

# Financial Mathematics Seminar

## Madoff's Ponzi Scheme

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# Topic of Interest

- Largest Ponzi scheme in history
- Very sophisticated and complex fraud
- Why did he start it?
- How did he keep it going for so long?
- Lessons for investors
- Betrayal of trust by cunning con artist
- Lessons for risk management and regulation
- Role of financial crisis

# Outline

- Introduction
- Madoff's investment operation
- History in the securities industry
- Growth of the scheme
- Cash flow crises
- Analysis of his returns
- Discovery of fraud
- Rules for recovery

# Sources

- Erin Arvedlund (2010), "Too Good to be True, The Rise and Fall of Bernie Madoff"
- Diana B. Henriques (2011), "The Wizard of Lies: Bernie Madoff and the Death of Trust",
- Various court documents
- SEC reports
- Bernard C., and P. Boyle (2009), "Mr Madoff's Amazing Returns", *Journal of Derivatives*, 17, 1. 62-76.
- Boyle P., and Y. Zhu, (2011) "Ponzi Schemes"

# Beginnings

## Bernie L Madoff Investment Securities

- Started **trading** stocks as broker in early 60's.
- Provided a third market
- Competed with specialists on NYSE
- One of the first to automate trading through computers
- Firm became a very important broker dealer
- This was a profitable and legitimate business.

# External activities

Madoff was active in industry and professional circles

- Served on NASD committees
- Member of the NASD board
- Chairman of NASDAQ
- Had good relations with the SEC
- Firm anticipated (influenced) regulatory changes

# Journal of Finance 1997

Paper by Robert Battalio on Madoff's impact.

*This article compares the bid ask spread for New York Stock Exchange (NYSE) (listed securities before and after a major third market broker dealer Bernard L Madoff Investment Securities (Madoff) begins to selectively purchase and execute orders in those securities. Tests reveal that the quoted bid ask spread tightens when Madoff enters the market . . . .*

# Madoff's IA business

- From inception Madoff acted as an investment adviser.
- Secret activity
- Early investors included his father in law Saul Alpern and Alpern's clients.
- Madoff provided very good returns
- Not clear when or why the Ponzi Scheme began.

# Madoff's Early Investors

- Early investors family and friends
- Madoff targeted Jewish groups
- Affinity fraud: feature of several Ponzi schemes
- Charities and wealthy individuals
- Promised and delivered solid steady returns
- Investors loved the low volatility.

# Buy Low Sell High

Certain special clients received very high returns sometimes 100% in year.

- Firm created false trading records
- Backdated purchase at low price: fabricated sale at a future higher price
- Double back dating
- Madoff engineered bogus trades to buy high sell low for certain clients
- Why would investors like these losing trades ?

# Popular Madoff Strategy

## Split Strike Conversion

- Go long selected blue chip stocks in S&P 100
- Sell out-of-the-money call options on the Index
- Buy out-of-the-money- puts on the Index
- Strategy limits losses because of puts.
- Call sales help defray the cost
- Madoff claimed to go into cash for certain periods
- **Stock picking and market timing ability**

# Lipstick Building

- In 1993 BLMIS moved into Lipstick Building
- Broker Dealer business occupied 18<sup>th</sup> and 19<sup>th</sup> floors
- Segregated from 17<sup>th</sup> floor where Ponzi scheme operations carried on
- Shrouded in secrecy. Virtually no contact with rest of the business
- Returns were made up and phony records concocted

# Different Clienteles

- Three different groups of clients
- First based on split-strike strategy
- Mainly feeder funds, administered by Frank DiPascali
- Next two groups used other strategies
- Unsophisticated clients
- Sophisticated clients

# Feeder Funds

- Starting in 1990 used feeder funds. 15 by 2008.
- Very productive marketing channel
- Returns of around one percent per month after all fees
- Funds received fees (say one percent plus 20 % performance fee)
- Madoff **only** collected commissions
- Example: Fairfield Greenwich Group: Fairfield Sentry

