

Long-Term Capital Management

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I. Introduction and History

Introduction

- Long-Term Capital Management was a hedge fund founded by John Meriwether
- Employed many trading strategies based on leverage and convergence trades
- Achieved terrific returns on investment in early years leading to significant exposure to major counterparties in the financial system
- Series of macroeconomic crises resulted in significant loss of capital in the late 1990's
- Eventually bailed out by a consortium of banks organized by the Federal Reserve of NY

Before LTCM

John Meriwether Profile

- John Meriwether headed Salomon Brothers' bond arbitrage desk until resigning in 1991 amid a trading scandal
 - Group accounted for >80% of firm's total revenue
- Looked to hire smart traders who treated markets as intellectual discipline: “quants”
- Exposed market inefficiencies
 - Over time, all markets tend to get more efficient, allowing his desk to exploit profit on the spread between riskier and less risky bonds



John Meriwether



Salomon Brothers Building

Introduction to Hedge Funds

- Privately and largely unregulated investment vehicles for the rich
- Originally based on premise of “hedging” a bet
 - Limit the possibility of loss on a speculation by betting on the other side
- 215 hedge funds existed in 1978, while >3,000 hedge funds were active by 1990
- Concentration on “relative value” by betting on spreads between pairs of bonds
 - Example: If interest rates in Italy were higher than in Germany, a trader who invested in Italy and shorted Germany would profit if this differential narrowed
- Leveraged the firm up to 30x with borrowed capital at a low cost
- Convergence Trade: Find securities that are mispriced relative to one another and take long positions in the cheap ones and short positions in the overpriced ones. Four main types of trade

Famous Hedge Funds



Appaloosa Management, L.P.



 **CITADEL**


THIRD POINT


BRIDGEWATER

Pershing Square Capital Management, L.P.

Long-Term Capital Management Profile

Overview

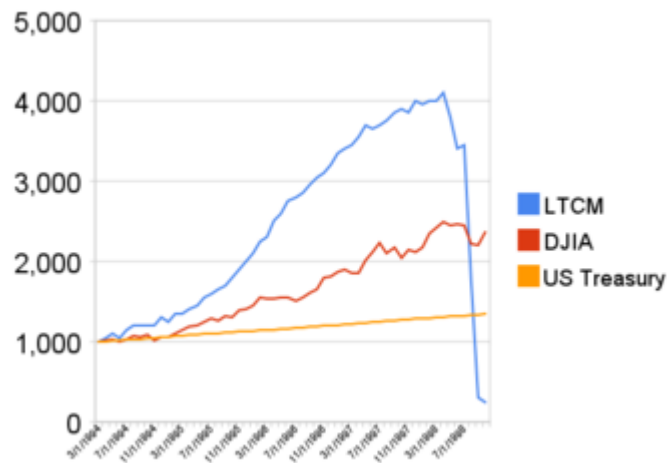
Founded: 1994



Headquarters: Greenwich, CT

- Hedge fund formed by John Meriwether
- Employed several key personnel from Salomon Brothers' bond arbitrage desk

