically.
- For example, value factor moved 0.75% in one day – unheard of – with 8x leverage moved 6%. August 2 – August 8, every day was within worst 5% moves in 20 years.

Story 3:

■ The Quant Crisis of 2007

FIGURE 8.4 Ratio of Daily Returns of Common Factors Divided by Historical Standard Deviations



Source: Chapter 8 **The Crisis of Crowding**

Story 3:

- The Quant Crisis of 2007
- Quant copycats everywhere...
- Factors different, but correlated...
- Transaction costs models similar
- Result → Similar small portfolios
- A seemingly liquid space became very illiquid...risk mis-measured.

Story 3:

■ The Quant Crisis of 2007

We saw the growth of quant assets under management, but didn't see how far these strategies had extended into statistical arbitrage desks and hedge funds. We felt our proprietary factor specifications and weightings would provide differentiation, and this was supported by historical correlations plus low exposures of other quant managers to our factors. Our individual equity positions were small, liquid, and diversified—we didn't foresee a significant liquidation event focused on similar portfolios.

—Goldman Sachs analyst statement, December 13, 2007
(GSAM 2007)

Source: Chapter 8 **The Crisis of Crowding**

Story 3:

- The Quant Crisis of 2007

Crowding among quants happens for several reasons, but the transaction costs model was of primary importance, as it caused us to trade similar securities at each point in time.

—Mark Carhart interview, former co-CIO of Quantitative Strategies at GSAM and Founder of Kepos Capital, October 11, 2011

Source: Chapter 8 **The Crisis of Crowding**

Story 3:

- The Quant Crisis of 2007
- Many hedge funds completely wiped out.

Story 4:

- The Lehman Aftermath

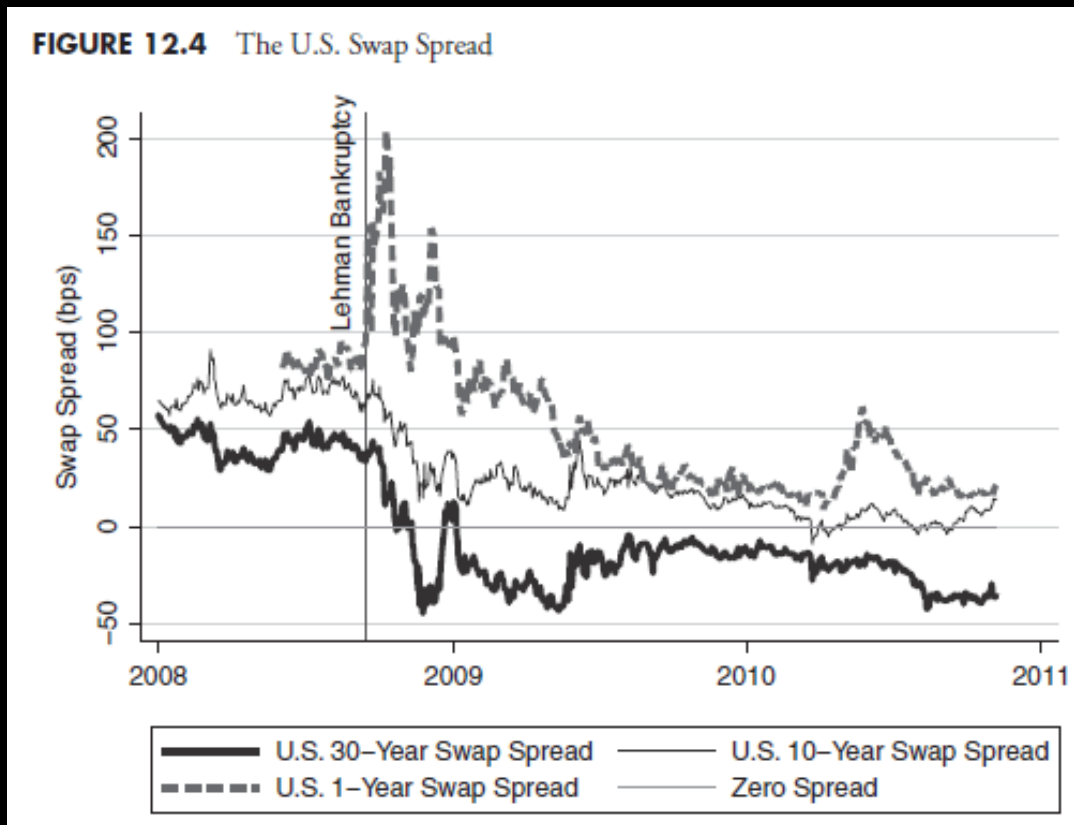
What trade would you do in 2008?