# Fairfield Greenwich Group

- *Asset managers, with USD\$12 billion AUM*
- *FGG entities are: registered with the U.S. SEC*
- *Client base includes: private banks, financial advisors, family offices, pension funds, government authorities, and other institutional investors*
- *Rigorous portfolio oversight and risk monitoring*

# Fairfield Greenwich Group

*Fairfield Sentry Limited has employed a split strike conversion strategy since inception in 1990. Sentry's objective is seek returns that*

- Provide long-term capital appreciation by delivering short-term gains*
- Are uncorrelated to the market*
- Are disproportionately high relative to risk exposure*

# Connection of FGG to Bernie

*The “split strike conversion” strategy is implemented by Bernie L. Madoff Investment Securities LLC (“BLM”), a broker dealer registered with the Securities and Exchange Commission through accounts maintained by the Fund in that firm. The services of BLM and its personnel are essential to the continued operation of the Fund and its profitability.*

# FGG: Promises

- *Maintain full transparency to BLM accounts*
- **Independent verification of prices and account values**
- *P&L attribution analysis*
- *Examination of option greeks to make sure the hedge is working as expected*
- *Risk oversight using Risk Metrics*
- *Systematic investment compliance monitoring of Operating Guidelines*
- *Regular written communication to clients*

# FGG: Due Diligence

FGG's due diligence process is deeper and broader than a typical Fund of Funds, resembling that of an asset management company acquiring another asset manager, rather than a passive investor entering a disposable investment.

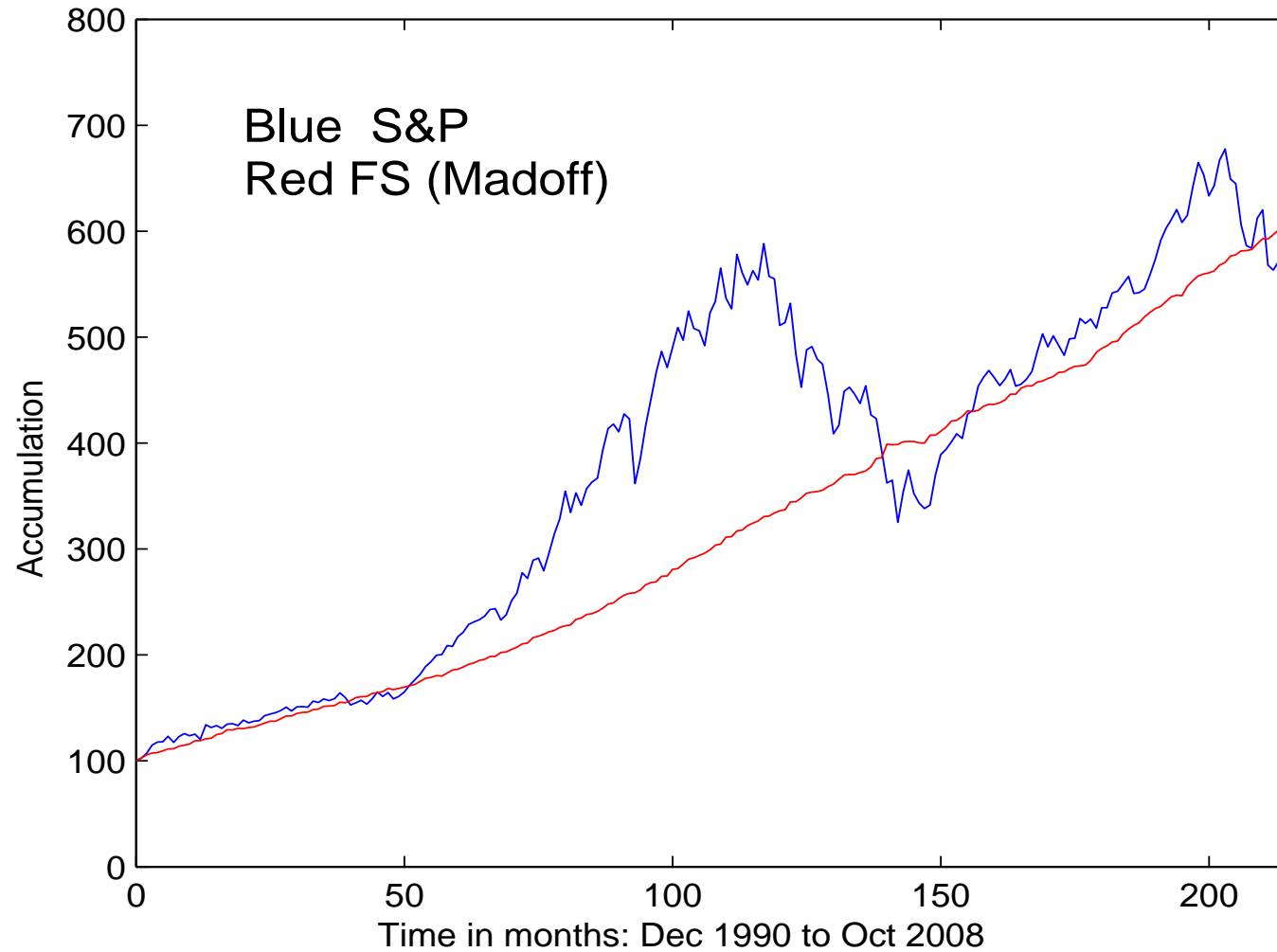
A number of areas of inquiry are examined by a team of FGG professionals who specialize in evaluating respective areas of risk. Typically, a manager has been investigated and monitored for six to twelve months before that firm can be accepted onto the FGG platform.

