Alternative Investments for Life Assurance Companies and Pension Funds

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1 Introduction

1.1 Background to the Paper

This paper was written by a working party of the cross border life committee of the Society of Actuaries in Ireland. The members of the working party were:

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The main purpose of the paper was to review the issues which arise for life assurance companies, product development actuaries and appointed actuaries in relation to unit linked life assurance products where the link is to some form of 'alternative' investment. The paper also briefly looks at the issues which arise for pension funds.

Rather than look at all forms of alternative investment the working party chose to use hedge funds as an example of alternative investments and discuss the issues in the context of hedge funds. Other forms of alternative investment, e.g. structured bonds with upside/downside potential related to equity indices, venture capital funds, private equity funds etc., were considered to be generally less complex than hedge funds.

1.2 Executive Summary

1.2.1 Portfolio Diversification

The returns on certain types of alternative investments have a low correlation with the returns on equities and the mean return on these alternative investments has historically exceeded the mean return on equities. Including these types of alternative investments in a diversified portfolio of equities and bonds can therefore lead to a higher expected return and a lower level of volatility than a portfolio without these alternative investments.

The working party is of the view that it is desirable that life companies are in a position to market alternative investments with these characteristics.

The working party has concluded that under the EC Life Assurance Framework Regulations, 1994 Irish life companies can offer alternative investments in a unit linked life assurance wrapper.

1.2.2 Different Rules in Different Countries

Despite the fact that each member state of the EU has implemented the same 3rd life directive the actual enabling legislation in different member states can be quite dissimilar.

The UK's implementation of the 3rd life directive has in some areas been more restrictive than the Irish implementation. For example, under UK legislation it is extremely difficult to wrap alternative investments in life policies.

The working party's view is that the restrictive approach followed in the UK should not be adopted in Ireland as this approach eliminates the possibility of marketing alternative investments with desirable characteristics.

1.2.3 Life Company Responsibilities

If life companies decide to market alternative investments to retail investors, who would not satisfy the host country's 'qualifying investor'[1] rules, the working party's view is that there is an onus on the life company to carry out appropriate due diligence on the nature of the alternative investment and the providers/managers of and the other parties involved in the alternative investment.

The purpose of this due diligence is to ensure that the alternative investments being marketed are suitable for the retail investor and achieve the portfolio diversification outlined in 1.2.1.

1.2.4 Policyholder Disclosure

1.2.4.1 Description of Risks

The level of disclosure for alternative investments is likely to be more onerous than that which would apply to products linked to the traditional asset classes. The life company will need to be satisfied that it has adequately understood and described the risks the client is taking. The Appointed Actuary will need to consider how to discharge his duty under GN1 which states**:**

"It is also incumbent upon the Appointed Actuary to take all reasonable steps to ensure that the company's incoming policyholders should not be misled as to their expectations."

1.2.4.2 Counterparty Failure Risk

Where counterparty risk is being passed through to policyholders there should be a clear unambiguous statement in the marketing literature and policy conditions explaining the effect on policyholder benefits of a counterparty default.

1.2.4.3 Disclosure of Parties to the Alternative Investment

Many alternative investments take the form of structured corporate bonds where there is a guarantee of a return of capital and an upside potential related to an equity index or a return on a hedge fund say. Details of the parties to the structured bond, i.e. the investment manager, custodian, prime broker, administrator, the party underwriting the guarantee etc. should be disclosed.

1.2.4.4 Disclosure of Charges

Some forms of alternative investments have multiple layers of charges. In the above example each of the parties charge a fee. If it is a fund of funds structure there may

[1] Some forms of alternative investments are only authorised to be sold to 'qualifying investors' and are not licensed for sale to the general public. A qualifying investor for Central Bank of Ireland purposes is one who can afford a minimum subscription requirement of at least €250,000 and in addition must demonstrate that, apart from his principal private residence, he has a net worth of at least €1.25 million.

be another layer of fees for the manager of the fund of funds. Finally there is the life company's fee. The total of all the charges could be up to 6% p.a. of the net asset value plus a 7-8% initial charge. The working party's view is that all the layers of charges should be disclosed including costs of guarantees, administration costs and custodian costs. The reason for the full disclosure of all costs is that in many cases all the parties to the structured bond may be part of the same group and it is not clear that inter-group fees are negotiated on a commercial basis.

1.2.4.5 General Disclosure of Market Risk

The Working Party believes that in respect of all products involving some risk additional information should be disclosed such as:

- Showing a 95% confidence interval for the range of outcomes for a 10-year period say.
- The probability of losing money over the period.
- Showing the maximum drawdown (i.e. the largest peak to trough) for the fund over the past ten years say. Where the fund is a new fund the drawdown could be based on benchmark indices.

1.2.5 Regulatory Disclosure

The working party's view is that there should be full disclosure in Schedule 4, Article 4(2) of the DETE returns of the nature and structure of the alternative investments held by the linked fund.

The parties associated with the alternative investment and the fees deducted within the alternative investment structure should also be disclosed.

1.2.6 Unit Pricing

Some forms of alternative investments have performance related fees. Where performance fees apply the Appointed Actuary needs to satisfy himself that equity in unit pricing is not compromised.

1.2.7 Personal Portfolio Bonds

Personal portfolio bonds (PPB's) have traditionally invested in alternative investments chosen by the bondholder. The owners of PPB's typically are wealthy individuals who would satisfy 'qualifying investor' definitions. They could therefore purchase alternative investments directly rather than through the PPB vehicle. In many cases the owners of PPB's employ their own investment advisors. Where PPB policyholders would qualify as 'qualifying investors' or where they employ their own investment advisor the working party is of the view that the life company is not required to undertake any due diligence on the alternative investment other than to satisfy itself as to its limited liability.

Where the PPB owner would not satisfy the 'qualifying investor' definitions and does not employ an investment advisor the life company will need to consider whether to allow the inclusion of the alternative investment after the necessary due diligence or to simply disallow the purchase of the alternative investment.

1.2.8 Pension Funds

The working party came to the conclusion that pension funds were likely to increase their exposure to alternative investments which offered portfolio diversification as outlined in 1.2.1, particularly given the recent performance of equity markets.

The larger funds will achieve this exposure directly whereas smaller funds may use life wrappers to obtain this exposure.

1.3 Organisation of the Paper

The paper contains the following sections:

- A brief review of hedge funds and hedge fund trading practices (section 2)
- Rationale for using hedge funds, some practical issues relating to past performance of hedge funds and hedge fund charges (section 3). The purpose of sections 2 and 3 is to highlight and explain the issues which are addressed in later sections of the paper.
- Life Assurance Valuation regulations (section 4)
- Consumer protection issues (section 5)
- Some examples of alternative investments and the their risk/reward profile (section 6)
- Unit pricing and performance fees (section 7)
- Issues for Pension funds (section 8)

There are four Appendices as follows:

- A summary of the UK position in relation to permitted derivatives (section 9)
- A review of LTCM (section 10)
- Hedge funds and recent crises (section 11)
- Assumptions for the models in section 7 (section 12)

2 Hedge Funds - Background[2]

2.1 General Description

The term "hedge fund" is commonly used to describe a variety of different types of investment vehicles that share some similar characteristics. Although it is not statutorily defined, the term encompasses any pooled investment vehicle that is privately organized, administered by professional investment managers, and not widely available to the public. The primary investors in hedge funds are wealthy individuals and institutional investors. In addition, hedge fund managers frequently have a stake in the funds they manage. Entities classified as hedge funds are commonly organized as limited partnerships or limited liability companies, and in many cases are domiciled in offshore locations.

2.2 Developments in Recent Times

In the last five years or so, there has been a significant growth in the number of hedge funds that are domiciled in OECD countries such as the United States, France and Ireland as opposed to offshore locations. These new hedge funds are regulated by such entities as the Central Bank of Ireland, the Financial Services Authority in the UK, the COB in France, and the Securities and Exchanges Commission and the Commodity Futures Trading Commission in the USA. Many of the funds listed on the Dublin Stock Exchange might be classified as hedge funds and a significant proportion of such funds are regulated by the Central Bank of Ireland (see section 5 for some details on this regulation) and domiciled in Ireland.

Investors can have significantly more confidence in hedge funds which are established and regulated in OECD countries. This is because these regulators require that the principals of the hedge fund are 'fit and proper persons' and have the resources to carry out their commitments to investors.

In addition, the Central Bank of Ireland requires that such firms are:

- Adequately capitalised;
- Have adequate personnel, IT, risk management, and other resources in place to operate an investment business;
- Have proper controls in place to operate their business; and
- Give their investors sufficient information to make an informed decision in relation to investing in the hedge fund.

2.3 Hedge Funds – Not a Homogeneous Group

Hedge funds are by no means a homogeneous group. From the point of view of an investor, they differ in terms of the degree of regulation, expected return, risk and most significantly in terms of the correlation of their returns with the returns on existing portfolios of equities and bonds.

[2] For a thorough review of hedge funds see the Report of the U.S. President's Working Group on Financial Markets by A Greenspan, R Rubin, A Levitt and B Born issued April 1999.

2.4 Market Size and Access for Retail Investors

In the September 2002 issue of Portfolio International[3] a report from the Hennessee Group estimated that the value of net assets under management by the hedge fund industry in January 2002 was US$563 billion. The number of funds was 5,500.

The same article noted that hedge funds were now available to retail investors in Hong Kong, Japan, France, Italy, Germany and the Scandanavian countries and that Radobank in the Netherlands had recently launched a non-guaranteed hedge fund product with a minimum investment of €1,000.

2.5 Comparisons with Other Investment Vehicles

Hedge funds differ from alternative types of investment vehicles in a number of ways. Hedge funds determine their own restrictions on their investment policy and are able to sell securities short and to buy securities on leverage[4]. While this activity is not unique to hedge funds there is a perception that hedge funds are highly leveraged.

2.5.1 Are Hedge Funds Highly Leveraged?

A 1988 IMF study[5] reports that an estimated 85% of hedge funds have a leverage ratio of two or less. Bank trading desks that compete with hedge funds in many markets employ much more leverage than the average leveraged hedge fund and when an investor buys shares in a bank he is exposed to this leverage. The bank may have to increase its regulatory capital as a consequence of leveraging its positions – the hedge fund must limit its leverage because it does not have regulatory capital.

Hedge funds don't have regulatory capital but their position size is limited by what margin a market counterparty requires i.e. some counterparty is willing to underwrite the market risk that the hedge fund takes. This is market capital rather than regulatory capital.

2.5.2 Leverage – Not the Full Picture

If investors focus mainly on the degree of leverage in a hedge fund they may not get to grips with the real issue – the level of risk in the fund.

The real issue with hedge funds is not the degree of leverage but the risk of the fund. Based on the level of volatility in 2001, an investor has less risk in a 2x leveraged investment in the S&P500 index than an investment in the NASDAQ100 index!

The risk level of a 2x leveraged investment in the S&P500 index in 2001 was about 40% (as measured by standard deviation of return) compared with 57% for an investment in the NASDAQ100 index. So focusing on leverage is asking the wrong question.

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[3] www.portfolio-international.com

[4] Leverage can be defined as the ratio of total assets to capital (this is called balance-sheet leverage) – see section 2.7.4 for a fuller discussion of leverage.

[5] Bankim Chadha and Anne Jansen, "The Hedge Fund Industry: Structure, Size and Performance," in Barry Eichengreen and Donald Mathieson, eds., *Hedge Funds and Financial Market Dynamics*, International Monetary Fund, Occasional Paper 166, May 1998.

The chances[6] of a 2x leveraged investment in the S&P500 index falling 20% in one month are about 2.5% whereas they are over 10% for an investment in the NASDAQ100.

2.6 Hedge Fund Strategies

There is no single market strategy or approach pursued by hedge funds as a group. Rather, hedge funds exhibit a wide variety of investment styles, some of which use highly quantitative techniques while others employ more subjective factors.