Trade 1: Go long the 30-year swap spread (i.e. bet that swap spreads widen).

Trade 2: Go short the 30-year swap spread (i.e. bet that swap spreads narrow).

Story 4:

■ The Lehman Aftermath



Holy
Irrationality!

Source: Chapter 12 **The Crisis of Crowding**

What does solvency mean? The answer is, I don't know. I still could not answer that question . . .

—Jamie Dimon, CEO of J.P. Morgan, October 20, 2010, in FCIC

Story 4:

■ The Lehman Aftermath

- In typical markets, **swaps trade above** governments – government debt is seen as less risky to bank debt.
- After Lehman, **different** holders acted differently and as **crowds** ran for exits, odd market prices emerged.

Story 4:

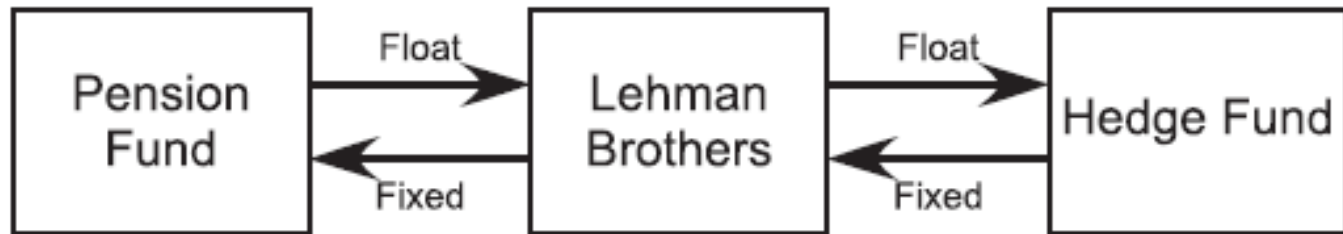
■ The Lehman Aftermath

- Pension funds typically **receive** 30-year fixed swaps (*long duration to hedge long duration liabilities*).
- Hedge funds (& others) **pay** fixed 30-year (*to offset other exposures*).
- Lehman was an intermediary for this.

Story 4:

- The Lehman Aftermath

FIGURE 12.3 A Typical Swap Situation with Lehman Brothers



- Upon Lehman's bankruptcy, ISDA allows counterparties to terminate positions w/ a fax.

Story 4:

- The Lehman Aftermath

- No one wanted to keep contracts open with Lehman – no upside.
- Pension funds had huge A-L mismatch and had to find new swap receiving fixed.
- Hedge funds did not want to restore pay fixed – (a) interest rates likely to come down (b) hard to get financing and even cut Treasury positions.

Story 4:

- The Lehman Aftermath

- Supply and Demand imbalance. Demand for long-dated swaps high, but supply low.
- Thus, **swap spread inverted** ... unusual indeed.
- In many countries, not just the U.S.

Story 4:

■ The Lehman Aftermath

Typical 30-Year Spread Before and After Lehman Collapse

	Before	After	
USA	55	0.69*	
UK	49	-29	
Japan	7	-25	
Germany	20	-6	

*Later became -19 bps negative. All numbers in bps.