# Raising Funds

Several reasons why Madoff was able to raise money.

- Good steady returns
- High profile in in industry
- Reputation for charitable giving
- Waiting list made it exclusive
- Broker dealer operation added credence
- Very profitable investment for the feeder funds

# Fairfield Sentry Performance

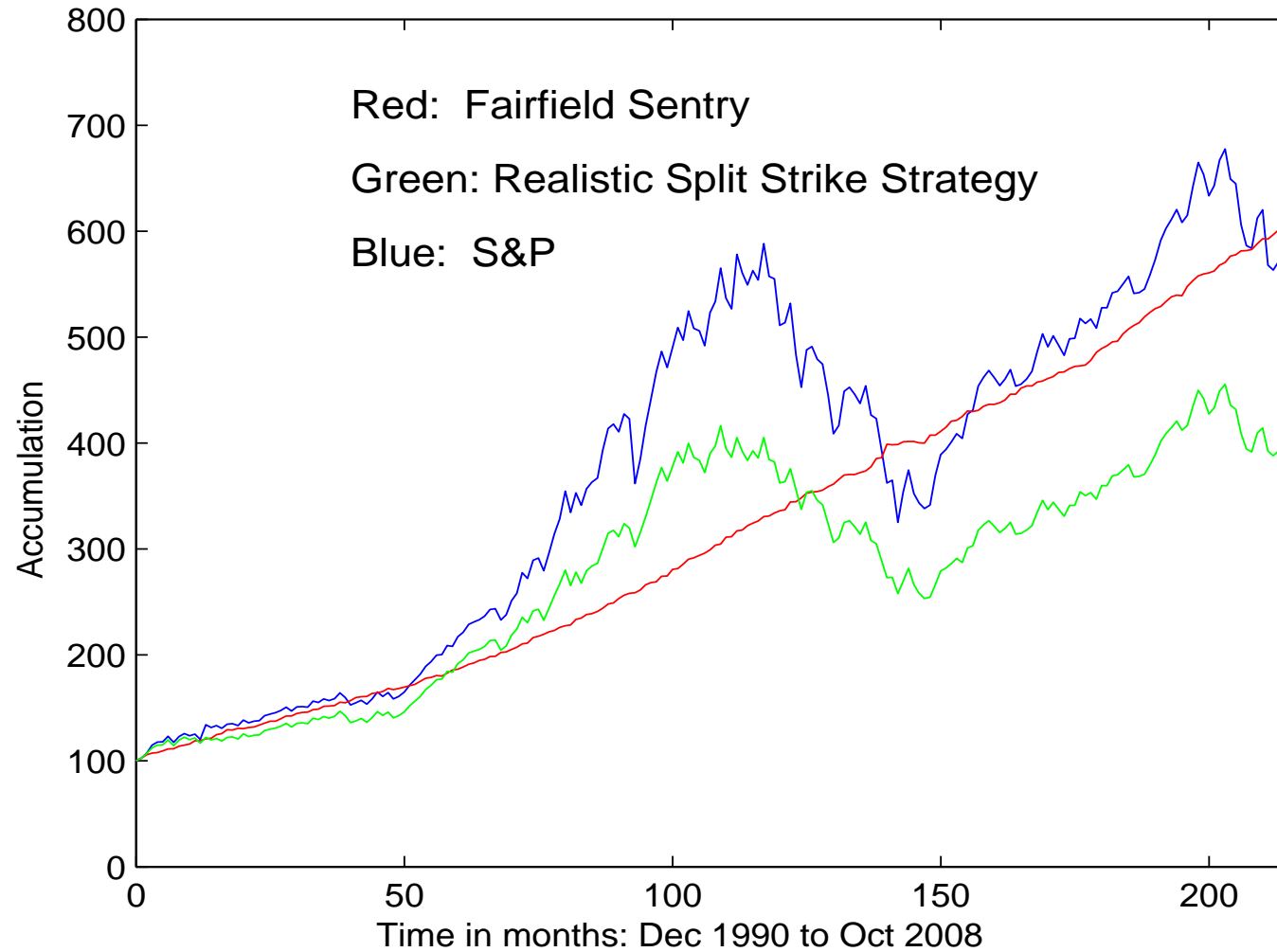


# FS returns 1990 to 2008.

Strategy	Long S&P	Fairfield Sentry
Average return (y)	9.64%	10.59%
St deviation (y)	14.28%	2.45%
Sharpe Ratio (y)	0.36	2.47
Max monthly return	11.44%	3.29%
Min monthly return	-16.79%	-0.64%
% months positive	64.65%	92.33%
Corr with <i>S&amp;P</i>	1.00	0.32

From Bernard and Boyle (2009).