Historical Performance



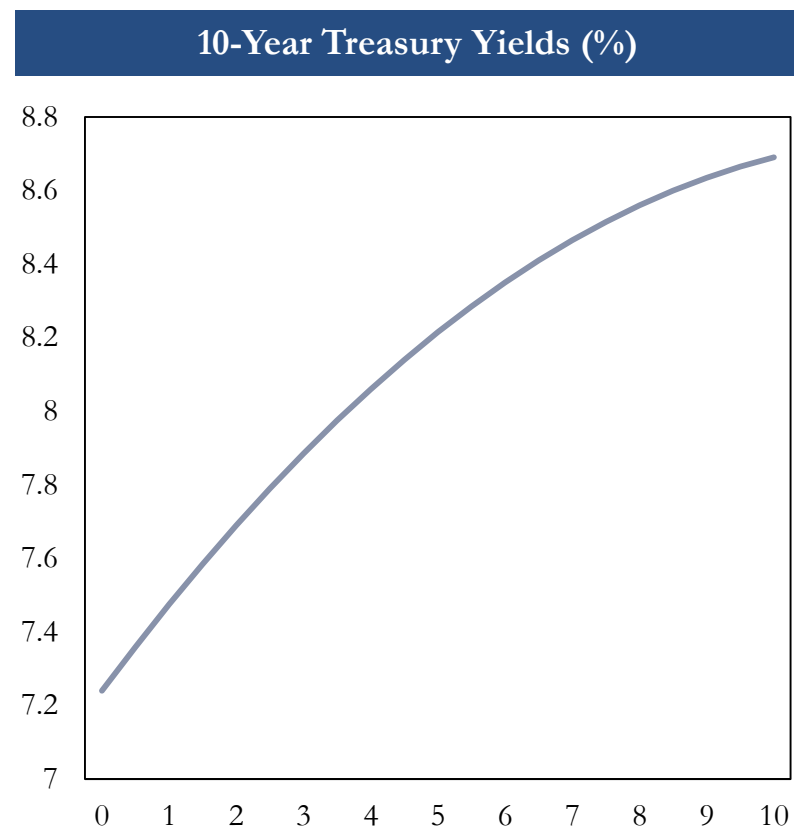
Key Personnel

Member	Past Affiliation
John Meriwether	Head of Bond Trading at Salomon Brothers
Robert Merton	Professor at Harvard University
Myron Scholes	Professor at Stanford University
David Mullins	Vice Chairman at the Federal Reserve; Professor at Harvard University
Eric Rosenfeld	Salomon Arbitrage Group; Professor at HBS
William Krasker	Salomon Arbitrage Group; Professor at HBS
Gregory Hawkins	Salomon Arbitrage Group
Larry Hilibrand	Salomon Arbitrage Group

II. Trading Strategies

Trading Strategies

- Convergence Trading
 - Capitalize on prices of 2 assets converging without taking risk of general market
- Fixed-Income Arbitrage
 - On-the run treasuries trade at higher premiums due to it being more liquid
 - The liquidity premium eventually erodes as bonds become off-the-run
 - Trade: long old benchmark treasuries, short similar duration newer benchmarks
 - Created exposure to flattening of yield curve, hedged out by entering smaller credit curve steepener
 - Discrepancy is typically a few basis points: leverage 30-40x
 - 1993: 30yr 7.24, 29.5yr 7.36



Trading Strategies (cont'd)

- Convergence trading in many markets
 - Example: Italian Swap curve above yield curve
 - Companies can enter into interest rate swaps at lower cost than borrowings from government
 - Implied government had higher likelihood of default on bonds than Italian companies with high credit ratings of similar duration
 - Trade: traded Libor payments for Treasury (long treasuries), then received Libor in exchange for paying fixed swap rate to capture spread
- Leverage
 - Used leverage to enhance returns and to borrow for short positions
 - In 1998, Equity: \$4.72bn, Debt: \$124.5bn, D/E = 25:1
- Non-Arbitrage Strategies
 - Long/short equity options, takeover stocks, EM debt, catastrophe bonds

Black-Scholes Model

- Developed partially by Myron Scholes and used to identify mispricings in options
- Key takeaways:
 - Difference between asset-or-nothing call verses cash-or-nothing call
 - Second term: probability of expiring in the money times cash value of money, discounted
 - First-term: present value of expected asset price at expiration, given asset price expires above exercise price

Model Algebra

$$C(S, t) = N(d_1)S - N(d_2)Ke^{-r(T-t)}$$

$$d_1 = \frac{1}{\sigma\sqrt{T-t}} \left[\ln\left(\frac{S}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)(T-t) \right]$$

$$d_2 = \frac{1}{\sigma\sqrt{T-t}} \left[\ln\left(\frac{S}{K}\right) + \left(r - \frac{\sigma^2}{2}\right)(T-t) \right]$$
$$= d_1 - \sigma\sqrt{T-t}$$

Key Terms

- $N(\cdot)$: standard normal distribution
- $T-t$: Time to maturity
- S : Spot price of underlying
- K : Strike Price
- r : Risk free rate
- σ : volatility of underlying

III. Causes of Collapse

East Asia Financial Crisis

- Crippled East Asia in 1997 and spread fear of a worldwide economic meltdown due to financial contagion
- Began in Thailand with the collapse of the Thai baht – lack of foreign currency to support its fixed exchange rate caused massive debt default
- Indonesia, South Korea, and Thailand were most affected by the crisis – marked by high Debt/GDP ratio and alarmingly low forecasted growth
- IMF stepped in to initiate a \$40bn program to stabilize Asian currencies
- Principal causes include credit bubbles fueled by hot money and fixed exchange rates