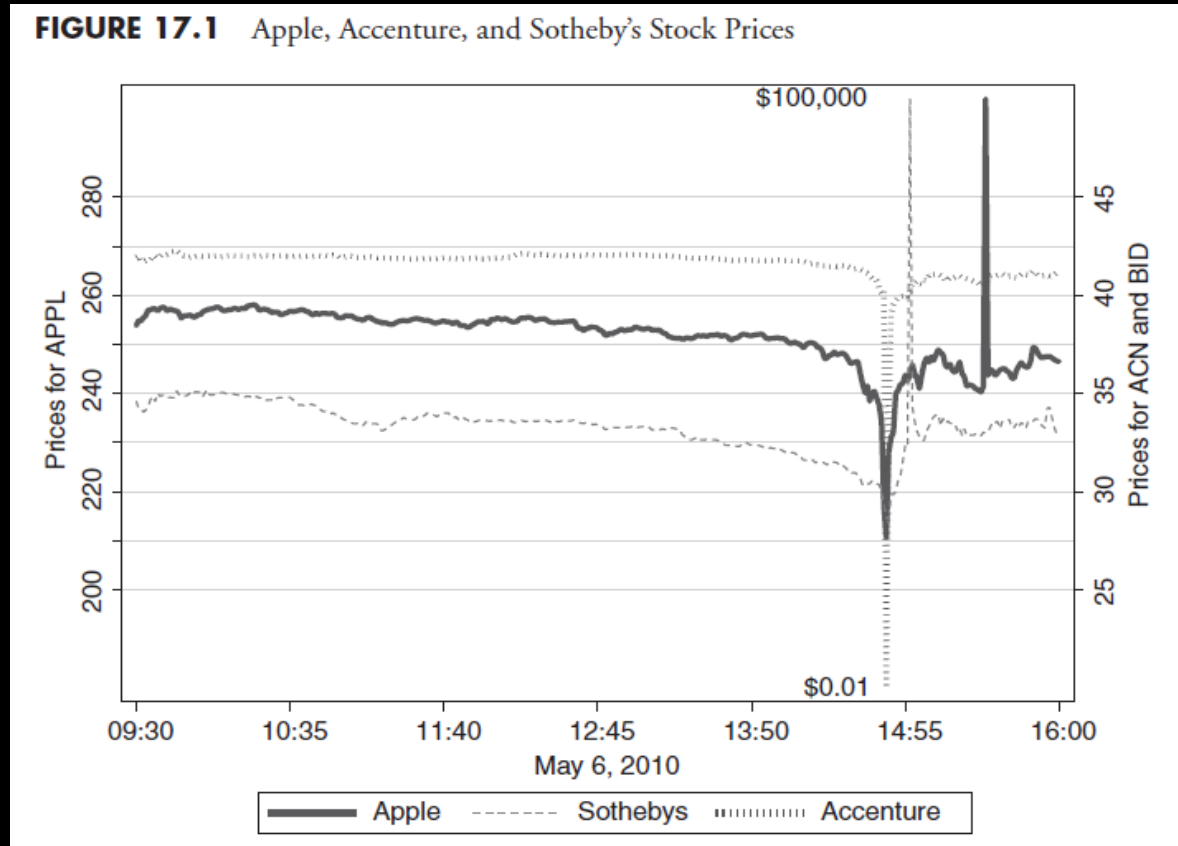
Story 5:

- The Flash Crash

- How does AAPL trade at \$100,000 per share?
- How does Accenture trade at 1 cent per share?

Story 5:

■ The Flash Crash



Source: Chapter 17 **The Crisis of Crowding**

Story 5:

- The Flash Crash

- What happened?
- SEC said it was Waddell-Reed...riiiiight.
- 75,000 e-mini futures sell order.
- Too small, happened before, and liquidity dried up later.

Story 5:

■ The Flash Crash

- What happened?
- NYSE Arca had old computers on many of the stocks.
- Fast trading caused a glut and delayed quotes appeared on orders.
- **Market makers** saw inconsistencies in ticker tape and got scared.

Story 5:

- The Flash Crash

- **What happened?** Odds bumps in price quotes.