Researchers and other industry observers therefore often classify hedge funds according to the main investment strategy practiced by the funds' management. Global-macro funds, for instance, take positions based on their forecasts of global macroeconomic developments, while event-driven funds invest in specific securities related to such events as bankruptcies, reorganizations, and mergers. A relatively small set of market-neutral hedge funds employ relative-value strategies seeking to profit by taking offsetting positions in two assets whose price relationships are expected to move in a direction favorable to these offsetting positions.

Hedge funds are also diverse in their use of different types of financial instruments. Many hedge funds trade equity or fixed income securities, taking either long or short positions, or sometimes both simultaneously. A large number of funds also use exchange-traded futures contracts or over-the-counter ("OTC") derivatives, to hedge their portfolios, to exploit market inefficiencies, or to take outright positions.

Still others are active participants in foreign exchange markets. The foreign exchange markets of the US Dollar, the Yen and the Euro are the most liquid investment markets in the world. In general, hedge funds are more active users of derivatives and of short positions than are mutual funds or many other classes of asset managers. In this respect, the trading activities of hedge funds are similar to those undertaken by the proprietary trading areas of large commercial and investment banks except that hedge funds tend to have lower levels of leverage than such commercial and investment banks.

2.7 Hedge Fund Trading Practices

2.7.1 Trading Practices

Hedge funds are only one example of a collection of institutions that actively trade securities and derivative instruments. Among the wide range of institutions participating in this trading activity are hedge funds, trading desks of banks, securities firms and insurance companies, mutual funds, and other managed funds. Some of these institutions engage in trading activity more intensively than others. The diverse collection of institutions, including hedge funds, that engage in trading activity can be characterized by similarities in their use of mark-to-market discipline, leverage, and active trading. These concepts are illustrated in the context of a currency hedge fund which trades in the world's most liquid currencies, the US Dollar, the Yen and the Euro.

[6] The chances quoted assume that the returns on the indices in question are normally distributed. In reality, the distribution of returns for these indices are not normal and exhibit significant kurtosis increasing the chances of a 20% fall in one month above those quoted.

2.7.2 Mark-to-market

Mark-to-market practices, the discipline of periodically, generally daily, valuing positions at current market prices, may be imposed through external accounting or regulatory requirements, or through internal risk management practices. In addition, mark-to-market practices may be imposed through counterparties' valuation of trading exposures and collateral. This discipline is useful for preventing the concealment of losses and for encouraging the timely resolution of problems.

While they may not necessarily be required to mark their investments to market, hedge funds generally practice this discipline – it is difficult to see how they can manage their risk if they don't know the value of their positions. In a property fund where nobody has bought or sold at the price assumed it is very difficult to manage the risk as evidenced in the sharp mark ups and downs in the unit prices of property funds from time to time.

2.7.2.1 Mark-to-Market Example

Consider a currency hedge fund which is trading a €10m fund. The fund manager expects the dollar will increase in value against the Euro over the next six months. The current (or spot) exchange rate is $1= €1.1 The 6-month (182 day) forward rate in the market is $1=€1.105312. The currency manager expects the spot rate in six months will exceed the 6-month forward rate so he buys dollars forward, i.e. he enters into an agreement with bank A to buy $20m in six months time at an exchange rate equal to the current 6-month forward rate, i.e. $1=€1.105312.

Bank A is the currency manager's counterparty to this deal and vice versa.

Suppose at the end of the next day the manager's expectation proves correct and the current 181-day forward rate moves to $1=€1.110592. The currency manager could now lock in a profit in 181 days by selling $20m forward against the euro. The profit would be:

$$20{,}000{,}000 * (1.110592 - 1.105312) = €105{,}588$$

Assuming a Euro discount rate of 4.5% p.a. the present value of this profit is €103,308.

The mark-to-market value of the trade is a profit of €103,308 in the fund's books and a loss of €(103,308) in bank A's books.

2.7.3 Terminology

The currency fund has a credit risk (or counterparty risk) with bank A in that if bank A was to default on its obligation to the currency fund the fund would lose the current value of the position.

If the forward rate had moved to 1.09 bank A would have a credit risk with the currency fund. Bank A would normally ask the currency fund to lodge with the bank an amount of cash equal to the current value of the position. This is known as posting collateral.

Banks normally seek collateral from counterparties before entering into forward transactions or other types of transactions where a potential credit risk may arise. This initial collateral is known as 'initial margin'.

If the value of the bank's position with the currency fund exceeds the initial margin at any point in time the bank would seek additional collateral, called 'variation margin'.

The use of mark-to-market valuation to reduce credit risk can impose cash flow strains on a fund. Such cash flow problems can be particularly severe for a highly leveraged trading vehicle, especially in volatility markets when mark-to-market driven collateral and margin calls may require the realisation of assets (possibly at a loss) to meet cash flow strains.

2.7.4 Leverage

Leverage allows hedge funds to magnify their exposures and, as a direct consequence, magnify their risks. The term leverage can be defined in balance-sheet terms, in which case it refers to the ratio of gross assets to net assets. Alternatively, leverage can be defined in terms of risk, in which case it is a measure of economic risk relative to capital.

Using a balance-sheet definition of leverage many banks and life insurance companies would have a very high level of leverage. For a unit linked life office a ratio of gross assets to net assets of 50 or more would not be untypical.

Hedge funds obtain economic leverage in various ways, such as through the use of forward agreements (as above), repurchase agreements, short positions, and derivative contracts. Apart from a trading institution's own risk management controls, both balance-sheet and economic leverage may be constrained in some cases by initial margin and collateral at the transaction level, and also by trading and credit limits imposed by trading counterparties.

As an example of internal risk management controls, one would expect that a fund prospectus, such as the currency fund mentioned in section 2.7.2.1, would indicate the maximum level of leverage which it can use.

The currency fund is likely to target a fixed volatility of returns to the investors in the fund. The lower the level of volatility targeted the lower the likely level of leverage. Some investors will also impose a maximum loss on their investment – if this level of loss is reached all positions will be closed out and the funds' assets held in cash. In order to avoid this loss the currency manager is likely to limit the level of leverage.

As an example of external controls on leverage bank A in the example in section 2.7.2.1 is likely to have a maximum credit limit with each counterparty with which it transacts business. In the case of the currency fund this limit is likely to be expressed in terms of the current collateralized exposure and the potential future exposure arising out of existing positions. Bank A is also unlikely to enter into any transactions with the currency fund which would increase its leverage beyond a limit acceptable to the bank.

For some types of financial institutions, e.g. banks involved in proprietary trading, regulatory capital requirements may constrain leverage, although this limitation does not apply to hedge funds as they are not required to setup regulatory capital. Apart from their own internal controls, hedge funds are limited in their use of leverage only by the willingness of their creditors and counterparties to provide such leverage.

Hedge funds vary greatly in their use of leverage. Nevertheless, compared with other trading institutions, certain types of hedge funds' use of leverage, combined with any structured or illiquid positions whose full value cannot be realized in a quick sale, can potentially make these kinds of hedge funds somewhat fragile institutions that are vulnerable to liquidity shocks (see section 10 for a review of the failure of Long Term Capital Management).

2.7.5 Liquidity

Consider a second example of a bond arbitrage hedge fund which had entered into a forward agreement to sell US government debt and buy corporate bonds just prior to the Russian government's devaluation of the ruble and declaration of a moratorium on its debt in August 1998. This action by the Russian government prompted investors to move from lower grade credit rated debt to higher grade credit rated debt.

In this scenario US government debt will increase in price and corporate bonds will fall in price. Furthermore, in the short term, there may not be any investors prepared to buy corporate bonds. This situation may be called a liquidity shock.

The hedge fund may not be in a position to close out the forward agreement or at best it may be able to close it out at a substantial loss. As the value of the position falls the hedge fund's counterparty (say bank B) will require additional variation margins as collateral. This will force the hedge fund to close out its more liquid positions (possibly at a loss) to meet these variation margins.

Bank B will be forced to put up additional regulatory capital against the default risk of the hedge fund. This limits bank B's ability to trade in the market and provide credit to its other clients. This may force other clients to close out their positions which in turn pushes market prices down and the spiral continues with liquidity in the system reducing each time.

This example highlights a potential problem with certain types of hedge funds, i.e. the lack of liquidity of the hedge fund's positions in illiquid assets, in this case corporate bonds. In order for hedge funds to be successful they must be able to trade actively. Unless the underlying assets are highly liquid this will not be possible in times of market stress.

2.7.6 Hedge Fund Approach to Liquidity

Hedge funds whose underlying assets are not highly liquid will generally impose long lock-up periods. The lock-up period avoids the need to sell assets in times of market stress due to redemptions from investors. This is similar to the situation in a unit-linked property fund where the property fund reserves the right to defer transactions for up to six months. Long lock-up periods are therefore a sign that the hedge fund's positions may not be that liquid.

Long lock up periods might lead to suspicions of mis-pricing and excessive risk. An examination of a lagged correlation on returns of locked up funds with market returns might show it to be very high, in other words the drops are spread into future months. See section 3.7 regarding 'stale pricing'.

Some hedge funds offer monthly liquidity but retain the right to make an in specie transfer of assets (i.e. assets are transferred rather than cash) if more than say 20% of the fund is redeemed on a given day – this again indicates that the underlying assets are not highly liquid.

While trading desks of banks and securities firms may take positions similar to hedge funds' investments, these organizations and their parent firms often have both liquidity sources and independent streams of income from other activities that can offset the riskiness of their positions.

2.7.7 Active trading

Active trading, which is typical of hedge funds, is a practice in which investment positions are changed with high frequency. Such trading may be conducted to maintain a desired risk-return profile as market prices fluctuate, or it may be conducted to attempt to profit from short-term changes in prices.

While turnover in hedge funds' portfolios differs widely, the typical hedge fund's use of active trading strategies is closer to that of the proprietary trading desks of investment and commercial banks than to a mutual fund or pension fund.

Active trading strategies rely on market liquidity and access to credit to meet funding needs. However, an entity's ability to trade actively can diminish either because creditworthiness concerns cause counterparties to cut trading and credit limits or because of a broader disappearance of market liquidity.

The inability to execute active trading strategies can lead to unexpectedly large mark-to-market losses as positions that had been thought of as modifiable exposures become longer-term positions.

Ultimately the key test of active trading is whether the hedge fund manager increases risk-adjusted returns.

3 Hedge Fund Performance

3.1 Hedge Fund Risk and Return

Recent studies[7] of hedge fund performance have generally found that hedge funds as a group offer greater return than investment benchmarks such as the Standard and Poor's S&P 500 stock index. Particular classes of hedge funds have at times outperformed benchmark measures on a risk-adjusted basis, while other classes have at times underperformed.

Importantly, the performance of certain types of hedge funds historically has not been highly correlated with overall market performance, thus accounting for the inclusion of those hedge funds that are uncorrelated with equities and bonds in the portfolios of wealthy individuals and institutional investors who seek a broad diversification of their investments.

In the remainder of this paper we will call hedge funds whose returns have a low correlation with those of equities, say less than 40%[8], and which have their good and bad months at different times to equity markets Portfolio Diversification Funds or "PDF's".

3.2 Hedge Fund Performance

The conceptual arguments for the virtues of investing in hedge funds are quite strong:

- Hedge funds attract the best and brightest talents of the investment management world.
- Free of investment constraints, conflicts of interest and bureaucracy, these talents have a much freer rein than they would enjoy in a mainstream straight-long manager.
- Performance fees incentivise and reward performance versus benchmarks.

So why wouldn't you consider hedge funds for at least part of your portfolio?

3.3 Performance History

One of the commonly quoted rationales for investment in hedge funds, is that hedge funds aim to produce strong returns in absolute terms, irrespective of market conditions. Hedge fund promoters regularly produce statistics to back this up, for example:

A recent survey by VAN Hedge Fund Advisors International[7] shows that, over the 13 years from January 1988 to December 2000, the VAN U.S. Hedge Fund Index returned 19.4% p.a., compared to the average equity mutual fund return of 13.3%, and 16.7% on the S&P 500.

In the 5 years 1996 to 2000, the top 10% of U.S. hedge funds returned 37.5% per annum after fees, while the top 10% of equity mutual funds earned only 21.9%.