# Split Strike Implementation

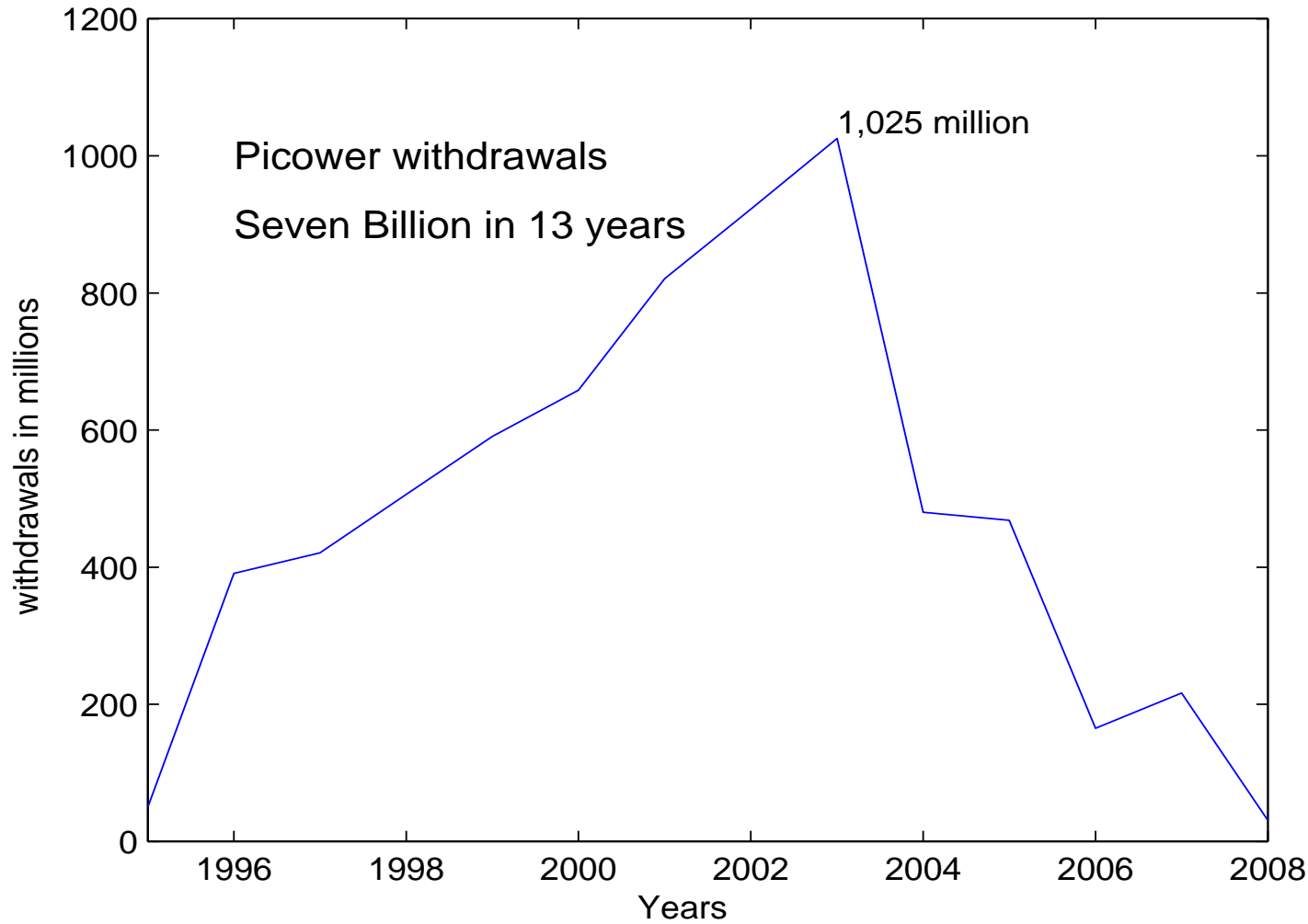


# Special Deals

Some selected Madoff clients were given **much higher returns**. For example, the late Jeffrey Picower received returns of over 100 % pa. Picower invested \$620 million with Madoff and over the period 1995-2008 withdrew **7 billion dollars**.

Picower was a sophisticated investor and it is **very hard to make the case that he did not know it was a huge Ponzi scheme**.

# Picower Withdrawals



# Stanley Chais

- 35 times between 1996 and 2007 Chais family accounts had annual returns of more than 100 percent
- 125 times when the returns exceeded 50 percent.
- Some tax losses were fictitious.
- Outsize returns - compensation to Mr. Chais for steering millions of dollars into the Ponzi scheme.

# Double Backdating

We can estimate value of double backdating. Suppose stock is lognormal with  $\mu = .09$ ,  $\sigma = .35$ . Assume fund *buys* the stock at a price  $S_L$  and *sells* it at a price  $S_H$  at a later time. Use daily data. Define

$$Y = \max \left( \frac{S_H}{S_L} - 1 \right)$$

Returns not annualized.

# Value of Backdating

Compare returns on investing directly in stock with no foresight with double back dating.

	Long stock No foresight	Double back dating
Expected return	9.4 % pa	55.8 % pa
Volatility	39.5 % pa	31.9 % pa
Sharpe ratio (y)	0.14	1.62

# Growth of Fictitious Portfolio

The portfolio value grows for two reasons. One is because of phony return:- a made up number. The other is because of (net)new investments. This is an actual cash flow.

- $P_t$ : notional value at time  $t$  Fictitious portfolio.
- $r_t$ : *rate of return* on fund during  $[t, t + 1)$ .
- $g_t$ : net actual growth rate of fund during  $[t, t + 1)$ .

Then

$$(1) \quad P_{t+1} = P_t(1 + r_t)(1 + g_t)$$

# Portfolio Growth

Table gives total portfolio values for 1995 and 2008.