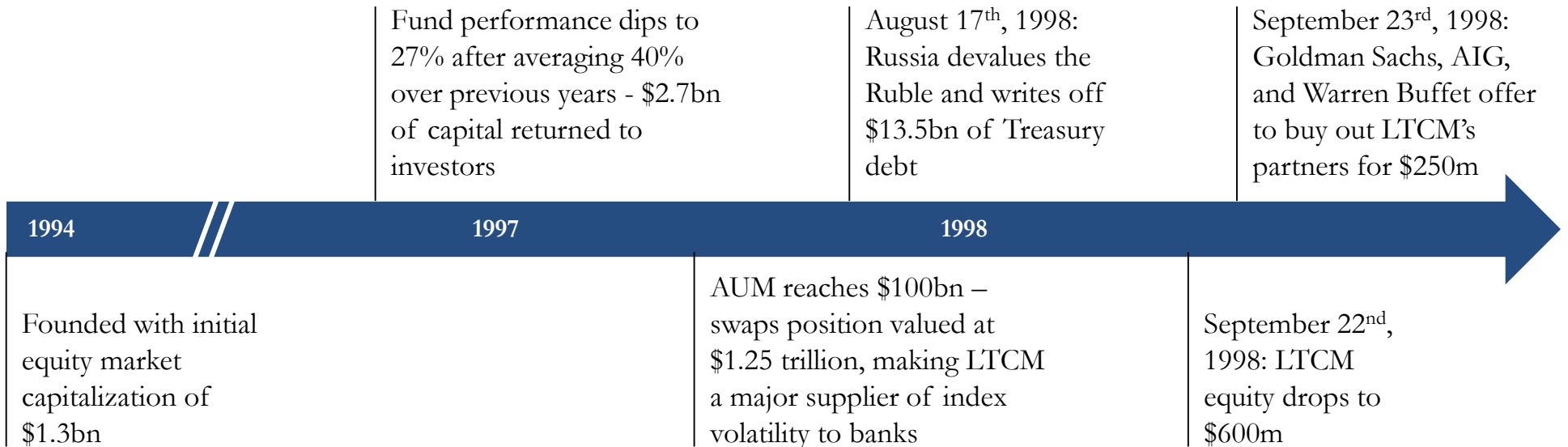
Russia Financial Crisis of 1998

- Debt Buildup: Perpetual war, collapse of tax system, political corruption, foreign denominated debt, collapse of productivity
- USSR breakup in 1991 spurred a dramatic social and political transition
- Lack of economic diversity (highly dependent on oil exports) and foreign denominated debt made trade surplus important – pegged currency to USD
- Asian crisis unfolds in 1998, collapsing the oil and non-ferrous metals markets
- Investors believed that Ruble would be massively devalued and debt would be defaulted on

Beginning of the End

- The Proximate Cause: Russian Sovereign Debt Default
 - Russia defaults on its government obligations (GKOs)
- The Ultimate Cause: Flight to Liquidity
 - As Russia collapsed, fixed-income traders flocked to more liquid assets (e.g. on-the-run T-Bills)
 - Spreads between on-the-run and off-the-run Treasuries widened dramatically
 - Short positions increased in price relative to long positions
 - Issuance of US Treasuries declined into the 90s, reducing the liquidity of the Treasury market
- Systemic Risk: The Domino Effect
 - Leveraged Treasury bond investors were similarly exposed to this liquidity crisis