[7] See www.vanhedge.com/why.htm

[8] See J Caslin's paper "Hedge Funds", Society of Actuaries in Ireland, 2001.

For 2001, a survey of 2,100 single-manager hedge funds worldwide by Allenbridge Hedge Info[9] showed an average return of +4%, in a year when for example the FTSE 100 was down 16.2%, and the S&P 500 (with dividends) was down 11.9%.

3.4 A Grain of Salt

Commentators without a vested interest on the other hand raise a number of quite valid reservations with these sorts of statistics. One of these is that, for the most part, they include only funds that have been in existence for the entire period under consideration, and therefore take no account of funds that are now wound up – "*survivorship bias*".

3.5 Impact of Survivorship Bias

In most analyses of the hedge fund universe, "fund closed" means that the fund is no longer reporting results into the database. In this case the fund may be totally wound up, and one common reason is that the fund's net asset value (NAV) is well below the level at which performance fees[10] kick in (by closing the fund and starting a new fund the manager effectively resets the benchmark for performance fees to the opening unit price of the new fund). To omit these funds from any performance analysis will obviously, significantly reduces the integrity of the average return number, particularly if the survey covers a long period. However, another reason that a hedge fund stops reporting into these databases is that it has reached target asset size, and therefore has no further need to publicise its results. Omitting these funds is a little different.

Academic research[11] in this area suggests annual attrition rates (numbers of funds closing) of the order of 10% or more in recent years (from an analysis of the Tremont TASS database from 1994 to 2001). The impact on surveys such as those quoted in 3.3 has been analysed in various research works. It has been estimated that to omit closed funds from return figures such as these will overstate average annual returns by about 2-3%[12], based on analyses of the returns on the closed funds up to the time of closure. With this level of reduction, the average returns from hedge fund indices still compare quite well with equity returns, as can be seen from the numbers in section 3.3.

The same research[11] also suggests that ignoring closed funds may also lead to a significant underestimation of the standard deviation and kurtosis as well as overestimation of the skewness on individual hedge fund returns.

3.6 Selection Bias

Another common concern about the returns quoted in marketing material from promoters of hedge funds is 'selection bias'. A fund chooses whether or not to enter in any of these surveys, and a fund that chooses to participate would therefore be

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[9] www.kpmginsiders.com/display-reuters.asp for Jan 8 2002

[10] A performance fee is payable if a fund's unit price reaches a new high, at the end of a quarter say. The amount of the fee is typically 20% of the increase in value over the previous highest quarter end unit price, i.e. 0.2*(Current price less previous highest price)*(Number of units)

[11] G Amin and H Kat of the University of Reading, Welcome to the Dark Side, Hedge Fund Attrition and Survivorship Bias Over The Period 1994-2001

[12] This compares with a survivorship bias for US Mutual funds of 0.8%-1.5% reported by Brown and Goetzmann (1995)

expected to have a more attractive record than someone that doesn't. In some cases, when these funds are added to surveys of hedge funds, their results from inception are "back-filled". Results of any subsequent database analysis will therefore look healthier than you would derive if you could find some way to analyse the entire hedge fund universe. Given that the returns on any funds that decide not to be part of any database will by definition not be available, the impact of selection bias on reported hedge fund earnings is a lot harder to quantify.

3.7 Stale or Managed Pricing

"Stale pricing" or "managed pricing" is a particular worry for hedge funds that deal in more illiquid or esoteric investments, and refers to the possibility that if an asset is not quoted on a regularly traded exchange or in a highly liquid over-the-counter (OTC) market, you can value it pretty much as you like, especially if there is no independent audit of the figures. Again, the impact on index returns is difficult to quantify in any accurate way.

Where funds have long lockup periods (or can invoke them in times of market stress) there is a suspicion that asset prices may be managed down rather than marked-to market on a daily basis during these lockup periods.

These problems are not confined to hedge funds. The exact same issues arise in property funds and unitised with-profit funds.

3.8 CSFB/Tremont Hedge Fund Index

The CSFB/Tremont Hedge Fund Index is one of the biggest and best known hedge fund indices, using the TASS Database of over 2,600 funds (as at December 2001). It is the industry's only asset-weighted index (unlike for example the Hedge Fund Research or HFR Index, which weights each fund equally). It includes performance for funds that have liquidated, for the period during which they were active. It also includes funds that are closed to new investment. New funds are added to the index only on a going-forward basis. Lastly, it is a requirement that funds have a current audited financial statement before they can be included in the Index. So this Index at least attempts to mitigate or remove the impacts of all of survivorship bias, selection bias and stale pricing.

The table below shows some performance statistics on this index (net of all fees) up to 31/12/2001 (inception was 1/1/1994).

Net Performance Statistics on CSFB/Tremont Hedge Fund Index			
	Hedge Fund Index	S&P 500	MSCI[13] World $
1 month	1.19%	0.76%	0.56%
3 months	2.19%	10.37%	8.37%
6 months	2.24%	-6.23%	-7.49%
1 year	4.42%	-13.04%	-17.83%
2 years	9.48%	-21.86%	-29.37%
3 years	35.12%	-6.60%	-12.83%
5 years	69.55%	54.99%	22.33%

[13] Morgan Stanley Capital International global equity index - returns in US dollars

Since Inception	141.17%	146.13%	67.67%

The conclusions you can draw from these numbers are:

- Over the medium-term (8 years from January 1994), hedge funds generally (as represented by this particular index), have had returns that compare reasonably well with pure equity returns (in the U.S).
- In particular, the returns in the last 3 years have been solid, at a time when equity markets have been struggling**.**

3.9 Portfolio Diversification

As mentioned earlier, one of the commonly quoted rationales for investment in hedge funds, is to produce strong returns in absolute terms irrespective of market conditions. Another main motivation is to improve portfolio diversification and therefore risk-adjusted returns, because hedge funds should produce returns that are not correlated with other asset classes. In particular, there are strong arguments that hedge funds produce solid returns during market downturns - 2001 is a good example of this.

3.9.1 Portfolio Diversification – Example During Recent Stockmarket Slumps

When you look over the longer term there tends to be a lot of averaging out. So how would a portfolio consisting of two actual managed unit-linked pension funds in the Irish market have compared with a combination of a managed fund and a PDF[14] have done in the last year or so? The table below shows the results for the 13-month period from the end of June 2001 to the end of July 2002.

Last 13 months (end June 2001 to end July 2002)

Comparison Heading	50% Manager A & 50% Manager B Combination	50% Manager A & 50% PDF Combination
Total return	-11.0%	-2.1%
Biggest percentage fall in the value of the customer's investment	-13.2%	-7.7%

Table 1 illustrates why it is so important to invest in a PDF that has its good and bad months of performance at different times to a managed fund and that have higher returns than managed funds.

3.9.2 Traditional Portfolio Diversification

Conventional thinking for many years in this area has only stretched as far as bonds, property, and foreign investments. Proponents of hedge funds in recent times have been challenging this and posing a number of questions. For example to what extent does an investment in U.S. shares represent real diversification for a portfolio predominantly invested in the Eurozone, and to what extent does this give you real protection from "single factor risk" like accounting scandals or global economic

[14] The PDF is represented by the ITR currency index. Currency hedge funds tend to have a very low level of correlation with unit-linked pension managed funds available in the Irish market.

slowdown which affect all markets? Are hedge funds, in particular PDF's, a better solution?

3.9.3 Correlation of Individual Hedge Funds with equities

Some recent research has looked at the area of correlation between returns on individual hedge funds and an equity portfolio:

- Amin and Kat's study from Reading University[11] calculated a correlation with the S&P for a subsection of funds in the CSFB/Tremont database from June 1994 to June 2001, of 0.36.
- Another study[15], this time of a subsection of funds in the Managed Accounts Reports (MAR) database, calculated a correlation with the S&P 500 over the period May 1990 to April 2000, of 0.29.

Hedge Fund promoters tend to focus on indices. Over a period from January 1988 to December 2000, the VAN U.S. Hedge Fund Index had a correlation of 0.71 with the S&P. Over the same period, the correlation of the Lehman Bond Index with the S&P was 0.17; and the MSCI World Equity Index was 85% correlated with the S&P.

For the period from January 1994 to December 2001, the CSFB/Tremont Index shows a correlation with the S&P 500, of 0.51.

As pointed out earlier[8] a correlation of 0.4 or less is required for a significant level of diversification from equities. Hence when choosing a fund or index it is important to determine its correlation with the portfolio into which it is to be included.

The critical question however, is the more general one of whether it is possible to use hedge funds in a way that improves the risk-adjusted returns of a portfolio of assets consisting of equities and bonds by using a PDF?

3.9.4 Risk adjusted returns – Sharpe Ratio

Typically, the way that a question such as this will be addressed is by looking at risk-adjusted returns, and the most common measure of risk-adjusted returns is the Sharpe Ratio. The Sharpe Ratio is defined as the excess return over the risk free rate of return divided by the standard deviation of return (i.e. the higher the Sharpe ratio the better the risk-adjusted return). The table below shows two comparisons of Hedge Fund Indices to some relevant benchmarks.

Sharpe Ratio Analysis of Hedge Fund Indices			
	Index	S&P 500	MSCI World $
CSFB Tremont *	0.72	0.45	0.12
Van U.S. Hedge Fund Index **	1.54	0.9	0.34
* Jan 94 to Dec 2001, Sharpe is calculated using 90-day Treasury Bill ** Jan 1988 to Dec 2000.			

The relativities paint a very good picture, a hedge fund index can outperform the S&P on a risk-adjusted basis during the strongest bull market in history, but there are serious caveats. The biases mentioned earlier can have a double whammy here – in

[15] Amin and Kat, 2001, Do the money machines really add value?

particular, selective use of stale pricing can allow you to manage both volatility and returns, with the obvious impact on Sharpe Ratios.

Another problem is that the traditional Sharpe Ratio measure assumes a normal distribution for hedge fund returns, which research has shown to be a dubious assumption at best. Some hedge funds have asymmetrical returns due to the nature of the strategies they pursue. A Sharpe Ratio would be an inappropriate measure for funds with asymmetrical distributions and is also inappropriate for high kurtosis returns. It is very important when looking at returns on alternative investments (indeed any investment) to study the skew and kurtosis as well as the volatility.

The types of Index figures promoted above must also be substantially better than any analysis of individual hedge funds, since the low correlation between hedge funds reduces the volatility at index level, and consequently the denominator for Sharpe.

To replicate an index type risk/return profile will either need a lot of capital if you decide to spread your investments among several hedge funds or will cost a lot of fees if you go down the fund-of-funds route. Alternatively you can choose a PDF with symmetrical returns which manages volatility to a constant level – the Sharpe Ratio for this type of fund is very easy to measure and is also reliable.

3.9.5 Risk Adjusted Returns – Other Methods

A research paper from Reading University in 2001[16] tackled this area and came up with the following conclusions, analysing data from the HFR database, May 1990 to April 2000:

- On a stand-alone basis, the average hedge fund does not offer a superior risk-return profile.
- However, included in a portfolio that mirrors the S&P, the average hedge fund can improve portfolio efficiency, an allocation of 10-20% producing the best results.
- At Index level, all the results look better because the volatility of the index is lower than the volatility of the individual funds due to the low correlation of returns between the funds.

[16] G. Amin and H. Kat, 2001, "Do the money machines really add value?"

4 Solvency Regulations

4.1 EC (Life Assurance) Framework Regulations, 1994 - Annex V

4.1.1 Interpretation of Article 2(1)(b)

Before considering whether alternative investments could or could not be used as assets backing property linked benefits the working party needed to clarify the ambiguous meaning of Article 2(1)(b) of Annex V of the EC (Life Assurance) Framework Regulations, 1994 (the "Framework Regulations"). Article 2(1) states:

"2. (1) (*a*) This Annex applies with respect to the determination of the value of assets of undertakings for the purposes of any investigation to which Article 15 of these Regulations applies and for all other purposes of the Insurance Regulations.

(*b*) However, in the case of a linked asset of an undertaking including approved derivative instruments which meet the requirements of Articles 2(9) and 12(4) of this Annex, the value given will be the value of that asset as determined in accordance with generally accepted accounting concepts, bases and policies or other generally accepted methods appropriate for insurance undertakings."