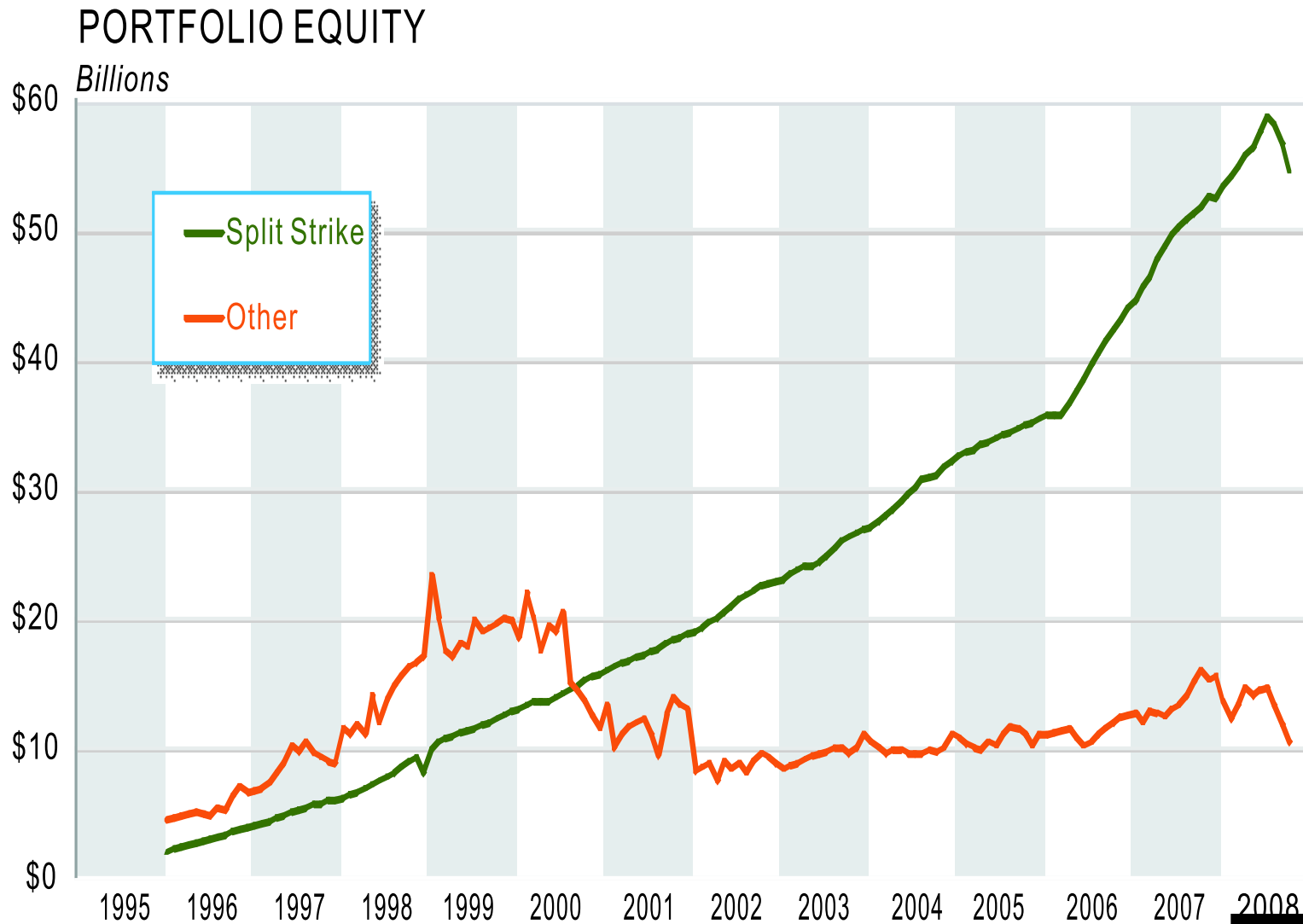
Year	Total portfolio billions
1995	6.0
2008	64.9

Yearly average compound growth rate 20% . So assuming constant net growth and returns.