Timeline of Collapse

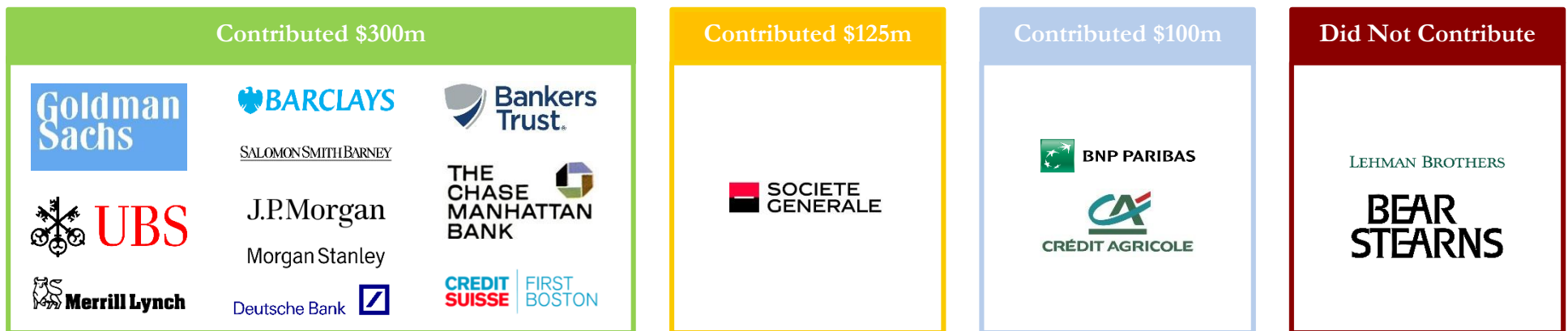


IV. Bailout and Consequences

Bailout and Aftermath

- Wall Street and the government were fearful that a failure in LTCM would result in systemic damage to the capital markets
- GS and JP Morgan were hired to source credit to little avail
- GS, AIG and Berkshire Hathaway initially offered to buyout fund's partners for \$250m, and offered a \$3.75bn capital injection
 - This was considered low at the time since LTCM was worth \$4.7 billion a year ago
 - Time lapsed before LTCM would make the deal
- New York Fed (governing body of LTCM) organized major firms into a bailout coalition to find a private sector solution

Participating Firms



Bailout and Aftermath (cont'd)

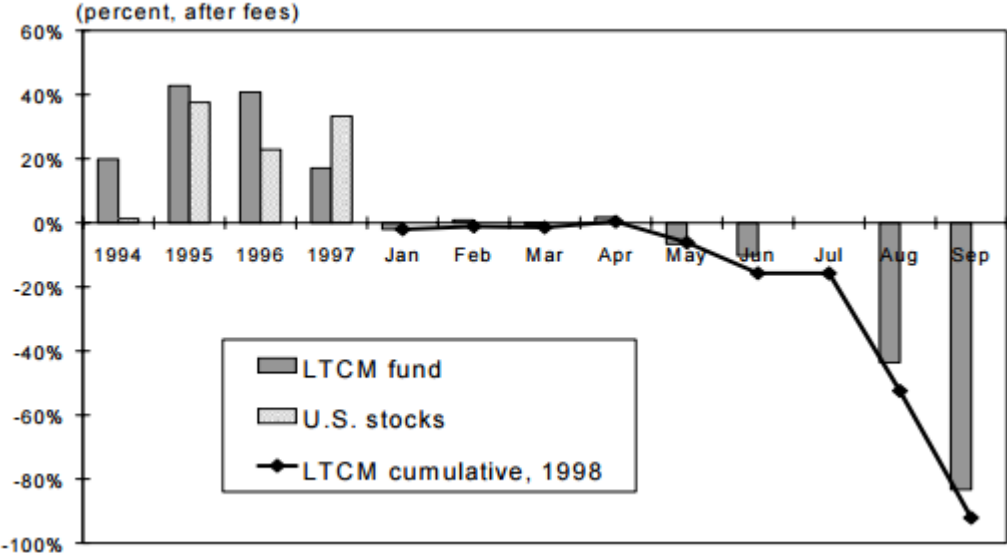
- Participating firms acquired 90% ownership of the equity in the fund
 - Original partners kept 10% control (~\$400m) but this was mostly wiped out by debt
 - Partners once had \$1.9bn capital invested in LTCM, all of which was wiped out
- LTCM continued operations after and earned 10% in the following year
- Fund completely liquidated by early 2000s for a small profit to the rescuers
- Meriwether launched JWM Partners in 1999 utilizing LTCM's strategies with less leverage (15-to-1)
 - During the credit crisis of 2008, JWM Partners was hit with a 44% loss from 2007 to 2009 and the hedge fund was shut down in July 2009