Two interpretations can be taken from 2(1)(b) as follows:

1. The rules of Annex V do not apply to linked assets
2. The rules of Annex V do not apply to the valuation of linked assets only to the extent that parts of Annex V deal with the specific issue of how to determine the *value* of an asset. Other aspects of Annex V such as requirements relating to liquidity do apply to linked assets under this interpretation.

In order to clarify this point the 3rd life directive (the Directive) was reviewed as the Framework Regulations are the implementation of this directive.

4.1.2 3rd Life Directive

It is clear from the Directive that the correct interpretation of article 2(1)(b) is the second interpretation above. Article 23 of the Directive exempts linked assets from article 22 of the Directive – article 22 is the equivalent of the Schedule 7 diversification requirements of the Framework Regulations in respect of assets backing non-linked liabilities.

Article 21 of the Directive is the equivalent of articles 2(2) to 2(16) of the Framework Regulations – there is no exemption from article 21 in the Directive in respect of linked assets and hence the working party concluded that articles 2(2) to 2(16) of the Framework Regulations apply to linked assets.

4.1.3 Irish Permitted Links?

This conclusion also resolved a further ambiguity in the Framework Regulations, i.e. whether the list of assets in article 2(2) is a list of permitted links. Based on the

reasoning in 4.1.2 and a close reading of the Framework Regulations the working party concluded that the list in article 2(2) is in fact a list of permitted links.

4.2 Hedge Funds Sold via a Life Assurance Wrapper

There are two main ways in which a hedge fund could be packaged under a life assurance wrapper:

(i) The internal fund of the life assurance company is invested 100% to an external hedge fund – the 'mirror fund' approach and

(ii) The internal linked fund holds its own portfolio of assets directly, which may include an element of leverage – the 'own fund' approach.

This section considers the regulatory position for an Irish insurance company under both of these approaches respectively. For comparison purposes, we also consider the regulatory regime for a UK company and for an Isle of Man based company, where hedge funds through life assurance wrappers have been a feature of the market for some years.

4.2.1 Regulatory Issues for Mirror Fund structures

With the mirror fund approach, the asset of the internal linked fund is a hedge fund managed by a third party. The internal linked fund is not exposed directly to the individual underlying assets or liabilities (e.g. derivatives or borrowings) of the hedge fund but rather to the net result of the hedge fund. This is an important point from a risk management perspective. Provided that the life assurance company has limited liabilities in respect of the third party hedge fund, this approach is safer for the life assurance company than the 'own fund' approach and this is commented on further below.

4.2.2 Ireland

Considering first the mirror fund approach, Annex V of the EC Framework (Life Assurance) Regulations 1994 effectively specifies a list of "permitted links" for unit-linked business in article 2(2). There are a number of permitted links that are of interest when considering the permissibility of a hedge fund. The main ones are:

- "units in undertakings for collective investment in transferable securities and other investment funds "
- "shares and other variable yield participations" and
- "debt securities, bonds and other money and capital market instruments"

4.2.2.1 Units in undertakings for collective investment in transferable securities and other investment funds

The phrase "units in undertakings for collective investment in transferable securities" is taken to mean UCITS which are compliant with EU Directive 85/611/EEC ("the UCITS directive"). Due to the investment restrictions that apply to UCITS and the relatively low levels of borrowing allowed, most hedge funds would not qualify under this part of the definition.

'Other investment funds' are not defined in the regulations (or the DETE guidance).

Sub-articles 2(4) to 2(8) add a number of general and particular considerations with regard to prudence and security which companies are required to take account of in considering the nature of assets held against technical reserves.

Sub-article 2(10) sets out minimum liquidity requirements for all assets backing technical reserves.

In the absence of a clear definition, a non-UCIT fund should be assessed on its merits to determine whether or not it is a permitted link, based on the criteria described above such as the nature of the fund's underlying investments and the liquidity and marketability of the fund.

4.2.2.2 Shares and Other Variable Yield Participations

Equally, the liquidity and marketability considerations of the regulations should be taken into account in assessing whether or not a particular investment would fall into this category.

Regarding liquidity the regulations say that an asset should be "realisable in the short term". Article 6.3.8 of the Guidance Notes issued by the DETE make three points about what this means:

a) "the realisability of a security must clearly be considered in relation to the value assigned to it"

b) "there should be no temporal qualifications of any significance to the transferability of the securities, such as pre-emption rights"

c) "there should be a genuine confidence, as distinct from a hopeful expectation, that the value assigned can be realised"

The Guidance Notes also state that:

"In view of the differing circumstances, it is reasonable to recognise some flexibility as to what would be accepted as 'short term' but as a general guide, a period of six months might be regarded as reasonable".

Applying this six-month measure, some hedge funds may not meet the liquidity requirement.

Many hedge funds contain the provision that if the shares or units in the fund pass to individuals or companies not approved by the directors, the directors have a right to redeem the units or shares. Usually, the directors want to prevent certain groups of investors (e.g. US citizens) from holding the funds as it may open the hedge fund to taxation or scrutiny by U.S. authorities. This right may constitute a "pre-emption" right according to DETE Guidance Note 6.3.8 and may rule out the hedge fund being a "permitted link".

4.2.2.3 Debt securities, bonds and other money and capital market instruments

Structured bonds would pass the admissibility test under this heading. These bonds would have to satisfy the liquidity requirements in article 2(10).

4.3 UK Permitted Links Rules

This section concentrates on the differences between the Irish and UK rules.

4.3.1 Permitted Links/Admissible Assets

In the UK, a distinction is made between the assets that can be used to cover the technical reserves and solvency margins ("admissible assets") and the type of assets allowed for the purpose of determining the value of property linked benefits ("permitted links"). In Irish legislation and guidance notes the list is the same for practical purposes as noted above.

It should be further noted that in the UK an inadmissible asset can still be held by the life company, but it has zero value for the purpose of meeting technical reserves. However, the permitted links list is exactly that - only explicitly permitted fund links are allowed.

The permitted links for a unit linked policy are described in the FSA's 'Interim Prudential Sourcebook for Insurers', Appendix 3.2.

For full details the actual regulations should be referenced, what follows is only an overview.

4.3.2 Hedge Funds and Permitted Links

Basically a hedge fund is a permitted link in the UK if either it is a UCITS or it is a collective investment scheme which satisfies all of the following requirements:

- It contains only permitted assets
- The units are readily realisable at their net asset value
- The unit prices are published regularly.

Many hedge funds use some form of derivatives – in the UK 'permitted derivative contracts' are on the list of permitted links.

A permitted derivative contract must satisfy all of the following conditions:

- The purpose for which they are used must either be for a reduction in investment risk or for efficient portfolio management.
- A permitted derivative must satisfy the 'in connection with' test. The 'In Connection With' test requires that any derivative held by the fund must he held in connection with another asset of the fund for the purpose of efficient portfolio management or reduction in investment risk.A permitted derivative contract must be 'covered'. The requirement that derivative contracts be covered means that the insurer must hold appropriate assets to meet any obligation on an insurer which that derivative contract could impose.Permitted derivative contracts must be listed on a recognised exchange or with approved counterparties and must also be liquid.A permitted derivative contract must be based on a permitted link. For example a derivative based on the price of gold would not be a permitted derivative contract because gold is not a permitted linkThe derivative must have a prescribed pricing basis.Any derivative where the exercise price is fixed or where it is related to the value of an asset which is a permitted link will satisfy this test.

Hence, the Insurance company would need to ensure that the managers of the hedge fund were going to deal in line with these guidelines, or that the fund prospectus stated these guidelines as a fund constraint for the fund to be a permitted link to a UK contract.

Given the above restrictions it is not surprising that hedge funds do not form a significant part of UK life company assets.

4.3.3 Look-Through Rules

The UK rules (Interim Prudential Sourcebook for Insurers, Volume 1, Chapter 3, Rule 3.7) require a company to 'look through' to the assets underlying a collective investment scheme for the purpose of determining whether the collective investment scheme itself is a permitted link. This look through rule is not required under the third life directive and in this area the UK has introduced rules which are stricter than the third life directive.

The Irish regulations do not require the look through test. It is the opinion of the working party that it would be inappropriate to introduce the look through test in a situation where other European countries have not done so.

In a case where a look through test might render assets inadmissible under UK rules the working party recommends that the company carry out appropriate due diligence as outlined in section 5. It appears unreasonable to use a look through rule to render inadmissible PDF's which can reduce the risk of the client/company's overall portfolio and enhance return.

4.4 Regulatory Issues for Own Fund structures

Under this approach, the internal linked fund of the life assurance company follows its own hedge fund trading strategy and invests directly in derivatives and so on. Before exploring this approach further, it is worth mentioning that we are not aware of any life assurance company in either Ireland or the UK which runs an internal hedge fund in its 'purest form'. However there is at least one company that operates a hedge fund within an internal linked fund.

There is no single definition of a hedge fund and as mentioned in other parts of the paper, there are many different trading strategies adopted by hedge funds. However, in order to examine the regulatory position for an Irish life assurance company, the regulations (and accompanying guidance) are analysed in the context of the following four questions:

- What are the rules on derivatives?
- What are the rules on borrowing?
- Can a life assurance company sell short?
- Can a life assurance company lend stock?

4.4.1 Irish Rules

4.4.1.1 Derivatives

Annex V of the EC Framework (Life Assurance) Regulations 1994 sets down rules that must be satisfied by a derivative (including futures, options and contracts for differences). The various rules are contained in a number of articles in the Annex but are best summarised by the DETE Guidance Notes as follows:

‘The following conditions must all be satisfied:

- the instrument must be listed or, if OTC, must be with an approved credit institution and be capable of being closed out readily
- the investment must be for the purpose of efficient portfolio management or reduction in investment risks
- the instrument must be held in connection with assets which are themselves admissible under the asset valuation rules in the Regulations, and
- the instrument must be covered, i.e. the undertaking must be assured of having, so far as can reasonably be foreseen, appropriate assets at the settlement date to fulfil its obligations under the instrument.

The general import of the Regulations is that, in the case of linked funds, these conditions determine the derivative instruments which may be used in such funds while, in the case of non linked funds, they determine which instruments may be admitted for solvency purposes.’

Of these tests, the second test is designed to prevent speculative use of derivatives i.e. in other words, derivatives must be used either for ‘efficient portfolio management’ or to contribute to a ‘reduction in risk’. The exact meaning of these terms is not defined in the regulations but the Guidance Notes expand on them further as follows:

‘The use of derivatives would be interpreted (i) as contributing to efficient portfolio management where their use enabled a reasonable investment strategy to be effected more readily or more flexibly or more economically without any corresponding significant increase in investment risk, and (ii) as contributing to a reduction of investment risks where their use reduced mismatching with a broadly positive or neutral effect on investment risk or reduced investment risk with a broadly positive or neutral effect on the matching position, due regard being had both to the credit risk and to the market risk components of overall investment risk.’

In applying the efficient portfolio management test, there would seem to be some latitude in determining whether or not the use of derivatives enable “a reasonable investment strategy to be effected more readily or more flexibly or more economically” without “any corresponding significant increase in investment risk”.

Does the latter requirement mean that derivatives should not be used for speculative purposes? Such an interpretation would be seem to be supported by the following extract from the Guidance Notes:

“6.13.5 The condition that derivatives must be used “in connection with” other admissible assets is also of primary importance. For example, a purchased put option would not meet the condition unless the underlying stock were held and a purchased call option would do so only if used in connection with liquid assets. If the use of the derivative involved significant gearing or if a significant penalty could arise in some reasonably likely circumstances, then the condition would not be met.”

The underlying guidance in relation to the use of derivatives is similar in both the UK and Irish rules although UK life assurers are subject to a very detailed prudential

guidance note on the subject. The Irish rules on derivatives are such that the full gambit of hedge funds could not be created using an "Own Fund" structure.