TABLE 17.1 Consolidated Tape for Accenture on May 6, 2010

Time	Shares	Price	Exchange
2:47:25 P.M.	100	38.66	ISE
2:47:25 P.M.	100	40.22	FINRA
2:47:25 P.M.	100	40.22	FINRA
2:47:25 P.M.	100	39.06	NYSE Arca

Story 5:

■ The Flash Crash

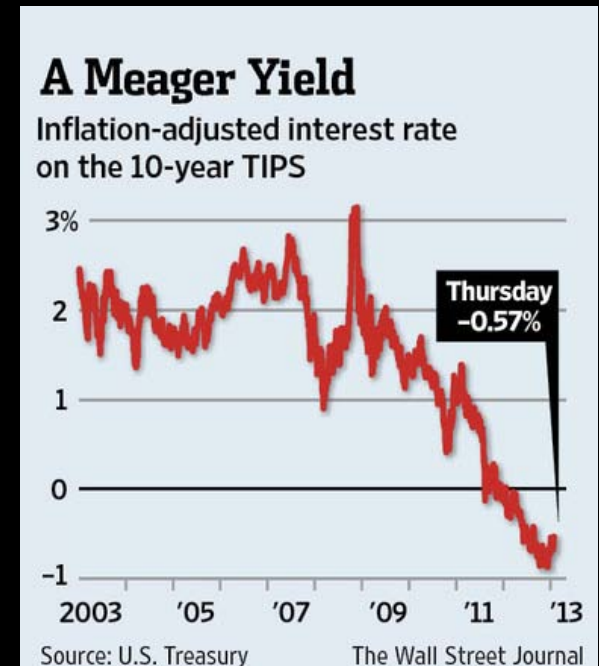
- What happened?
- The market maker crowd ran for the exits.
- Left stub quotes (due to regulation)
- One major brokers kept sending orders through system...catching stub quotes.
- Eventually, liquidity came back.

The Future

- ❖ Potentially crowded spaces
- ❖ Better risk models
- ❖ Lessons

The Future: *Potentially Crowded Spaces*

- Treasury securities? ... holders may be similar...but historical risk is probably mismeasured.
- TIPS? ... similar to above
- Gold?
- Junk Bonds?



The Future: *Better Risk Models*

- Need to **model risk** – return space as function of holders in the space.
- Need to **consider valuation**.
- Need to **consider crowding**.

The Future: *Better Risk Models*

- The Million \$ Question: How?
- **Indirect Methods:** Measure the expected opportunities.

Example: Swap Spread behavior over recent past and current value.

The Future: *Better Risk Models*

➤ The Million \$ Question: How?

➤ **Direct Methods:** Gather data on people in space and behavior. Simulate the way they might behave in various situations.

Example: Short-interest with stocks or more detailed information on holders (institutional, etc).

The Future: *Lessons from the Crisis*

- **1. Interconnectedness and crowds** - real estate, haircuts, ratings, all pro-cyclical, OTC Swap market back to LTCM
- **2. Leverage** again on steroids - Freddie and Fannie
- **3. Derivatives** - more education needed, less polishing the shoes. Encouragement of honesty rather than greed. Merton example.
- **4. Conflicts of Interest** - complicated, rating agencies, mortgage lenders comp, real estate comp.
- **5. Policy Lessons** - not prepared, runs happen faster than ever in today's age Bailouts - yes, needed, but how to prevent moral hazard.
- **6. Risk Management** - crowds, valuation to measure risk, holders. Incentives.
- **7. Counterparty Issues** - liquidity on down quote p. 304
- **8. Hedge funds** - some nuances, dynamic risk hedging
- **9. Importance of arbitrage** - p. 307 good things of finance

Thank you

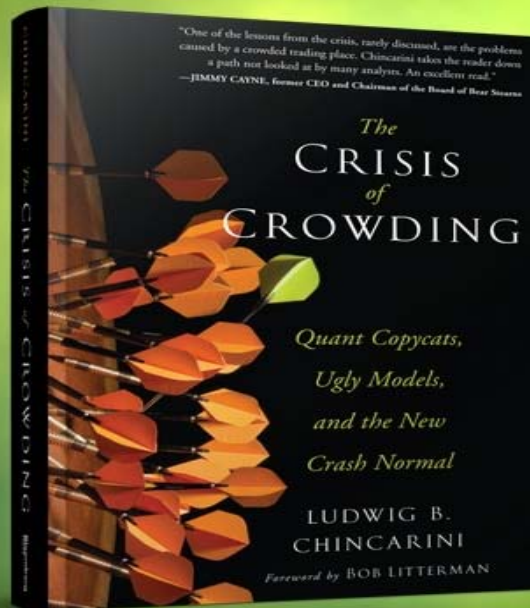
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A RARE, IN-DEPTH ANALYSIS OF THE 2008 FINANCIAL CRISIS

“An excellent read.” —JIMMY CAYNE



A unique blend of storytelling and sound quantitative analysis, *The Crisis of Crowding* explores the circle of greed from homeowners to real estate agents to politicians to Wall Street.