Lessons Learned

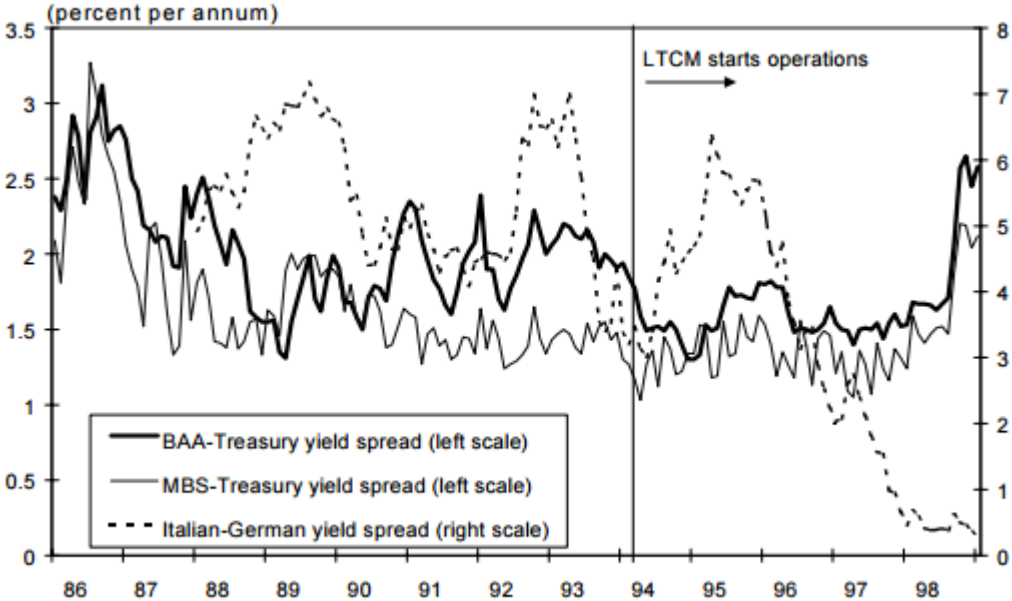
1. Leverage can be a double-edged sword
 - Flight by investors can essentially be seen as a bank run
2. Selling out-of-the-money naked options work in most but not all circumstances, with potentially catastrophic consequences
 - “Picking up nickels in front of a bulldozer”
3. New York Fed was willing to organize a group of private lenders to find a solution
 - Set a precedent for the attempted Lehman Brothers bailout in 2008
 - Possibly encouraged financial institutions to take on further risk
 - Moral hazard!
4. Cash is king; no matter how sound an investment strategy may sound on paper, even a short liquidity crunch can result in default

Q&A

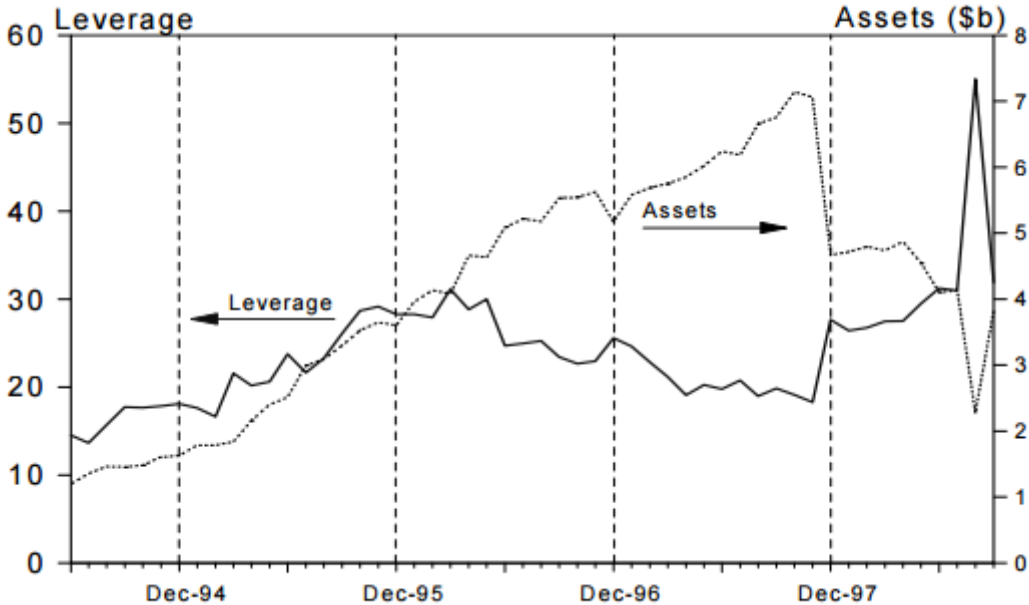
Appendix: LTCM's Returns



Appendix: Bond Yield Spreads



Appendix: LTCM Leverage and Asset Growth



Appendix: Distribution of Monthly Returns