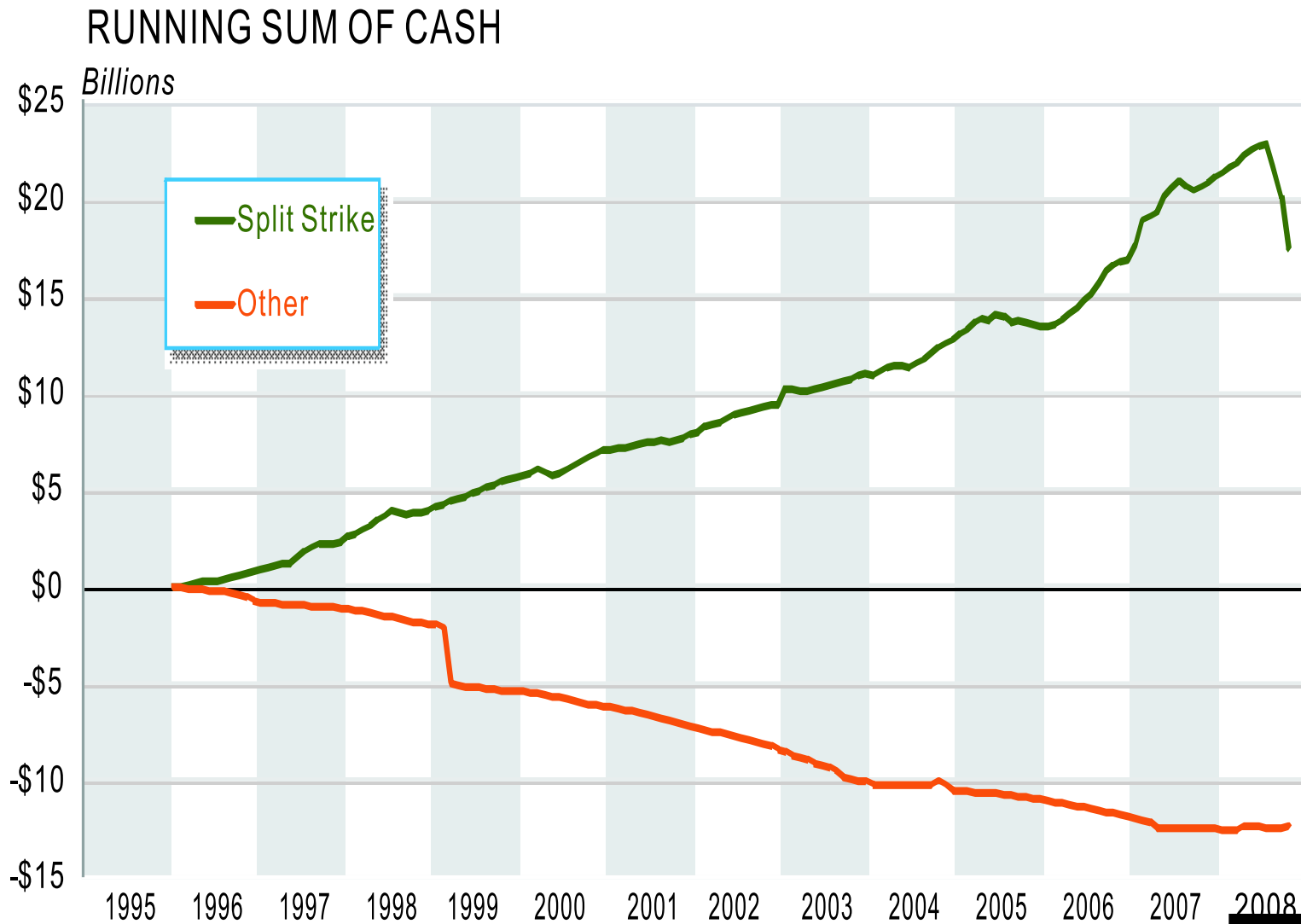
$$(1 + r)(1 + g) = 1.2$$

This aggregate calculation hides something very interesting.