4.4.1.2 Gearing of Internal Linked Funds

There is no explicit limitation on borrowings within an internal linked fund under the Irish regulations. Borrowing introduces a potential exposure for a life assurance company unless arranged on a non-recourse basis. In the former case, if the value of assets held falls below the level of the outstanding loan then the company will be liable for the difference. If the company is unable to meet this difference it may fall to be met by other groups of policyholders.

Although borrowing to gear up an internal fund introduces risks for a life assurance company, there is a maximum downside provided the borrowing is on a non-recourse basis, i.e. the borrowing is secured only on the assets of the fund. Controls can be put in place to monitor the level of gearing on an ongoing basis and if the ratio of borrowings to assets rises to an unacceptable level, the company could take action to sell some assets and reduce borrowings.

Once again, it is important to bear in mind that gearing is just one aspect of risk. The key issue is not the gearing but the overall level of risk.

4.4.1.3 Short selling

There is no explicit limitation on short selling within an internal linked fund under the Irish Regulations. A company which sells short has in theory an unlimited liability as the stock sold short could increase in value significantly. The company's directors and the Appointed Actuary would need to have suitable controls in place to manage this risk.

4.4.1.4 Stock Lending

There are no restrictions in the Framework Regulations that prevent stock-lending. In passing, it is worth mentioning that in the second half of 2001 the FSA appealed to life assurers in the UK to temporarily suspend stock-lending in an effort to reduce market volatility. This request was targeted at reducing levels of short selling rather than a move to limit stock-lending in itself.

In conclusion, a life assurance company in Ireland could structure limited forms of hedge funds on its own balance sheet. The directors and the Appointed Actuary of the company would need to be satisfied that the proper controls and procedures were in place to ensure that the solvency of the company would not be jeopardised.

4.4.2 UK Rules

The UK rules are similar to the Irish rules as mentioned earlier. Refer to the Appendix which discuses the UK rules in relation to permitted derivatives in more detail.

4.4.3 Conclusions on the 'Own Fund' Structure

Given the restrictions on asset admissibility and the use of derivatives it is not surprising that pure hedge funds are not common within the life company structure. As in the case of a geared property fund or a fund which engages in short selling it is important to have strong controls in place to ensure that the minimum value of the assets of the fund is zero, i.e. the assets of the fund can never turn into a liability.

5 Sales Regulation/Disclosure Requirements

5.1 Background

There are no specific requirements in relation to policyholder disclosure for life companies marketing products whose returns are linked to alternative investments as distinct from 'standard' investments. This section of the paper discusses the following issues:

- Section 5.2 reviews the restrictions on promotion required when alternative investments are sold under supervision from the Central Bank of Ireland
- Section 5.3 discusses the general principles of consumer protection
- Section 5.4 makes recommendations on the type of disclosure that should be made to policyholders
- Section 5.5 makes recommendations as to the level of due diligence that should be carried out by the life company.
- Section 5.6 reviews the Irish intermediary regulation and the Irish life assurance disclosure regulations as they apply to alternative investments
- Sections 5.7 and 5.8 comment briefly on the UK and Isle of Man disclosure regimes.

5.2 Central Bank of Ireland Rules

5.2.1 UCITS

There are two main categories of mutual funds marketed to the public under Irish law as follows:

- Mutual funds set up under the UCITS Directive, implemented into Irish law as the EC (Undertakings for Collective Investment in Transferable Securities) Regulations 1989, known as UCITS funds
- Mutual funds set up under Irish regulations (as distinct from the implementation of an EU directive and which do not benefit from the single passport), known as non-UCITS funds.

The Central Bank differentiates between UCITS and non-UCITS in its regulation and has issued separate series of "notices" governing their operation in respect of each.

A UCITS fund may only invest in transferable securities and are subject to the following investment restrictions:

Type of Security	**Max % of Net Asset Value (NAV)**
Quoted Securities	100
Unquoted Securities	10
Liquid Debt Instruments	10
Other UCITS	5
Precious Metals	0

- Property can only be included where it is essential to the business.

- Derivatives may only be used for efficient portfolio management purposes.
- Diversification rules apply. No more than 10% of NAV can be invested in the securities of any one issuer (other than credit institutions and government bodies).
- Short selling is not permitted.
- Borrowing for the purpose of gearing the fund is not permitted.

The investment restrictions and limited borrowing powers of UCITS mean that in practice hedge funds are not established through this route.

5.2.2 Non-UCITS Retail Funds

It is possible to set up retail funds which invest is a variety of asset classes other than transferable securities under non-UCITS regulations, e.g. property, private equity, funds of funds, cash and money market funds, exchange traded futures and options funds etc. The notices issued by the Central Bank in respect of non-UCITS set down conditions that must be met for different categories of non-UCIT:

- Derivatives may only be used for efficient portfolio management purposes.
- Diversification rules apply. No more than 10% of NAV can be invested in the securities of any one issuer (other than credit institutions and government bodies).
- Short selling is not permitted.
- Borrowing is limited to 25% of NAV.

5.2.3 Non-UCITS Institutional Funds

A more liberal regime relating to investment and borrowing restrictions applies to non-UCITS targeted at institutional funds and high net worth individuals, commonly called 'professional investors'[17], but stricter rules apply in relation to the promotion of these institutional funds. In essence, the freer the investment policy allowed for a particular category, the more restrictive the requirements are in respect of its promotion.

Institutional funds fall into the following two categories:

1. Qualifying Investor Schemes (QIS)
   These funds have more or less complete investment and borrowing freedom. A minimum subscription requirement of at least €250,000 per investor applies. In addition, an individual investor must demonstrate that apart from his principal private residence he has a net worth of at least €1.25 million. Institutional investors must own or invest on a discretionary basis at least €25m.

2. Professional Investor Schemes (PIS)
   Funds in this category are subject to some investment constraints which do not apply to the previous category but they are still afforded greater investment freedom and borrowing powers than UCITS. The minimum subscription for professional investor schemes must be at least €125,000.

[17] The definition of professional investors will vary from country to country. In general though it tends to encompass institutional investors and individual investors with large sums of money to invest

Alternative investments which require the ability to sell short, to use gearing in excess of 25% of net asset value, which do not wish to be restricted by the diversification rules of retail UCITS and non-UCITS etc. will therefore be set up as either as a QIS or a PIS. Most hedge funds would fall into this category. Geared property funds which are geared more than 25% would also have to be set up as either a QIS or a PIS.

5.3 Consumer Protection Issues

5.3.1 General principles

Life companies selling investment business are not subject to the UCITS/non-UCITS restrictions on investment but are subject to the EC (Life Assurance) Framework Regulations, 1994. The investment restrictions of the life assurance regulations are different to those of the mutual fund regime, e.g. there are no explicit restrictions on short selling and no limits on borrowing (see section 4 for a review of the investment restrictions in the EC (Life Assurance) Framework Regulations, 1994)

In cases where the life industry takes advantage of this different regulatory structure in relation to investment freedom to sell alternative investments there is an onus on the industry to ensure that the products sold to retail investors are appropriate.

Under the Third Life directive, certain activities of life assurance companies selling cross border are regulated by local regulators (the "General Good" provisions). Broadly speaking, these are the local sales and marketing rules. Disclosure and sales intermediary regulation are therefore subject to local rules. Given the wide diversity of the local rules throughout the world, we concentrate on principles, "best practice" and PRE considerations.

Consumer protection is considered below from four points of view: policyholders' reasonable expectations (PRE), disclosure, sales intermediary regulation, and due diligence.

5.3.2 Policyholders Reasonable Expectations

GN1(ROI) states that:

'It is part of the Appointed Actuary's continuing responsibility to advise the company of the Appointed Actuary's interpretation of its policyholder's reasonable expectations' and 'It is also incumbent upon the Appointed Actuary to take all reasonable steps to ensure that the company's incoming policyholders should not be misled as to their expectations.'

The interpretation of PRE has been the subject of much debate and indeed a separate working party of the Society of Actuaries presented a paper on this topic in November 2001. Therefore we do not propose to discuss PRE issues in detail but would like to make some comments of particular relevance to hedge funds.

The investment strategy of a hedge fund can be quite complex to understand. This presents additional challenges in attempting to communicate the risks inherent in the product in a manner that can be understood by investors. For professional investors it may be reasonable to assume a certain level of financial sophistication.

Hedge funds are often only designed for the professional investor. The minimum direct investment may be $1m or higher. In this case the insurance company may negotiate a lower minimum in return for a flow of business from retail investors, or else run a "box" of units.

The insurance company is therefore the professional investor, and it could be considered by a court as having a duty of care to ensure that the retail investors are aware of the risks. The linking of a third party fund of any sort to an Insurance company unit linked range may be seen as endorsing the fund in some way. The scenario of a fund going bust and policyholders looking for redress from the insurance company can be readily imagined.

Consequently "best practice" would suggest that the insurance company takes some steps to ensure the probity and competence of the fund managers and other parties involved in the fund. This is particularly the case when funds are constituted in offshore locations and regulation of the fund locally may be light. This aspect is covered in the Due Diligence section below.

In discharging his PRE responsibilities, the Appointed Actuary should have input to all policy, marketing and other literature. In the case of hedge funds, this could mean additional, fund related disclosure as discussed below.

Finally, it is important to ensure that the structure which is used to offer exposure to a hedge fund has limited liability for the protection of all policyholders.

5.3.3 Disclosure

As discussed above, the minimum disclosures to clients will be covered by local market rules. We concentrate here on "best practice" which where allowed could be followed in any market, or perhaps would be the place to start when the market has no disclosure rules. There will be an overlap between the issues considered here and PRE considerations.

What should be disclosed to clients, so that clients are aware of what they are buying and the risks involved, depends on many factors including:

- Quality of advice at point of sale;
- Financial sophistication of clients;
- Familiarity of clients with generic product types;
- Complexity of benefits (including surrenders).

Local disclosure rules, if they exist, may not address these issues, and the company must consider what extra disclosure is appropriate. For products linked to hedge funds, there are a number of specific risks that need to be brought to the attention of clients. These are normally listed in the Prospectus for the hedge fund. However, retail clients investing via a unit linked contract would not normally receive a Prospectus so some other method of disclosure needs to be adopted.

Also, the ways hedge funds tend to operate (e.g. performance fees, investment advisor commissions) may impact on clients, and the Appointed Actuary should consider how these should be disclosed.

In some markets the disclosure regime is prescriptive, and it may not be permissible to amend standard documentation. In this case additional explanatory literature may be necessary.

Best Practice disclosure should consider the sales process as a whole, and the type of clients and products involved, and add to or amend the minimum local disclosure requirements when required to protect the client.

Where insurance companies are dealing through intermediaries, and the intermediaries are giving the presale disclosures to the end clients, consideration needs to be given to how much of that disclosure is actually happening, and if it is, how much is being understood. Additional measures such as requiring client signature of acceptance of risks, or additional post sale disclosure directly to the client might need to be considered.*General Intermediary Regulation*

Currently, there is no EU passport for Intermediaries, although we believe that this is a live issue at European level. Intermediaries are required to become regulated in each member state where they wish to do business.

Where possible it is preferable to use authorised intermediaries. This is intended to be a broad-brush protection for clients against poor advice and fraud. However, this raises some issues for cross border companies. In some countries there is no regulation of intermediaries (e.g. Germany). In others there appears to be practical difficulties for certain brokers to get regulated (e.g. Spain), the local regulators apparently taking the view that they don't need to be involved in regulating intermediaries selling only to non resident clients. Where there are authorised intermediaries, the qualifications they are required to have, and capital and professional indemnity cover required will vary. The amount of consumer protection conferred by being authorised is rather patchy when Europe is considered as a whole.

As far as hedge funds are concerned, the key question is how much do the intermediaries understand, and how much are they going to explain to end clients? The company will need to take a view on this and tailor disclosure and intermediary training appropriately. In markets with unsophisticated or poorly trained salespeople, disclosure will need to be stronger. We recommend that companies offering links to hedge funds give their distributors a comprehensive training program.

5.3.5 Due Diligence

In cases where the life industry uses the regulatory structure available to life companies in relation to investment freedom there is an onus on the industry to ensure that the alternative investment based products sold to retail investors are appropriate. This is a two-part process, i.e. a review of the promoters of the alternative investment and a review of the alternative investment itself. These issues are discussed more fully in section 5.5.

5.4 Suggested Disclosure to Policyholders

5.4.1 Disclosure of Parties

We recommend that where a life company sells an institutional non-UCIT wrapped in a life product the disclosure should follow that required by the Central Bank of Ireland's disclosure regime for Qualified Investor Schemes (QISs), i.e disclosure of

the details of all parties to the hedge fund (investment manager, custodian, prime broker, administrator, etc.) and disclosure of the principal risk factors be given to clients in advance of investing in a QIS.

We would further recommend that the client acknowledge that he has read and understood the disclosure material.

5.4.2 Counterparty Risk

Where counterparty risk is being passed through to policyholders there should be a clear unambiguous statement in the marketing literature and policy conditions explaining the effect on policyholder benefits of a counterparty default.

5.4.3 Disclosure of Charges

For many structured products there may be multiple layers of charges. Consider a unit-linked life product where the returns are linked to the returns from a fund of hedge funds. The fund of funds manager will typically charge an annual management fee of 1% p.a. and a 10% performance fee. Each of the underlying managers will typically charge a 2% p.a. annual management fee and a 20% performance fee above a hurdle rate, say 4% p.a. There may also be entry charges to the fund of funds.

On top of these charges there will be charges for the administrator, the broker and the custodian. In some cases these parties, e.g. the broker/administrator, may be within the same group as the fund of funds manager and the fees paid to these parties may not be at commercial rates.

Finally the life company will normally charge an entry fee of 5-8% and an annual management fee of 0.5%-1% p.a.

Assuming the gross investment return on the underlying fund is 10% and the hurdle rate is 4% p.a. the return to the client is:

Underlying Fund Manager:	(1+0.1-(0.1-0.04)*0.2)*0.98-1 = 0.066
Fund of Funds Manager:	(1+0.066*0.9)*.99-1 = 0.049
Life Company 1%:	1.049*0.99 = 0.0385

assuming charges are taken annually for simplicity. The total charge is therefore 10%-3.85% = 6.15%.

The working party recommends that all the layers of charges be disclosed in the marketing literature and policy conditions.

5.4.4 Disclosure of Risk Relating to Asymmetrical Distribution of Returns

The working party recommends that when offering life assurance policies linked to any form of alternative investment companies should consider very carefully whether to offer a fund where the distribution of returns is asymmetrical or has high kurtosis (i.e. risk of extreme outcomes) and how they intend to clearly disclose the potential risks to policyholders.

5.4.5 Disclosure of Risks

The working party recommends that when offering life assurance policies linked to any form of alternative investment there should be a statement of the risks involved in the investment. The policyholder should be required to sign that he has read and understood these risks as part of the disclosure process.

5.5 Recommended Due Diligence

5.5.1 Current Requirements for Due Diligence

As far as we are aware, there is no requirement in any market to carry out due diligence on the funds being linked to a unit linked policy (although some markets have the concept of 'permitted links' which are quite restrictive, e.g. the UK). However, as mentioned above, it seems prudent to do some – this would protect the company to some degree in case of difficulties later with policyholders. This consequently comes under the "best practice" heading.

5.5.2 Suggested Due Diligence on Providers

Due diligence is a kind of open-ended subject as to the amount of detail that could be gone into. The company will want to perform an amount of work consistent with the risk being run. Having said this, most of the work is only required to be done once. The following should be considered for attention:

- Company history, business background, and legal structure
- Length of time in the business
- Business strategy and competitive environment
- Company organisation, management, and expertise
- Integrity of key players
- Financial condition of the company and relationship with parent
- Fee compensation structure
- Historical performance
- Portfolio and risk management controls
- Leverage
- Jurisdiction – regulatory reporting
- Associated third parties – custodians, stockbrokers, bankers

For those interested in a more comprehensive discussion of due diligence issues see the paper by John Caslin [8].

5.5.3 Suggested Due Diligence on the Hedge Fund

We recommend that the company carry out appropriate due diligence on any fund used as a link for retail investors. (This is not intended to cover personalised bonds).

In particular, companies should consider:

- The distribution of daily returns from the hedge fund
- The size of the largest historical drawdowns (peak to trough falls in the value of the fund).
- Holdings of illiquid assets whose value cannot be determined with certainty until they are sold (illiquid over-the-counter derivatives, property etc.).

- The kurtosis of daily returns – this may identify the existence of 'jump risk'.
- The extent to which standard deviation and Sharpe ratios measure the risk in the fund. As mentioned earlier these statistics are very misleading for funds with asymmetrical or kurtotic distributions.
- Whether the returns have been generated from one, two or a few big positions taken or from a large collection of positions taken day in day out. We should have more confidence about the repeatability of the latter compared with the former.
- The fund's volatility risk management strategy (see "Hedge Funds"[8] for further details of volatility risk management strategy).

5.5.4 Personal Portfolio Bonds

Personal portfolio bonds (PPB's) have traditionally invested in alternative investments chosen by the bondholder. The owners of PPB's typically are wealthy individuals who would satisfy 'qualifying investor' definitions. They could therefore purchase alternative investments directly rather than through the PPB vehicle. In many cases the owners of PPB's employ their own investment advisors. Where PPB policyholders would qualify as 'qualifying investors' or where they employ their own investment advisor the working party is of the view that the life company is not required to undertake any due diligence on the alternative investment other than to satisfy itself as to its limited liability.

Where the PPB owner would not satisfy the 'qualifying investor' definitions and does not employ an investment advisor the life company will need to consider whether to allow the inclusion of the alternative investment after the necessary due diligence or to simply disallow the purchase of the alternative investment.

5.6 Irish Disclosure Rules

5.6.1 Intermediaries regulation on advice

Regulation of investment intermediaries in Ireland is now the responsibility of the Central Bank of Ireland.

The Handbooks drawn up by the Central Bank for intermediaries set down codes of conduct of business (which have statutory backing).

A key requirement of the Central Bank of Ireland Handbook is as follows:

"Before recommending a transaction for a client, an Authorised Advisor or a Restricted Intermediary must take all reasonable steps to ensure the client understands the risks involved."

The Central Bank handbooks prescribe additional requirements where products are advertised by intermediaries. There are specific requirements in relation to 'high volatility' products and also disclosure obligations relating to 'not readily realisable investments', which is of course pertinent to less liquid hedge funds. Interestingly, an earlier draft of the handbook placed an obligation on intermediaries to highlight 'unusual risks' but these requirement was removed in the final version. This

requirement would be sensible when looking at any financial products that have asymmetrical or kurtotic distributions of returns.

We believe that our suggested disclosure regime and due diligence regime, together with intermediary training and the above requirement will ensure that policyholders' gain a greater understanding of the risks involved.

5.6.2 Life assurance Disclosure Regulations

The Life Assurance (Provision of Information) Regulations, 2001 prescribe minimum product and commission disclosure information which must be provided to potential Irish policyholders before a proposal form is signed. This includes information about the policy and a projected table of illustrated values and sales remuneration. In the main, the information provided relates to the technical nature of the product (type of policy, encashments, review clauses and so on) and the illustrated projections are designed to provide the potential policyholder with an indication of value for money.

However, there are no specific requirements in the regulations which require the disclosure of the volatility of returns. An investment in the Nasdaq100 index will generally receive the exact same illustration as an investment in the ISEQ index, despite the fact that the Nasdaq100 index may be twice as volatile as the ISEQ index.

It is arguable that the disclosure required under the Life Assurance (Provision of Information) Regulations, 2001 should include some measure of the volatility of the underlying investments and the potential effects on policyholder benefits. The difficulty with the current approach is that it encourages equity type investment by illustrating at rates of return in excess of that available on risk free investments but it does not adequately address the additional risk that must be taken to justify this additional return. A possible solution to this problem is to illustrate a confidence interval for returns.

It is worth saying however that the regulations do not explicitly require a life company to disclose its charging structure for a product as it is presumed that the illustration table will convey the level of charges to the prospective policyholder (although it seems to be market practice to describe the charges in marketing literature). There is no direct obligation in the regulations therefore to disclose performance fees.

5.6.3 GN22

The regulations also provide a statutory footing for guidance issued by the Society of Actuaries in Ireland, which is contained in GN22(ROI) and GN22A(ROI). The scope of the guidance provided for in the regulations is limited to the projected illustrations of benefits and remuneration and not the 'descriptive product information' requirements of the regulations.

The guidance does contain some specific clauses that are worth noting in the context of funds with volatile returns:

- Article 2.2. requires that illustrations are 'fair, clear and not misleading'
- Article 3 reinforces the Appointed Actuary's PRE requirements in GN1(ROI) (see below)

- Article 4.8 states "If the Actuary believes that additional information in addition to that provided in the Illustrative Table of Projected Benefits and Charges is needed to ensure that the provision of product information is fair, clear and not misleading, then the Appointed Actuary should advise the company as to what additional information should be disclosed. For this purposes, the Illustrative Table of Projected Benefits and Charges and any explanatory notes attaching thereto should be modified, amended or augmented as necessary.

In addition, the guidance specifically addresses the issue of performance fees which are a common feature of hedge funds:

- Article 6.1 states 'It is possible that the prescribed illustration may give a misleading impression of the company's charging basis. An extreme example of this would be where the company has a charging structure which deducts, say, 25% of the investment return in excess of the prescribed maximum growth rate. A more likely example would be fund management charges which vary in accordance with investment performance.' and

- Article 6.3 states 'Undoubtedly these examples are not exhaustive. The Actuary would be expected in such circumstances to make such adjustments to the calculations as are deemed appropriate to present a fairer illustration of the expected benefits and level of deductions rather than to present a precise reflection of the prescribed scenario. If necessary, the Actuary should give a clear explanation of how and why a departure has been made from the prescribed formula'

The geared nature of many alternative investments and the contingent charges associated with them can pose problems when trying to illustrate projections and charges under the Irish disclosure regime.

As with other countries, the Irish disclosure regime contains deterministic projections. The current investment returns to be assumed are 6% p.a. and 8% p.a. gross. However, as discussed earlier in this paper, GN22 of the Society of Actuaries in Ireland does permit the actuary to provide additional information and make efforts to ensure that the quotations are not misleading.

5.6.4 Gearing

As mentioned above, the maximum rates of investment return to be used under GN22 are 6% p.a. and 8% p.a. If there is gearing involved, the use of these returns could lead to an expected return greater than the return assumed under GN22. This is illustrated using a simple example of an equity fund with 100% gearing secured by a single premium. Using an investment return of 8% p.a., an interest rate of 5% p.a. (ignoring charges) the return on the net assets is 11% p.a. Therefore, in theory, an investment return of 8% p.a. could actually show an increase in the fund from year to year of 11% p.a.

It is not clear whether GN22 intends the growth rate on the fund to equal the investment return (net of expenses) or growth rate on the fund from year to year. Showing a fund growth rate in isolation would clearly cause problems as the risks of the strategy have not been illustrated. If GN22 intends the fund growth rate to be

equal to the investment return then the actual investment return on the underlying investments must be different. For this product, to generate a fund growth rate of 8% p.a., the actuary would have to assume an investment return of 6.5% p.a. and an interest rate of 5% p.a. or some other combination.

In any case, on projections where the underlying return is not guaranteed, the risks should be apparent to the policyholder. In his recent presidential address to the Institute of Actuaries, the President Jeremy Goford stated that:

"There is another piece of information that could help customers to understand the underlying volatility of the investment that they have chosen. If customers are shown a projection using the best estimate return, they could also be shown the return that is expected to be produced with, at least, an 85% probability….."

The Working Party believes that in respect of all products involving some risk additional information should be included such as:

- Showing a 95% confidence interval for the range of outcomes.
- The probability of losing money over the period.
- Showing the maximum drawdown (i.e. the largest peak to through) for the fund over the past ten years say. Where the fund is a new fund the drawdown could be based on benchmark indices.

These would be simple statistics for the policyholders to grasp. However the debate about the models and assumptions to use could take up an entire paper in itself and, indeed, has been left to another paper!

In addition, there should be some clarification as to whether the investment return assumptions in GN22 should be equal to the gross fund growth assumption or the net return on the underlying asset combination.

5.7 UK Disclosure Rules

At the time of writing we are not aware any UK policy which is linked to a hedge fund. This may be due to the existence of the 'look-through' rules discussed in section 6.

5.7.1 Intermediary regulation on advice

UK and Irish regulation are quite similar and both require the provision of the "reasons why" letter by the intermediary to the client. This must cover why the product has been recommended taking into account the client's personal circumstances. In the case of a recommendation to invest in a hedge fund, it is clear that the risk profile of the fund must be explained. If the intermediary is recommending a PDF the recommendation will probably be justified on the grounds that the risk of the client's total portfolio is reduced and the return enhanced.

5.7.2 Disclosure

The actuary has no formal legal role in disclosure, other than what stems from PRE considerations. However, for other funds with additional charges like broker funds, the FSA have insisted that the additional charges are disclosed explicitly. This would

also apply to performance fees. This is usually done by a fund specific addendum to the Key Features document.

5.8 Isle of Man Market Practice

The offshore companies on the IOM have for a number of years sold non-mainstream funds under unit linked wrappers to markets all around the world. There are many similarities between IOM business and cross border business from Ireland into the EU.

Given the considerable experience in the IOM and we thought it useful to include some of their experience in this paper.

IOM legislation is generally light and what follows here is the best practice that has developed following much market experience.

5.8.1 Disclosure to clients

The practice has developed, for high risk or non-standard funds sold via a life assurance wrapper, of additional fund specific disclosure. One approach taken by some offshore companies is to prepare a one page 'Risks Fact Sheet' which summarises the different risks inherent in the product.

In some markets there is also a declaration that the client must sign before the product will be sold. The declaration will say something along the lines that the client fully appreciates the risks involved and that he/she understands that the amount paid out on encashment could be considerably less than the amount originally invested and that in some circumstances it could in fact be zero.

Risks specific to that fund, which are normally found in the prospectus can be reproduced here.

The Risks Fact Sheet is deliberately limited to one page so that the client does not have to wade through pages of information making it less likely that he/she will be misled as to his expectations.

IOM experience is that this saves many problems later with clients.

5.8.2 Due Diligence

IOM companies have a well developed initial and ongoing due diligence process. Experience has shown that active due diligence not only allows the company to avoid some of the worst excesses of unregulated or lightly regulated offshore funds, but also encourages those funds to "clean up their act". The fund managers know that to get retail distribution they have to provide a quality fund.

5.8.3 Benefits of OECD Type Regulation

Companies investing in hedge funds regulated by an OECD regulator such as the Central Bank of Ireland can have greater confidence in such funds and are unlikely to have to do the same amount of due diligence as might be required with an unregulated offshore hedge fund.

For a firm to set up a hedge fund operation in Ireland, it must obtain an initial authorisation from the Central Bank of Ireland and sign up to the Bank's regulations and codes of conduct governing the day-to-day business of operating an investment firm.

Similar types of regulations apply in most OECD countries.

6 Alternative Investment - Risks and Rewards

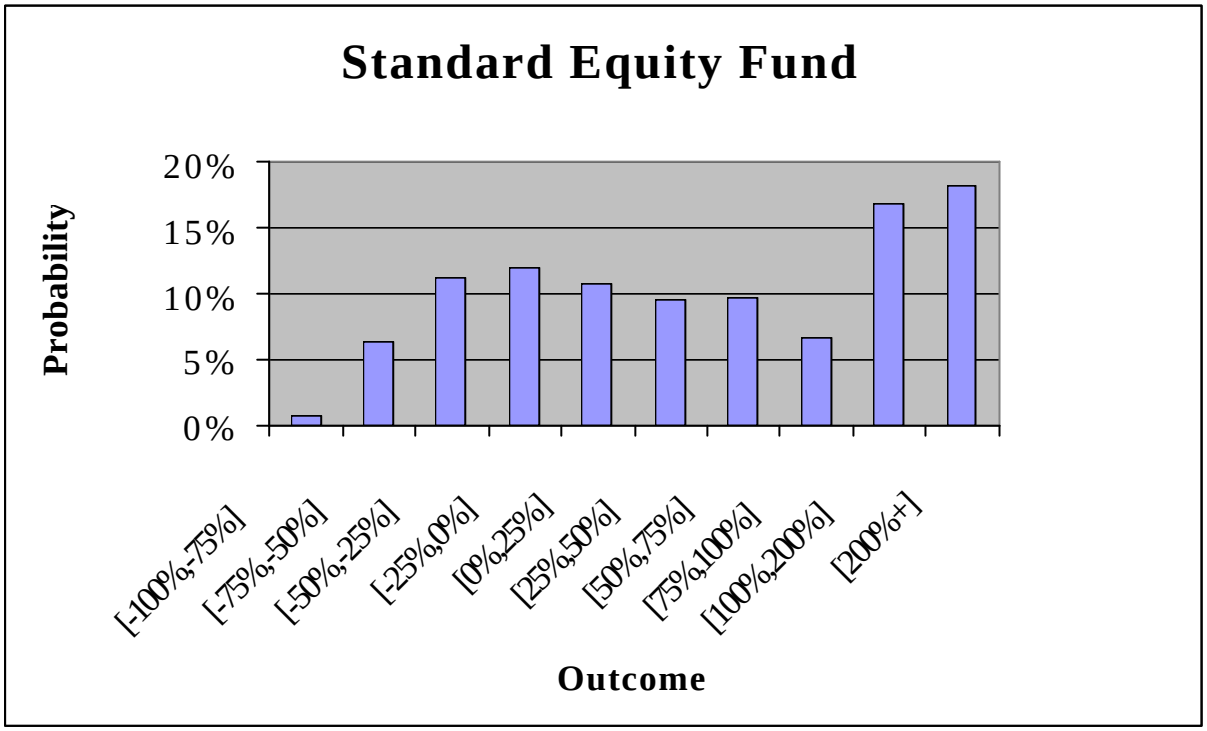
6.1 Introduction

In this section a number of typical and not so typical alternative investments have been examined to determine the real underlying risks and returns involved. What these products have in common is that the risks/returns perceived by the public may be completely different from those actually underlying the product.

The assumptions, charging structure and models used are contained in the Appendix to this document. It is worth noting that the equity model used is log normal. From empirical analysis of the stockmarket, a log normal equity model tends to understate the "kurtosis" or "jump risk" of the market. Therefore the market has a tendency to generate more extreme returns at greater frequencies than implied by the model.

6.2 Standard Equity Fund Product

By way of comparison, the statistics on a 10-year single premium standard equity fund product have been shown as follows



Statistics	No Fees	With Fees
Mean	7% p.a.	4.4% p.a.
Standard Dev	25% p.a.	22% p.a.
Skewness	0.0	-0.070
Excess Kurtosis	0.0	-0.055

The graph shows the numbers gross of fees.

Skewness characterises the degree of asymmetry of a distribution around its mean. Positive skewness indicates a distribution with an asymmetric tail extending toward more positive values. Negative skewness indicates a distribution with an asymmetric tail extending toward more negative values.

Kurtosis characterises the relative "peakedness" or flatness of a distribution compared with the normal distribution. Positive kurtosis indicates a relatively peaked distribution. Negative kurtosis indicates a relatively flat distribution. A peaked distribution implies a greater probability of extreme values than implied by the normal distribution.

For the standard equity fund, the 95% confidence interval of returns is [-90%, 425%] with no fees and [-95%, 260%] with fees. The chances that the policyholder will lose money over the period is 34% and 39% respectively.

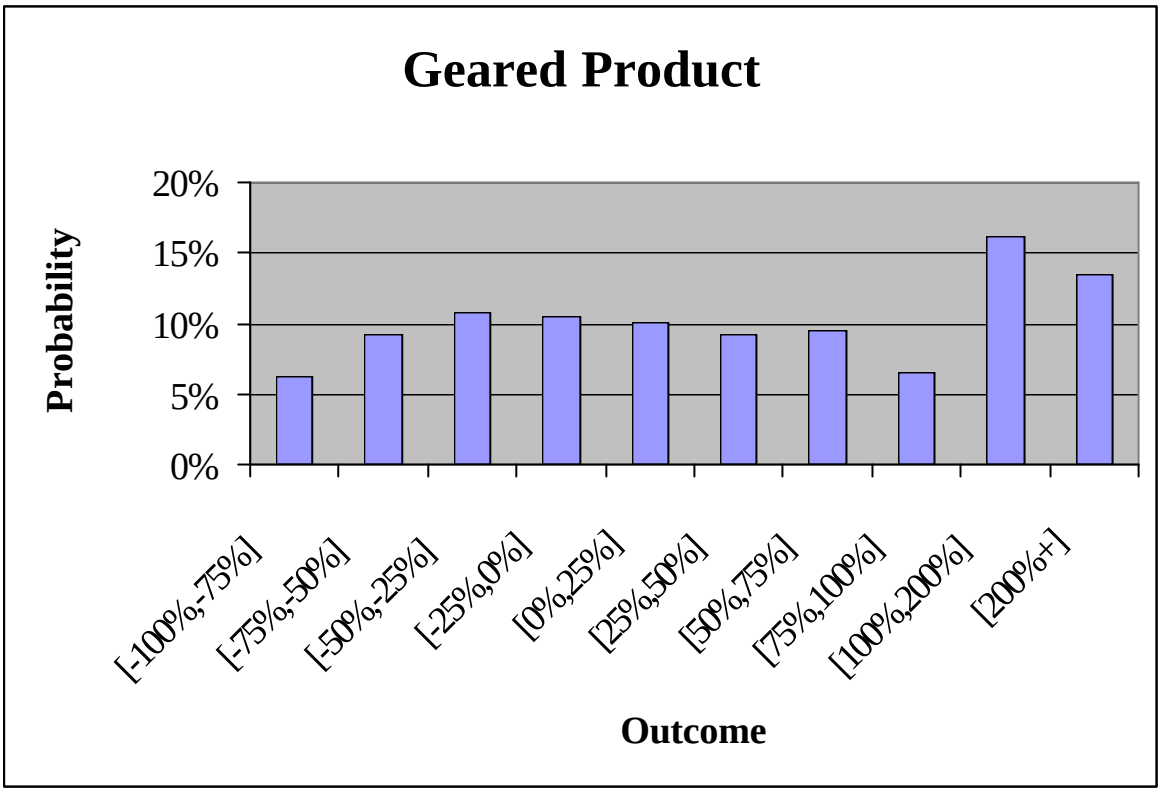
The chances of losing money over the period may surprise but it is worthwhile noting that negative returns over 10 year periods have occurred in the past. For example, the Dow Jones Industrial Average (DJIA) produced negative returns at various times in the 1920s, 1930s and 1970s. In fact, between 1900 and 1931 the DJIA lost 8% of its value.

It is worth noting that low expected returns and high volatility lead to greater chances of negative returns being experienced.

6.3 Geared Equity Product

This is a 10-year product which invests entirely in the equity markets. To add some spice to the returns, the life office gears up the fund by 25%. During the term interest payments are removed from the fund. At the end of the 10 years, the capital is repaid and the remainder is returned to the policyholder. If there is insufficient capital at the end of the term, there is no recourse to the policyholder.

The following graph shows the spread of returns (net of fees and as a percentage of initial premium).



Statistic	Value
Mean	5.3% p.a.
Standard Deviation	35% p.a.
Skewness	-3.63
Excess Kurtosis	12.59

There is a 2% chance the fund will "bomb" with nothing being returned to the policyholder. There is a 37% chance that the policyholder will lose money. This is not dissimilar to the ungeared fund. However the extent of the loss given that this occurs is much greater (as can be seen from the graph above) and the excess kurtosis figure. The performance fee is largely responsible for pushing the skewness into negative territory. The 95% confidence interval of returns is [-90%,415%].

The returns under this fund are sensitive to the gearing used, volatility of equities and interest rates on the loan.

