

University of Essex

Department of Economics

Spring 2012

EC 372 Economics of Bond and Derivatives Markets

Roy E. Bailey

Do Hedge Funds Hedge?

With an Illustration of the Fall of Long Term Capital Management

Term Paper by Vincent Dreher

Graduate Diploma in Economics

RegNr: 1100471

vdrehe@essex.ac.uk

1. Introduction

Hedge funds belong with no doubt to the most intriguing actors in financial markets. While delivering annual double-digit returns with ease and charging extravagant management fees, they hide their activities behind a veil of utmost secrecy. How are these venturesome investment funds related to the principle of hedging, whose plain goal is risk minimization?

Section 2 of this term paper will analyse hedge fund strategies while contrasting them with the economic theory of hedging. Several points will be made regarding the question: do hedge funds hedge? Section 3 will explain the fall of Long Term Capital Management while linking this event to the analysis of section 2.

2. Hedge funds and what they do

“It is essential to always remember that hedge funds are an organizational form, not an investment strategy” state Brown et al (2009: 175). Stulz says “[hedge] funds are unregulated pools of money managed by an investment advisor, the hedge fund manager” (2007: 177).

These two quotations of academic literature highlight the ambiguity which still remains today concerning any clear description of what defines a hedge fund. Supporting this circumstance is the condition that even the Securities and Exchange Commission (SEC) of the United States does not carry a legal definition.

The Lipper TASS index identifies ten (distinct) hedge fund strategies according to which either Stulz (2007) or Coggan (2011) define four broad hedge fund categories: *equity funds*, *arbitrage funds*, *macro funds* and *event driven funds*. These classifications will provide a rough framework in the further analysis; their limits will however become apparent soon.

2.1 Equity Funds

Long/short equity investment is with roughly 40% of the market the dominant hedge fund strategy today. When applying this strategy a fund holds in principle a long position in the stock market and hedges its position with futures contracts or options to achieve possibly market neutrality.

This comes closest to the textbook ideal of *hedging*: as pointed out by Bailey (2005) the aim of hedging is risk minimization of any particular trade or stock portfolio. The aforementioned futures contracts and options are two of the main vehicles used for hedging. In futures markets the hedger tries by purchasing/selling futures to fix the price which she has to pay or receive for a certain good in the future – making it market neutral. In option markets a hedge is very similar to insurance; if the price develops favourably the options dies and the option premium is deducted from the overall gain. If the price develops against the hedgers interests, the option provides a floor or a ceiling respectively.

Fung/Hsieh (2011) find significant evidence that long/short equity funds do have lower market exposure and therefore do benefit from shorting as opposed to equity mutual funds which pursue similar investment strategies without hedging.

Equity market neutral and *short selling* are sorted as well into the equity funds category. In market neutral strategies, long and short positions are taken in similar stocks to exploit equity market mispricings while the direction of the market should equally have no impact on the performance. However, an extension to the concept of hedging has to be introduced at this point. As will be seen in the following, merely long/short equity strategies seem to rely on the classic approach of using solely financial derivatives as hedge instruments. The broader working definition of hedging in this paper becomes therefore: *the process of taking an opposing position in a second asset to secure ones position in a first.*

The concept of *the basis* introduced by Hull (2011) will give further elucidation. The basis is expressed as: $\text{basis} = p - f$, where p is (in this case) simply the market price of the first asset, f the price of the second asset. For a perfect hedge the basis is zero. All risk has been eliminated since the prices move one-to-one, which implies the highly improbable case of perfect correlation between the asset prices. A basis $\neq 0$ leads to *imperfect* or *risky hedging*, whose goal is to minimize the variance of the outcome. This remaining uncertainty is termed *basis risk*. These findings will be taken up below.

Finally *short-selling* cannot be interpreted as a hedging strategy. Short sellers do use hedging to some extent but they need to remain continuously net short for still being counted to this sector; and when betting against the market they obviously do not hedge. Coggan (2011) asserts that this strategy rather serves as diversifier for widely spread portfolios and is not a hedging strategy on its own.

2.2 Arbitrage Funds

Arbitrage funds apply strategies which resemble neutral equity market strategies. The overall goal is to profit from market inefficiencies by taking positions to make use of speculated mispricings.

However, one must be careful do distinguish these arbitrage strategies from riskless arbitrage, i.e. the risk-free exploitation of arbitrage opportunities in inefficient markets. Speculation, by its nature, involves risk.

Another excursion to theory will provide the necessary understanding of how hedge fund strategies are guided by the three motives of hedging, speculation and arbitrage.

Bailey (2005) puts hedging in context with mean variance analyses. The *optimal hedge ratio* \hat{h} is given by

$$\hat{h} = h^* + (f_0 - E[f_1]) / 2\alpha\sigma_f^2$$

where h^* is the pure hedge ratio, i.e. the risk minimizing proportion of the two opposing positions (here asset and futures contract) given the variances of the prices and their correlation. f_0 is futures price today, $E[f_1]$ is the expected futures price tomorrow, σ^2_f is the variance of $\Delta f = (f_1 - f_0)$ and α is the preference for risk minimization relative to wealth maximization.

If α is infinitely large – meaning the investor is risk averse – the second term on the right-hand side is negligible and $\hat{h} = h^*$. The hedge ratio is then solely chosen due to risk minimization and the motive of speculation is assumed to be marginalised. If α is finite the speculative component influences the decision of \hat{h} to a variable degree. The investor accepts a certain amount of variance in the outcome in exchange for possibly higher wealth maximization.

This application of portfolio selection theory illustrates the trade-off between risk reduction and speculative returns, between hedging and speculation. The portfolio choice itself is preceded by the identification of an assumed arbitrage opportunity, i.e. the identification of a mispricing.

How can this analysis be applied to arbitrage funds or hedge funds in general? Hedge fund managers assume normal relationships between asset prices to hold; any deviation of this ‘normal’ behaviour of two prices provides therefore a potential arbitrage opportunity. Managers then invest/speculate on these opportunities while securing their bets via taking hedging positions. They hedge because this ‘normal’ relationship of the prices is based on observed data and prevalent models – which certainly *does not* determine any future price behaviour: the variance will always remain variant. It has to be noted, additionally, that the hedging positions themselves may deliver returns while being hedged in turn by the primary investment.

What kinds of strategies then fall under the category of arbitrage funds? *Convertible arbitrage* for example aims to profit from going long in convertible bonds of companies which are assumed to be

underpriced. The position is hedged by shorting the company's common stock. The cost of short selling the shares will eventually be offset by the continuous stream of bond yields while profits are made through the repricing of the bond relative to the shares. The assumed mispricing represents the arbitrage opportunity, the risky investment on the expectation of repricing the speculation and the short selling of stock the hedge.

A second strategy is *fixed income arbitrage*. The aim is to exploit price inefficiencies between similar fixed-income securities (fixed income because a return in fixed periodic payments is provided). One classical example is *convergence trading* in US treasury bonds which illustrates the more complex context as given by Fung and Hsieh (2002): there tends to be an irrational preference among investors for 30-year issued government bonds which causes the 29-years to maturity bonds to be traded at a discount – the market inefficiency. When expecting eventual correction of this mispricing, i.e. the yield spreads of bonds to narrow, a manager would go short in 30-year bonds and long in 29-year bonds – the speculation secured by a hedge. The anticipated weakening of the basis would generate profits on both legs. The possibility of a widening of the spread represents the inherent risk. To profit from these mostly minuscule corrections bets are often *highly leveraged*, i.e. funds are borrowed to increase the potential gains; which increases potential losses alike.

Computer-assisted quantitative *statistical arbitrage* is a third of the arbitrage family, betting as well on yield spreads but in massive dimensions. Fung and Hsieh (2006) sort these to equity neutral strategies, since their main field of activity would be equity markets. One example of how any attempt of categorizing hedge fund strategies will unavoidably be flawed.

2.3 Macro Funds

Directional or *global macro funds* dominated the hedge fund industry in the early 1990's and brought salient personalities such as George Soros to the forefront. Long and short in any major market they often make leveraged bets in direction of certain macro variables such as interest or exchange rates after having identified mispriced valuations. In general these funds seem to rely more on the intuition of a leading figure than on hedging considerations (Soros' bet against the pound in 1992 might be an example), which makes a case against the pure motive of hedging. According to Coggan (2011), global macro funds have come to resemble increasingly the newly emerging *multi-strategy funds*. Multi-strategy funds combine several strategies in search of diversification and are not confined to one specific area of interest or knowledge – which prevents any feasible classification.

Managed Futures funds invest in commodity futures and currency markets around the world and apply a trend following strategy; Fung and Hsieh (2001) find that the returns of trend-following funds resemble the returns of structured options called “lookback straddles”. They deliver a positive performance in both extreme up and downs of the world market. Whereas Coggan (2011) asserts that managed future funds cannot really be counted as hedge funds and are rather lumped together with the industry.

Emerging markets funds invest in developing countries. In less developed financial markets more sophisticated strategies such as short selling or derivatives trading are forbidden or simply absent. Long-only investment in equity and fixed income prevails and returns are therefore strongly correlated with the emerging markets stock index. These strategies do not involve hedging simply because the instruments are not available.

2.4 Event Driven Funds

Event driven funds finally try to exploit opportunities caused by extraordinary corporate transactions which in general create high volatility such as an announced merger, a spin-off or a bankruptcy. It should be noted, however, that times of high volatility are generally beneficial for most hedge fund strategies since it increases exponentially the rate of which perceived mispricings can be detected. One popular sub-category is *risk/merger arbitrage*: the fund invests in long positions of the company which is planned to be acquired (its stock value is assumed to increase) and goes short the shares of the acquirer (their value generally decreases). Fung and Hsieh (2006) underline that there is a high risk associated with these strategies because especially in bear markets many mergers are called off for various idiosyncratic reasons.

2.5 Do hedge funds hedge?

It has become evident that the motive of hedging as applied by hedge funds cannot be separated from the motives of arbitrage and speculation. In order to deliver their market beating returns managers need to identify possible arbitrage opportunities, speculate on these assumptions and hedge these bets if possible; or the two opposing positions of the hedge itself form the speculative investment, when spread yields are assumed to narrow. There are strategies which involve a substantially higher risk than others as highlighted by Brown and Goetzmann (2001), but it is less the choice of strategy or category which is decisive. It is rather the question to what extent a hedge funds actions are led by any of the three motives. Hedge funds hedge – but on their own, hardly observable terms.

3. The Fall of Long Term Capital Management¹

Long Term Capital Management (LTCM) was founded in early 1994 by a group of academics and traders under the leadership of John Meriwether. Possibly due to the reputation of its members – the Nobel laureates Myron Scholes and Robert C. Merton were amongst its advisers – LTCM managed to raise \$1.3 billion right from the start. Having very high fees, an annual charge of 2% of assets plus 25% of profits, and being highly secretive the partners did not demand little from investors; but they delivered.

In its first year the fund generated returns of 19.2%, 42.8% in 1995 and 40.8% in 1996 after fees.

By 1997 the fund had lost momentum though. It still made 17.1% but its premium field of bond arbitrage was drying out due to growing competition – there were just a limited amount of mispricings to exploit. In early 1998 LTCM was holding \$7 billion in capital with too few a places to invest and the partners returned more than \$2 billion to reluctant investors. Nevertheless, LTCM belonged without a doubt to the most successful and biggest hedge funds on Wall Street.

In mid-September of 1998, however, LTCM's equity had dropped to \$600 million, amounting to a loss of more than \$4 billion. A 16-member consortium consisting of all major investment banks of Wall Street raised \$3.65 billion taking over 90% of the remaining equity of LTCM to avoid its ultimate collapse. What had happened?

LTCM's ingenious investment strategy had been fixed income arbitrage. As illustrated in 2.2, the approach is to go short in overvalued and long in undervalued bonds. The bond prices are assumed to be eventually corrected, the bond yield spreads then narrow and profits are made on both legs.

¹ Based on The Economist (1998), Wall Street Journal (1998), Edwards (1999), Lowenstein (2001), Coggan (2011).

The belief in this ‘normal’ behavior of spread yields appeared to make it an almost safe bet; enough of a safe bet in any case for LTCM to leverage the initial capital at its heights 30 to 40 times.

With bond arbitrage running dry in 1997 the fund had to look for further spheres of investment. LTCM got involved in merger arbitrage (see 2.4), directional bets on currencies (see 2.3) and especially equity market neutral strategies (see 2.1). Or the partners combined seemingly unrelated securities in their hedging strategies: they bought high-yielding, less liquid bonds and sold short low-yielding, more liquid bonds such as US treasury bonds. The high-yielding and risky bonds included Danish mortgage-backed securities, bonds of emerging market countries or corporate “junk” bonds. It goes without saying that the speculative part of LTCM’s endeavors must have increased substantially. Possibly driven by ambition and investors expectations, more investment worthy ‘arbitrage’ opportunities were found – by incurring the hidden cost of uncontrollable risk.

The Asian currency crisis of 1997 widened the yield spreads of LTCM’s positions unexpectedly because investors tended to prefer liquidity and safety to high-yielding risk. The partners saw a huge opportunity – according to their models these spreads simply had to narrow soon. They were placing their bets in bond markets with a leverage ratio of more than 20 to 1 as well as in derivatives markets; at some point the notional value of LTCM’s derivatives contracts exceeded \$1 trillion.

This audacious confidence may have stemmed from trusting their models while additionally having Merton and Scholes as advisers, who had had developed the prevalent model of price determination. Nevertheless, also the Black-Scholes model is based on *assumptions* of continuous trading, normally distributed price movements and the always contingent term of price volatility; none of which guarantees certainty.

And spreads did not narrow. The ongoing Asian crises let many banks and securities traders in the spring of 1998 free themselves of illiquid, emerging market bonds in exchange for secure US treasury bonds. Within months there were no more markets for junk bonds and thus these yields soared.

LTCM lost on almost all of its hedged bets; the bases of every two positions strengthened continuously. An additional vulnerability arose when the first margin calls and calls for more collateral for the borrowed leverage started pouring in. Because of missing markets for illiquid instruments, the partners were unable to liquidate large parts of their portfolio in order to contain the damages. Being a substantial holder for some of these assets any selling would have depressed the prices rapidly and incurred even higher losses.

Then on 17th August 1998, Russia defaulted on large parts of its foreign debt. Investors immediately fled from all high risk, illiquid, emerging markets securities.

The unimaginable happened, the spreads widened even more. To give an example: the yield spread between emerging markets debt and US treasury bonds in September 1997 was 3.3 percentage points. In September 1998 the same spread had sky rocketed to 17.05 percentage points.

LTCM was losing hundreds of millions, per day. Soon the word got out about their serious troubles; all the banks, traders, funds and securities firms had somewhat an idea about which positions were remaining in LTCM's books. And they instantly started to sell all similar positions which set the seal on LTCM's demise.

5. Conclusion

Hedge funds do hedge; if hedging is understood to be the process of taking an opposing position in a second asset to secure ones position in a first. And this does certainly not exclude the pursuit of other objectives than mere risk minimization. Especially the case of LTCM has shown how the three motives of trading in futures markets – hedging, speculation and arbitrage – can be mingled together (to the detriment of risk reduction).

Overconfidence in the validity of their models let LTCM take bets which seem to have been motivated more by speculation than arbitrage or hedging. Prone to any irregular events, these strategies led to their ultimate failure.

(2990 words)

6. Bibliography

Bailey, Roy E. (2005): *The Economics of Financial Markets*. Cambridge: Cambridge University Press.

Brown, Stephen J. et al. (2009): *Hedge Funds in the Aftermath of the Crisis*. In: Acharya, Viral V./Richardson, Matthew (eds.), *Restoring financial stability: how to repair a failed system*. Hoboken: John Wiley & Sons.

Brown, Stephen J./Goetzmann, William N. (2001): *Hedge Funds with Style*. <<http://www.nber.org/papers/w8173.pdf>>

Coggan, Philip (2011): *Guide to Hedge Funds*. Hoboken: John Wiley & Sons.

Edwards, Franklin R. (1999): *Hedge Funds and the Collapse of Long Term Capital Management*. *The Journal of Economic Perspectives*, Vol. 13, No. 2, 189-210.

Fung, William/Hsieh, David A. (2001): *The Risk in Hedge Fund Strategies: Theory and Evidence from Trend Followers*. *The Review of Financial Studies*, Vol. 14, No. 2, 313-341.

Fung, William/Hsieh, David A. (2002): *The Risk in Fixed-Income Hedge Fund Styles*. <<http://faculty.fuqua.duke.edu/~dah7/Fixedinc.pdf>>

Fung, William/Hsieh, David A. (2006): *An Industry in its Adolescence*. <http://www.frbatlanta.org/filelegacydocs/erq406_fung.pdf>

Fung, William/Hsieh, David A. (2011): *The risk in hedge fund strategies: Theory and evidence from long/short equity hedge funds*. <http://www.romahi.com/yazann/wiki/data/Hedge_Fund_Beta_attach/paper.pdf>

Hull, John C. (2011): *Fundamentals of Futures and Options Markets*. New Jersey: Pearson Prentice Hall.

Lowenstein, Roger (2001): When Genius Failed. The Rise and Fall of Long-Term Capital Management. London: Fourth Estate.

Stulz, René M. (2007): Hedge Funds: Past Present and Future. *Journal of Economic Perspectives*, Vol. 21, No. 2, 175-194.

The Economist (1998): Turmoil in Financial Markets. *The Economist*, 17th of October 1998, 21-23.

Wall Street Journal (1998): How the Salesmanship and Brainpower failed at Long-Term Capital. The *Wall Street Journal*, 16th of November 1998, 1.