# Notional growth of two portfolios



# Cash flows in and out



# Cash Flow Crises

DH notes that Madoff experienced several severe cash flow crises. These are the main ones

- 1962 : Hot Issues market
- 1987: Black Monday and sequel
- 1992: Failure of Avellino and Bienes \$400 million
- 2002: Picower withdrawals 1 billion
- 2005-2006: Bayou failure over 1.3 billion from Fairfield
- 2008 Financial crisis

# 2008-2009 Financial Crisis

- Asset prices plunge
- Stock market drops by 40%
- Correlations and volatilities increase
- Massive redemptions because of panic liquidity spirals
- Feedback effect modelled by Brunnermeier and Pedersen
- Madoff cannot meet flood of redemptions. Confesses December 11 2008

# Bankruptcy Trustee

- Irving Picard appointed trustee under Securities Investment Protection Act
- Contest between the *Net Investment Method (NIM)* and the *Last Statement Method (LSM)*
- NIM settlement is cash in minus cash out. Court has decided to use NIM in Madoff case.
- Trustee has filed several clawback lawsuits

# Examples

Date	Investor A	Investor B
2000	Invests \$1,000,000	Invests \$1,000,000
2004	Withdraws \$400,000	Withdraws \$2,400,000
2008	Account=\$2,500,000	Account =\$5,000,000

Compare methods

Recovery Method	A	B
NIM	+\$600,000	- \$1,400,000
LSM	+\$2,100,000	+\$2,600,000

# Trustee sues Picower

Liquidation trustee Picard sued Picower for \$7.2 billion in 2009. Suit asserted that

- Picower knew or should have known scheme was a fraud because of implausibly high rates of return
- BLMIS and Picower's own documents further suggest Picower's complicity in the fraud
- Picower was aware of the fictitious nature of the transactions

# Settlement

Picower died in October 2009. In December 2010 his estate settled for the entire \$7.2 billion.

Trustee Picard stated

In the spring of 2009, the records available led us to allege that Mr. Picower might have or should have known of Mr. Madoff's fraud. With the benefit of additional records, I have determined that there is no basis to pursue the complaint against Mr. Picower, and we have arrived at a business solution instead.

# Red Flags

- Same firm managed assets, executed and cleared trades , and acted as custodian.
- Obscure accountants: Friehling and Horowitz
- Unusual fee structure. Madoff only charged *market rate commission*
- Pervasive family influence
- Extreme secrecy
- Impossible returns

# Growing Evidence

Several finance professionals and others became suspicious of Madoff's Operation.

- Harry Markopolous made several reports to the SEC
- May 2001 Michael Ocrant, MAR/Hedge article: "Madoff Tops Charts Skeptics ask How"
- May 27 2001 article in Barrons: "Don't Ask Don't Tell: Bernie Madoff is so secretive he even asks investors to keep mum"

# Avoiding Madoff

Many banks, investment advisers and FOFs refused to deal with BLMIS because of the unusual returns and extreme secrecy.

## **These firms included**

Société Générale, Goldman Sachs, Credit Suisse, Merrill Lynch, Morgan Stanley and Royal Bank. Other firms included Aksia LLC, Albourne Partners and Acorn Partners.

# Failure of the SEC

- Received six substantive complaints about Madoff's operation investments
- SEC conducted two examinations and three investigations
- Failed to uncover the Ponzi scheme
- Young lawyers overawed and intimidated by Madoff
- Told them he was on short list to be next Chairman of the SEC

# What Investors Knew

## Three main groups

1. Unsophisticated investors. Innocent victims. Did not suspect fraud.
2. Sophisticated investors. Feeder funds and others could have and should have suspected fraud. Would kill the goose that laid the golden eggs.
3. Special access investors. Some received incredibly good deals. How much did they know?

# Reflections

Next fraud will be different so need to be careful.

- Markets need regulation (Richard Posner)
- SEC
- Relation between return and risk
- Analyze returns
- Analyze the incentives
- Transparency. Shine a light
- Auditors, prime brokers custodians
- Diversification