Linking the 2008 financial crisis back to the 1998 crisis of LTCM, *The Crisis of Crowding* shows how banks, hedge funds, and other market participants repeated the sins of the past and how the collapse of Lehman Brothers led to market insanity thanks to the irrational behaviors of buyers and sellers in the crowded space.

LEARN MORE ►

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Stories Discussed in the Book

- **The Circle of Greed** – *The Housing Bubble how it got started, why it kept going, and everyone's role in its spreading.*
- **Fannie and Freddie**– *Although Wall Street is often blamed, much of the housing catastrophe started with the quasi-government institutions of Fannie Mae and Freddie Mac. This chapter described their colored past and how they and politicians manipulated the American housing market.*
- **The LTCM Debacle** – *The fascinating story of a hedge fund's troubles and how a problem in 1998 should have warned us about what could happen.*
- **The Lehman Collapse** – *The inside story of what led to Lehman's collapse and why no one did anything to save it.*
- **The Bear Stearns Hibernation** – *With inside interviews of the key players, a detailed analysis of why the market decided to make a run on the Bear.*
- **Asleep in Basel** – *Discusses how regulation can fail and how rules that regulators made actually helped fuel the housing bubble.*
- **The End of the LTCM Legacy** – *John Meriwether, the legendary investor, made famous in Liar's Poker, fell again in 2008. Why did it happen? Why didn't their risk models work?*

Stories Discussed in the Book

- **The Quant Crisis** – *In early August 2007, one of the most efficient areas of portfolio management went into trouble for all the same reasons that would cause banks to suffer in 2008, yet it was hardly noticed. This discusses that amazing event.*
- **Absurdity of Imbalance** – *We failed to understand that a Lehman Collapse would cause market chaos. This chapter discusses the most bizarre, irrational things that happened due to the Lehman failure.*
- **The Flash Crash** – *In 2010, one of the most liquid markets in the world led to people buying Apple stock at \$100,000 per share and selling Sothebys at 1 cent per share. What in the world happened?*
- **Getting Greeked** – *The Euro crisis has had its verberations everywhere, including the US. How did the whole problem start? Why did Greek politicians lie? What happened?*
- **New and Old Lessons from the Crisis of 2008** – *Discusses the important lessons that we should all understand about the financial system.*

Examples of Crowding

- Appendix A:

Later, 3COM announced it would spin-off the rest of PALM pending approval from the US IRS on the tax status. Prices remained in a similar range.

An arbitrage strategy emerged: **Short 1.5 shares of PALM, Buy 1 share of 3COM and wait. Almost guaranteed money maker.**

Examples of Crowding

- Appendix A:

- The Arbitrage Strategy

- 1 Share of 3COM = 1.5 shares PALM
- Price (3COM) = \$81 Price (PALM) = \$95.
- 3COM will spin-off all of PALM within 1 year
- Sell PALM, Buy 3COM
- At T, holders of 3COM will get 1.5 shares of PALM

Examples of Crowding

- Appendix A:

- The Arbitrage Strategy

- Between t and T , if prices stay the same, make money = \$61.5 and still own one share of 3COM.
- If PALM rises, lose on short, but will eventually have collateral. Price(PALM) = 1000, short in "losing" a lot you will own security. So as long, as brokerage understands, you should be fine.
- If 3COM rises, you do better (you're long 3COM), if it falls, you're also ok, because whatever happens, you make \$61.5 plus 1 share of 3COM. Even a 0 value is ok for you.

Examples of Crowding

Appendix A:

