

# The Failure of Long Term Capital Management (LTCM)

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## Abstract

For centuries, men have held the ambition to be able to beat the market consistently. Year after year many traders try new strategies to be able to win consistently in the market. However, their strategies predictably fail creating the belief that the market is invincible and that the ability to beat the market consistently is nothing but a pipedream. However, in the early 1990's this pipedream came to life in the form of a fund called Long Term Capital Management. This fund was created by a bunch of Nobel laureates who had created the option pricing formula. It ran successfully for some years and gave an average return of 40% after deducting fees and commissions. This makes it a gross return of close to 53% per annum. What's even more interesting is that fact that the founders of this fund ran it like clockwork meaning that there were no leveraged wild bets being placed on the market. Rather, they had a thorough, systematic plan which worked step by step with little volatility. High returns and low risk made them arbitrageurs i.e. people who generate risk-free profit. However, this massive arbitrage operation came to a grinding halt. The fame and aura of invincibility that surrounded both Long Term Capital Management fund and its founders was destroyed as this fund created a spectacular collapse leaving a trillion-dollar hole in the markets. In this article, we will discuss the rise and fall of the Long Term Capital Management fund.

**Keywords:** Failure of Long Term, Capital Management (LTCM)

## 1.0 INTRODUCTION

Long-Term Capital Management L.P. (LTCM) was a hedge fund based in Greenwich, Connecticut that used absolute return trading strategies combined with high financial leverage. LTCM was founded in 1994 by John Meriwether, the former vice-chairman and head of bond trading at Salomon Brothers. Members of LTCM's board of directors included Myron S. Scholes and Robert C. Merton, who shared the 1997 Nobel Memorial Prize in Economic Sciences for a "new method to determine the value of derivatives". Initially successful with annualized return of over 21% (after fees) in its first year, 43% in the second year and 41% in the third year, in 1998 it lost \$4.6 billion in less than four months due to a combination of high leverage and exposure to the 1997 Asian financial crisis and 1998 Russian financial crisis.[3] The master hedge fund, Long-Term Capital Portfolio L.P., collapsed in the late 1990s, leading to an agreement on September 23, 1998, among 14 financial institutions[4]—which included Bankers Trust, Barclays, Chase Manhattan Bank, Crédit Agricole, Credit Suisse First Boston, Deutsche Bank, Goldman Sachs, JP Morgan, Merrill Lynch, Morgan Stanley, Paribas, Salomon Smith Barney, Société Générale, and UBS for a \$3.6 billion recapitalization under the supervision of the Federal Reserve. The fund liquidated and dissolved in early 2000. Fixed income arbitrage

Fixed income securities pay a set of coupons at specified dates in the future, and make a defined redemption payment at maturity. Since bonds of similar maturities and the same credit quality are close substitutes for investors, there tends to be a close relationship between their prices (and yields). Whereas it is possible to construct a single set of valuation curves for derivative instruments based on LIBOR-type fixings, it is not possible to do so for government bond securities because every bond has slightly different characteristics. It is therefore necessary to construct a theoretical model of what the relationships between different but closely related fixed income securities should be. For example, the most recently issued treasury bond in the US – known as the benchmark – will be more liquid than bonds of similar but slightly shorter maturity that were issued previously. Trading is concentrated in the benchmark bond, and transaction costs are lower for buying or selling it. As a consequence, it tends to trade more expensively than less liquid older bonds, but this expensiveness (or richness) tends to have a limited duration, because after a certain time there will be a new benchmark, and trading will shift to this security newly issued by the Treasury. One core trade in the LTCM strategies was to purchase the old benchmark – now a 29.75-year bond, and which no longer had a significant premium – and to sell short the newly issued benchmark

30-year, which traded at a premium. Over time the valuations of the two bonds would tend to converge as the richness of the benchmark faded once a new benchmark was issued. If the coupons of the two bonds were similar, then this trade would create an exposure to changes in the shape of the yield curve: a flattening would depress the yields and raise the prices of longer-dated bonds, and raise the yields and depress the prices of shorter-dated bonds. It would therefore tend to create losses by making the 30-year bond that LTCM was short more expensive (and the 29.75-year bond they owned cheaper) even if there had been no change in the true relative valuation of the securities. This exposure to the shape of the yield curve could be managed at a portfolio level, and hedged out by entering a smaller steepener in other similar securities.

### 1.1 Leverage and Portfolio Composition

Because the magnitude of discrepancies in valuations in this kind of trade is small (for the benchmark Treasury convergence trade, typically a few basis points), in order to earn significant returns for investors, LTCM used leverage to create a portfolio that was a significant multiple (varying over time depending on their portfolio composition) of investors' equity in the fund. It was also necessary to access the financing market in order to borrow the securities that they had sold short. In order to maintain their portfolio, LTCM was therefore dependent on the willingness of its counterparties in the government bond (repo) market to continue to finance their portfolio. If the company was unable to extend its financing agreements, then it would be forced to sell the securities it owned and to buy back the securities it was short at market prices, regardless of whether these were favourable from a valuation perspective.

At the beginning of 1998, the firm had equity of \$4.7 billion and had borrowed over \$124.5 billion with assets of around \$129 billion, for a debt-to-equity ratio of over 25 to 1. It had off-balance sheet derivative positions with a notional value of approximately \$1.25 trillion, most of which were in interest rate derivatives such as interest rate swaps. The fund also invested in other derivatives such as equity options. John Quiggin's book *Zombie Economics* (2010) states, "These derivatives, such as interest rate swaps, were developed with the supposed goal of allowing firms to manage risk on exchange rates and interest rate movements. Instead, they allowed speculation on an unparalleled scale."

### 1.2 Secret and Opaque Operations

LTCM was open about its overall strategy, but very secretive about its specific operations, including scattering trades among banks. And in perhaps a disconcerting note, "since Long-Term was flourishing, no one needed to know exactly what they were doing. All they knew was that the profits were coming in as promised," or at least perhaps what should have been a disconcerting note when looked at in hindsight. Opaqueness may have made even more of a difference and investors may have had even a harder time judging the risk involved when LTCM moved from bond arbitrage into arbitrage involving common stocks and corporate mergers.

### 1.3 UBS Investment

Under prevailing US tax laws, there was a different treatment of long-term capital gains, which were taxed at 20.0 percent, and income, which was taxed at 39.6 percent. The earnings for partners in a hedge fund was taxed at the higher rate applying to income, and LTCM applied its financial engineering expertise to legally transform income into capital gains. It did so by engaging in a transaction with UBS (Union Bank of Switzerland) that would defer foreign interest income for seven years, thereby being able to earn the more favourable capital gains treatment. LTCM purchased a call option on 1 million of their own shares (valued then at \$800 million) for a premium paid to UBS of \$300 million. This transaction was completed in three tranches: in June, August, and October 1997. Under the terms of the deal, UBS agreed to reinvest the \$300 million premium directly back into LTCM for a minimum of three years. In order to hedge its exposure from being short the call option, UBS also purchased 1 million of LTCM shares. Put-call parity means that being short a call and long the same amount of notional as underlying the call is equivalent to being short a put. So the net effect of the transaction was for UBS to lend \$300 million to LTCM at LIBOR+50 and to be short a put on 1 million shares. UBS's own motivation for the trade was to be able to invest in LTCM – a possibility that was not open to investors generally – and to become closer to

LTCM as a client. LTCM quickly became the largest client of the hedge fund desk, generating \$15 million in fees annually.

#### 1.4 Diminishing Opportunities and Broadening of Strategies

LTCM attempted to create a splinter fund in 1996 called LTCM-X that would invest in even higher risk trades and focus on Latin American markets. LTCM turned to UBS to invest in and write the warrant for this new spin-off company. LTCM faced challenges in deploying capital as their capital base grew due to initially strong returns, and as the magnitude of anomalies in market pricing diminished over time. James Surowiecki concludes that LTCM grew such a large portion of such illiquid markets that there was no diversity in buyers in them, or no buyers at all, so the wisdom of the market did not function and it was impossible to determine a price for its assets (such as Danish bonds in September 1998). In Q4 1997, a year in which it earned 27%, LTCM returned capital to investors. It also broadened its strategies to include new approaches in markets outside of fixed income: many of these were not market neutral – they were dependent on overall interest rates or stock prices going up (or down) – and they were not traditional convergence trades. By 1998, LTCM had accumulated extremely large positions in areas such as merger arbitrage (betting on differences between a proprietary view of the likelihood of success of mergers and other corporate transactions would be completed and the implied market pricing) and S&P 500 options (net short long-term S&P volatility). LTCM had become a major supplier of S

## 2.0 THE ALBANIAN REVOLUTION AND PYRAMID SCHEMES

Pyramid schemes or Ponzi schemes as they are often called have been around in the market economy for quite some time now. They have even wrecked significant havoc and always end up being part of some form of crisis or another. Even in 2008, the Bernie Madoff scandal caused chaos on Wall Street as a pyramid scheme had been used to siphon off \$50 billion from under the nose of the world's most competent regulators. Pyramid schemes have therefore always been regarded as dangerous, to say the least. However, none of the pyramid schemes had brought about a revolution and engineered the fall of a government or bankrupted an entire nation. This distinction belongs to the Albanian pyramid schemes that mushroomed in the early 1990's and plunged an entire nation into economic turmoil in 1997. In this article, we will learn more about the economic insanity that gripped Albania in the 1990's.

### 2.1 Communism

Albania had been a strictly communist country till the late 80's. It was ruled by a dictator who believed in self-sufficiency. This meant that Albania was not trading with other countries of the world back then. Also, there was no concept of private ownership for over a generation. It is for this reason that the entire population of Albania was unaware of even the basics of investing in financial markets. Also, there were no channels that provided information to the Albanians. Hence, decades of isolation had created a country that was rife with financial scandals.

### 2.2 State Banks were Incompetent in Albania

To further complicate the problems, the banks owned by the Albanian state were outright incompetent. They were not able to even perform the basic functions of banking efficiently. For instance, it would take 5 to 6 days if money had to be transferred from one account of the same state-owned bank to another! If more than one bank was involved in the transactions, the payment process would take at least 15 days. Also, the Albanian banks were not very good at making loans. They always had a large number of nonperforming assets on their books. This made the investors worry about the safety of their investments, thereby limiting the deposits in these banks. The Albanian population had a distrust of banks and preferred to hold large amounts of cash. This is why the informal credit system was able to gain a foothold in Albania.

### 2.3 Informal Credit System

The shortcomings of the Albanian banking system created opportunities for other unscrupulous and fly-by-night operators to undertake activities in the financial sector. A lot of these organizations started mushrooming. They offered interest rates of close to 4% per month to their investors! These

interest rates were obviously not sustainable until the economy was in hyperinflation. The IMF was worried about the legitimacy of these operations. A lot of these companies were not banks at all. They were simply borrowing money from the Albanian public on their own account.

Some of these businesses were alleged to be laundering money for the Italian mafia. Some others were alleged to be indulging in smuggling goods past the Albanian border to the neighboring country of Yugoslavia which was facing sanctions from the United Nations. However, the naive Albanian public was totally unaware of the risks. They kept investing money in these operations and the amount of funds being managed by the informal credit system swelled up to \$1.2 billion dollars.

#### 2.4 The Mania

The informal credit system may have been engaged in illegal operation. However, they were engaged in some kind of operation. Seeing the success of these companies, many pure-play Ponzi operators stepped into the market. These operators kept bidding interest rates higher against each other and finally some operators were claiming to offer as much as 40% interest per month! Anybody with even the slightest knowledge of finance can say with certainty that such schemes are simply not possible however the Albanian public brought into these schemes. Farmers sold their lands and livestock and handed money over to the Ponzi operators. There were queues outside the offices of these companies to deposit money.

#### 2.5 Government Negligence

The Albanian government is also suspected to be hand in glove with these operators. This is because, despite the increasing volume of insanity in the markets, they took no action at all. Most of these operators were running unlicensed businesses which were outright illegal. Also, neither the businesses nor the investors were paying any taxes. However, the government ignored the activities of the marketplace and let the bubble mushroom. As the bubble grew large enough, these Ponzi schemes had money that was equivalent to over 10% of the GDP of Albania! Every Albanian citizen had invested in these schemes in one form or another.

#### 2.6 The Market Goes Bust

The Ponzi schemes had reached their pinnacle. Once almost everybody had invested in these schemes, there was no more room to go forward. Hence, there were no investors whose money could be taken and given out as interest to the earlier investors. This is when the fly-by-night operators started fleeing and the entire Albanian economy went into crisis. Riots broke out on the street, and hundreds of people died. A civil revolution took place as military and police deserted the government fearing angry mobs. A new government was elected, and the old one was replaced. However, even the new government took a firm stand. The investors were not compensated for their losses. Some of the Ponzi schemes which still had money were liquidated, and money was paid out to investors. The Albanian pyramid scheme crisis remains the only case when pyramid schemes caused an economic collapse and civil revolution in an entire country!

### 3.0 ISRAEL ECONOMIC CRISIS: 1983

The Israeli bank crisis of 1983 rocked the Middle Eastern financial world. The Israeli economy was believed to be strong and has been able to navigate many wars since its inception in 1948 without breaking down. However, in 1983, the economy faced major shocks even in the absence of any major war or political upheaval. In this article, we will have a closer look at the factors that caused this economic upheaval as well as how the Israeli government resolved it.

#### 3.1 Hyperinflation

During the early 1980's the Israel economy started experiencing extreme hyperinflation. The economy had gone from a 13% inflation rate in 1971 to 111% inflation in 1979. During the early 80's inflation was hovering at the 400% mark. This was shocking for the markets since Israel was a country with a sound financial track record. However, it was not the rising inflation rates that were the direct cause of

economic turmoil in 1983. Rather, it was the banking system which had crashed the Israeli economy. Let's have a closer look at how the banking system faced a major crisis during that period.

### 3.2 Fire Sales and Bank Runs

The Tel Aviv stock market faced a period when bank stocks were being hammered. 7 of the largest national banks which controlled over 80% of the commercial banking in Israel were facing fire sales. Investors were literally dumping the shares at whatever prices they could and there were no buyers in the market which was causing the share prices to plummet to levels never seen before. In order to stop this, the Israeli banks started buying back their own shares. This helped them momentarily stabilize the price of their shares in the market. However, investors noticed that the banks have utilized their capital in buying up shares. Therefore, they believed that banks would now be facing a liquidity crisis. That indeed turned out to be the case. When investors queued up outside banks to withdraw their cash, many could not do so. As a result, panic spread amongst investors and all seven major banks faced a bank run virtually bringing the entire Israeli economy to a grinding halt! The Israeli government had to quickly intervene in order to prevent a total and absolute breakdown of the monetary system.

### 3.3 Shares Converted to Bonds

The Israeli government intervened by closing the markets for 18 days. This caused further panic amongst Israeli investors. However, the government took some drastic measures in order to overcome the situation. The Israeli government converted the stock of all the banks to government bonds. This meant that the people who invested in banks would have the direct security of the taxpayer's funding in the event of a collapse of the financial system. By doing so, the government effectively linked its future with the future of the bank's stocks. If the banks failed, then so did the government. However, the situation was so bad that even such an explicit guarantee from the government did not help bail out the banks. The first day that the markets opened for trading after the closure, these bonds took a 40% hammering. The government somehow managed to save the day with great difficulty. However, probes were issued in order to find out the root cause of this financial debacle.

### 3.4 Earlier Manipulation Discovered

After the government agencies conducted their investigation, it came to light that the real reason why the bank stocks were being hammered was because of the earlier manipulation that the banks had done in the markets. The banks had virtually propped up their stocks for a very long time now and when traders took notice of this manipulation, they resorted to correcting the market prices by selling the shares.

- **Maintaining Capital Ratios:** The banks were propping up the value of their shares in order to be able to maintain capital ratios. The hyperinflation in Israel was making it considerably difficult for banks to maintain the required ratios and still be able to conduct operations profitably. Hence, banks took advantage of some of the loopholes in the system and maintained their capital ratios by converting overvalued stock into cash.
- **Benefitting From Sale Price:** The existing shareholders of the banks also stood to benefit as stocks were being sold at inflated prices. Hence they too turned a blind eye when the banks used their capital to manipulate the markets and inflate the stock prices.
- **Weak Insider Trading Laws:** The Israeli regulators were also at fault because of the weak insider trading laws that were in place when the crisis erupted. There were no restrictions on the banks when they indulged in trading their own stocks. Therefore, the banks could manipulate the value of their stocks without being afraid of any legal consequences. After this crisis was averted, Israel created new insider trading laws in order to prevent this situation from reoccurring.
- **Reduced Transaction Costs:** To make the situation worse, Israel decided to exempt banks from paying turnover tax post the war with Lebanon in 1982. Thus, not only were the banks allowed to trade in their own stocks, they could also rampantly indulge in this trading without any transaction

costs hindering the process. This too contributed significantly to the speculative activities conducted by banks.

The Israeli government took cognizance of these factors and created regulations that prevented such economic upheavals from happening again. Hence even though, Israel has faced small crisis when the world economy tanked in 2001 and 2008, no major catastrophe has rocked the Israeli economy ever since.

#### 4.0 THE NORDIC CRISIS OF 1992

The Nordic crisis of 1992 refers to the series of bank runs and currency crisis that shook Finland, Sweden as well as Norway in the early 1990's. This was the first major national banking crisis since the 1930's (if wars are not taken into account). Thus, an important belief that the fractional reserve banking system has been stabilized all over the world, has been challenged and shaken to the core. In this article, we will understand the factors that led to the crisis as well as the repercussions of the crisis.

##### 4.1 Increased Fragility

The period immediately preceding the crisis saw an unprecedented credit boom in the Nordic region. This was because earlier there was limited credit available in these countries. However, under the new system, credit was easily available. Hence, there was no need for the credit to be rationed. This caused a boom in the rate at which borrowing was happening in the Nordic region. To make matters worse, the tax authorities of Sweden, Finland as well as Norway created laws which favoured borrowing money. Liberal tax breaks were given to people who borrowed money regardless of whether the money is borrowed for productive purposes or not! In most cases, the interest rate for borrowing money was negative after tax breaks were taken into account. Thus people started believing that borrowing money is like getting a free lunch. As the quantum of borrowing increased beyond acceptable limits, macroeconomic problems began to develop.

##### 4.2 Over Valued Collateral

The banks in the Nordic region followed sound business practices. They would offer credit against collateral. Most of the times, the collateral was of good quality. There were real estate or blue chip stocks backing the loan. However, the increased expansion of credit had overheated the economy. As a result, the money supply had risen dramatically taking up the price of everything else. The central banks and other regulatory agencies conducted minimal supervision and ended up aggravating the crisis through their inaction. As a result, even after the sound business practices by banks, they ended up loaning money against highly overvalued collateral. This fact would come back to haunt them later.

##### 4.3 The Crisis

The crisis impacted the region in a big way because of a series of negative events that happened simultaneously. For instance, Norway's economy is largely dependent on oil. Hence, when there was an oil shock in the early 1990's, the economy faced distress and as a result, the overheated asset prices dropped rapidly. Consumer confidence took a plunge and credit started contracting much faster than it had expanded. Norway's central bank i.e. the Norges bank found itself in a soup as a result of the bank runs which were rampant in those days. The Swedish economy also faced a currency crisis because of an attack by speculators during those days. Sweden's largest savings bank i.e. the Forsta Sparbanken suffered a bank run as people lost confidence in their currency. Similarly, the Finnish economy also faced significant difficulties as the former Soviet Union disintegrated. The Finnish economy was largely integrated with Soviet. Therefore, as its biggest trading partner went into turmoil so did the Finnish economy. Multiple negative events shook the foundation of different Nordic countries making it impossible for them to support each other during the crisis, thereby aggravating the crisis even further.

##### 4.4 Resolution

The central banks of the three nations had to act in tandem. In fact, they even had to use the support of other developed nations to get rid of this crisis. The public's confidence in the fractional reserve

banking system was in jeopardy and therefore the governments and the central bankers of the Nordic region faced no shortage of sympathizers.

Firstly, there was a massive \$8 billion bailout by each of the three countries which was offered to their banks. At the root, the Nordic crisis was a bank run. Thus, to stop the bank run the government started to recapitalize the banks and it did so in a very public manner. The capital was offered to banks in the form of shares or notes. Most of the banks in the Nordic region accepted this capital and resumed business as usual. After some time, the depositor confidence was restored, and the bank runs were successfully managed.

To top it up, the Nordic governments vociferously proclaimed that they would guarantee the deposits of the entire banking system. They extended this guarantee for 6 long years i.e. till 1998. By that time, the Nordic crisis was long gone and banks could function as usual without any government intervention. The Nordic crisis was an important reminder that sudden credit expansion makes economies extremely vulnerable to any external shocks. Given the inherently unstable nature of the fractional reserve banking system, credit must be tightly monitored.

## 5.0 CONCLUSION

### 5.1 Human Judgment vs. Mathematics

Scholes, Merton and Miller i.e. the promoters of Long Term Capital Management (LTCM) were mathematicians. They believed that the market was inherently random and therefore the only way to be successful in the markets was by understanding the science of randomness i.e. probability. Based on this belief, one of their founders had co-created the Black Scholes formula. This was a formula that was used to price option contracts and began to be used widely in the market. Scholes ended up getting a Nobel Prize for this contribution.

However, Scholes further partnered with Merton and Miller and created a financial model which could make risk irrelevant. This would be done by something called "dynamic hedging". This meant that if an open position created a risk, this risk could be offset by creating a position that has an opposite risk thereby nullifying the effect. The founders at Long Term Capital Management (LTCM) called this strategy dynamic hedging and they had developed algorithms that would help them identify such securities within nanoseconds across various markets.

### 5.2 Big Ticket Investments

The founders of Long Term Capital Management (LTCM) were already big names in the academic circles relating to finance and economics. Decision makers in various banks had virtually studied under them or followed their opinions via their books. Hence, when it came to light that Scholes, Miller and Merton wanted to raise funds, Wall Street queued up outside their offices. The reputation of the founders was so stellar that Wall Street banks and investors had to compete with each other for an opportunity to invest in this fund. Even Central Banks like the Central Bank of Italy had invested money in this fund! Within no time, the founders had a huge kitty of \$3 billion to invest in the market place and the operations of Long Term Capital Management (LTCM) were soon underway.

### 5.3 Spectacular Success

For the first few years, Long Term Capital Management (LTCM) was a remarkable success. The founders had lived up their reputation. The first year saw a return of 23% whereas the latter years saw returns which were consistently in excess of 40%, a remarkable feat in the stock markets! All this was happening by itself as the founders of the fund were often seen playing golf or attending conferences during office hours. A passively managed fund generating those kinds of returns was virtually unheard of and Scholes, Merton and Miller came to be hailed as genius!

### 5.4 The Fall of Long Term Capital Management (LTCM)

The spectacular success and invincible business model of Long Term Capital Management (LTCM) faced failure when the markets started behaving irrationally. All the assumptions in the model are based on how the participants in the market would behave under normal circumstances. However, the Asian crisis sparked an epidemic of abnormality in the market. A crisis that began in Thailand started spreading

across Asia into developed countries like Japan and Korea and mayhem ensued in the marketplace. However, the founders of Long Term Capital Management (LTCM) were supremely confident in their model. Hence they continued to trade even as the rest of the world closed shop! In fact, Long Term Capital Management (LTCM) saw this as a massive opportunity. So much so that they borrowed \$100 billion dollars from various banks and started making highly leveraged bets.

Then, the unthinkable happened and Russia, the erstwhile economic superpower defaulted on its debts. This made Long Term Capital Management (LTCM) lose a lot of money. They were losing close to \$500 million every single day in mark to market losses on their derivative positions. Before they knew it, their \$3 billion equity was wiped off and the Long Term Capital Management (LTCM) was bankrupt leaving other Wall Street firms with over a trillion dollars in counterparty risk and no means to cover it. In retrospect the founders admitted that the market knew something that they did not and their attempts to outsmart the market every time had led to their downfall.

### 5.5 Bailout and Crisis

Lastly, the Federal Reserve had to utilize federal money to bail out the creditors of Long Term Capital Management (LTCM). This saved the market in the short term. However, the Fed came under enormous opposition because it had utilized public money to bail out billionaires that were toying with risk! The entire Long Term Capital Management (LTCM) episode made the investors realize that financial models can be used to understand the market and aid in decision making. However, left to their own devices, the decisions made by financial models can have disastrous consequences especially when the market behavior deviates away from normal.

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