6.4 "Bomb & Switch" Product

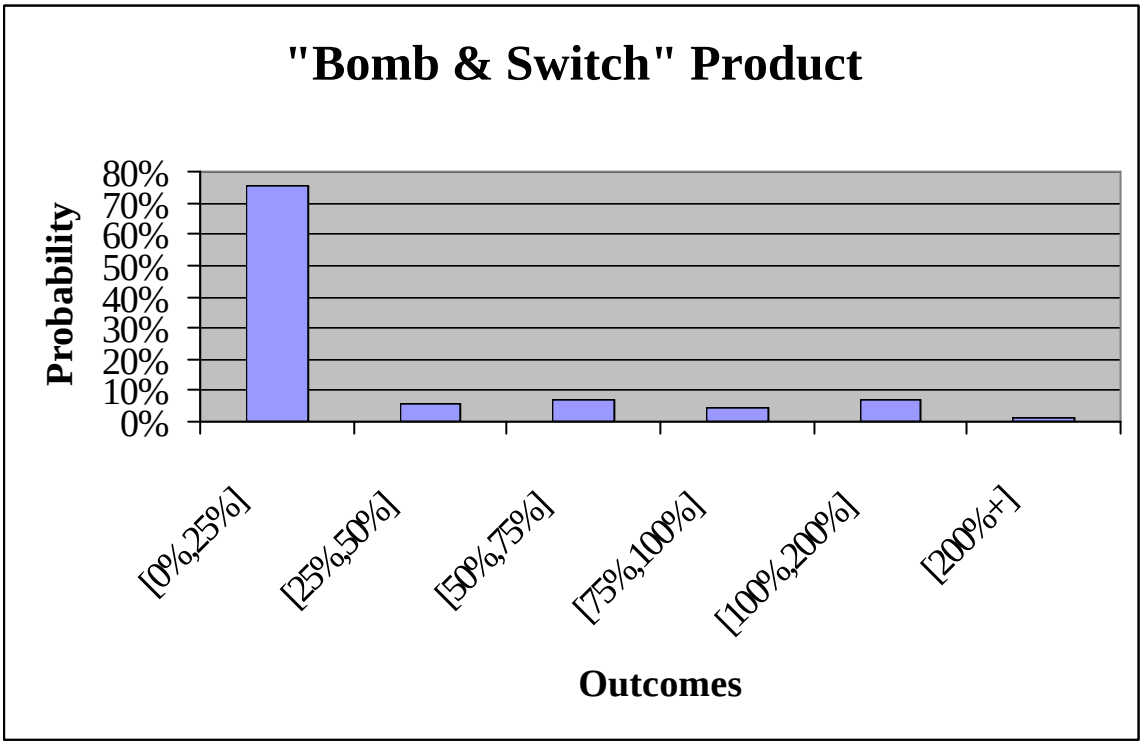
These are typically offered as "hedge funds" with a return of premium guarantee. There is a cost of guarantee charge to pay for this guarantee (on top of performance and management fees). However in the fine print is the proviso that if the fund drops significantly the assets will be switched into gilts (without any mention of a switch back!).

It is difficult to model this type of product accurately. For the purposes of this document, it is assumed that the fund invests in equities. However the switching formula has been simplified. It has been assumed that if the fund falls to the present value of the guarantee (using a stochastic discount rate) plus 20% (all to a maximum

of the initial premium), the fund is switched from equities into gilts and capital is returned. Therefore in effect the fund is providing a look back barrier option (i.e. if the performance reaches certain level the fund does not participate in any future growth and capital is returned). This type of option is cheaper than a standard European call option. The implication of this is that the return potential is considerably reduced. The term of the product is assumed to be 5 years.

With this type of product, there is a guarantee of return of premium provided by an investment bank. The purpose of this is to ensure that the premium is returned even if the fund cannot sell the underlying hedge fund quickly enough. The cost of the guarantee will be directly related to the liquidity and volatility of the underlying assets and to the safety margin above the present value of the premium at which point the switch takes place (in this case 20%).

This is demonstrated in the graph below (net of fees and as a percentage of initial premium).



Statistic	Value
Mean	4% p.a.
Standard Deviation	13% p.a.
Skewness	0.04
Excess Kurtosis	3.30

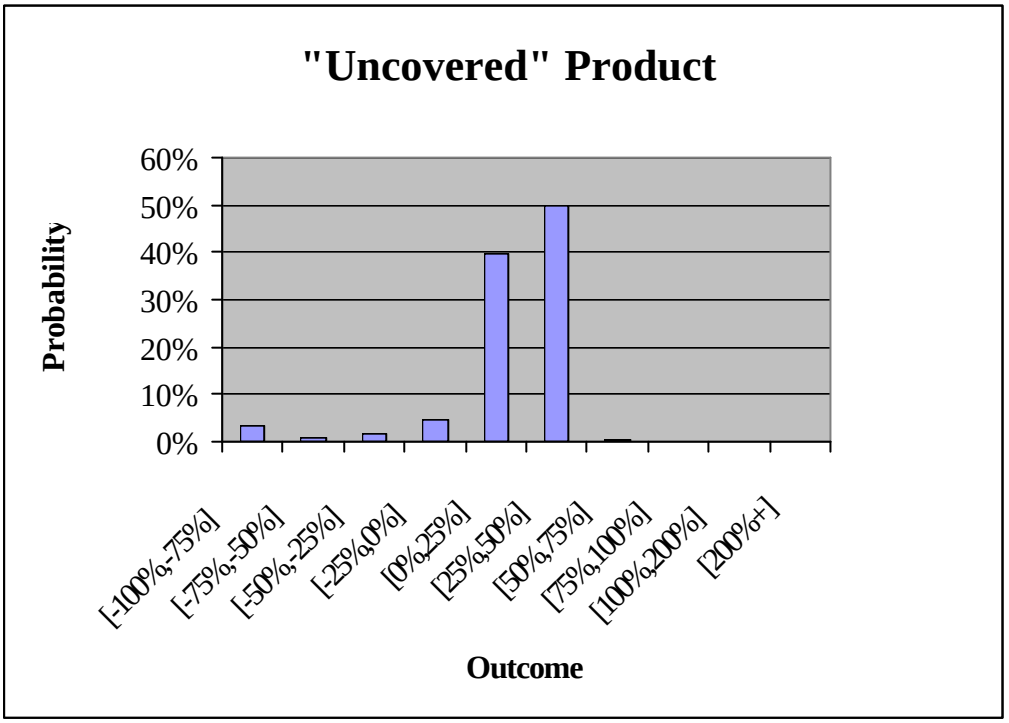
The probability of return of premium only is 72%. The 95% confidence interval of returns is [0,125%].

6.5 Uncovered Option Product

This is a variant of a "high income" type product. This product writes uncovered "out of the money" calls and puts at the beginning of each year. The strike prices are plus or minus 20% of the value of the market when written. The fund collects the premiums for these. It invests these (with the seed capital). At the end of the year, if the options are exercised, the amount that must be paid out to the purchaser is deducted from the fund. Therefore as long as the market is less volatile than assumed, the fund should win out in the "long run". However, in any case, there is always a danger that it will take a large hit in the short run and bomb out.

To add some variability, the volatility of the share price is assumed to be a random variable (with a log normal distribution). The options are sold at the volatility experienced in the previous year plus a volatility margin of 3%.

The term of this product is assumed to be 5 years. The calls and puts give it 25% participation in market movements.



There is a 15% chance that the policyholder will lose money over 5 years. The probability that this fund will "bomb out" is about 3%. In reality, the situation may not be as extreme as the counterparties would insist on the option being closed out if the fund was not in a position to pay. The fund could still take a major hit. Risks and returns could be reduced by the fund taking smaller bets.

The relevant statistics are set out below

Statistic	Value (% p.a.)
Mean	2.4% p.a.
Standard Deviation	38% p.a.
Skewness	-9.52

Excess Kurtosis	26.58

This fund is very sensitive to the volatility of the equity volatility ("vol of vol") and the participation in the market. For example, increasing the vol of vol to 50% and participation to 100% increases the "bomb out" chance to 23%. The chance of losing money over the period increases to 29%.

The excess kurtosis of this product is significant. It is likely that this product would be too risky for the retail market.

6.6 High Income Bond

The final product is the "High Income Bond". These have received adverse press coverage recently in the UK where many have been sold. It has been a less popular product in Ireland.

The general structure of high-income bonds is that they provide an income higher than the risk free rate over the term of the bond. This is achieved by selling options. If the markets perform according to a certain formula, capital is returned. If not, capital is reduced according to some formula.

What has been examined here is a relatively straightforward high-income bond.

The product features are as follows

- Term of 5 years.
- An income of 6.5% p.a. is provided yearly in arrear.
- The benefits are dependent on one market index. For each 1% fall in the index falls below its level at the date of issue, capital is reduced by 1%.

The product is priced as follows

- 5-year interest rate of 5% p.a.
- Sale of "at the money" put option generating 14% of the premium[18].
- Initial expenses of 7%.

The relevant statistics are set out below

Statistic	**Value**
Mean	-3.0% p.a.
Standard Deviation	12.0% p.a.
Skewness	-0.04
Excess Kurtosis	3.5

There is a 40% chance that capital will not be returned at the end of 5 years. If return of capital is not achieved, the average return is –8.5% per annum.

This excludes the income received over the period of 32.5% of the premium over 5 years.

[18] Risk free rate 5%, div yield 2%, vol 25%

It is worth noting that this is based on one index. The following will improve income rates but increase the chances of a maturity penalty.

- Linking to the lower of two or more indices.
- Linking to a basket of stocks (especially where a gain on one stock does not offset a loss on another) and if there is a high correlation between them.
- Averaging

7 Unit Pricing for Performance Fees

7.1 Background

Looking at fees is often the easiest part of an examination of a hedge fund. It is an important part of the due diligence process in taking on a hedge fund but it must viewed in the context of after-fees returns generated in the past. However when it comes to unit pricing, the nature of the fees can cause some unanticipated problems.

7.2 Nature of charges

Charges fall into two main categories:

1. Annual management charges (like in a unit-linked fund) and

2. Performance fees.

The first of these is easy enough to understand. The second needs more explanation. The manager is paid a performance fee for generating performance above a predetermined level. Usually, the manager receives a percentage of the gain above the higher of the initial fund asset value or the previous highest asset value (known as the "high water mark" or HWM). Often there is a hurdle rate. This is a minimum growth rate over the previous HWM that the manager must generate before the performance fee is payable. Without a hurdle rate the manager can effectively get performance fees for generating cash returns – cash returns can be generated a lot more cheaply than this. The hurdle rate might be 3-month LIBOR or the 3-month treasury bill rate.

Managers should not be allowed to reset the “previous high” for the purpose of calculating performance fees on an annual basis.

It is worth looking at the managers volatility risk management. Increasing the volatility leads to a greater chance that the performance fee will be payable. Alternatively, if the fund "bombs", the manager may lose interest in the fund or close it down as the chances of receiving a performance fee in the future would be small.

Performance fees can vary from 10% to 50% of the growth above the HWM (plus hurdle rate) depending on the type of hedge fund. A performance fee of 20% is quite common.

7.3 Unit-pricing when performance fees apply

7.3.1 Implications

There are a number of immediate observations which affect unit pricing:

- The fee is not being charged when the price declines.

- The performance fee is not rebated when performance is negative or below the hurdle rates.

- For new money, the hedge fund manager is usually entitled to take a performance fee on any growth from the date the monies are invested. Therefore new money may have a different HWM than previous investments.

7.3.2 Equity

Unless the fund's investors all join and exit at the same time there are equity considerations introduced by the features described above. Investors who enter and leave at various stages of the fund growth relative to the HWM may incur differing performance fees. Therefore the life office needs to find a way of passing on the correct amount of performance fee to each generation of units.

The following examples illustrate the types of inequity that can arise:

7.3.2.1 Example 1

- Consider a hedge fund with a 20% performance fee.
- This is deducted on a quarterly basis.

At quarter zero:

- The value of internal fund units is €1 and the value of the underlying hedge fund assets is €1.
- Investor A invests €1 and receives 1 unit.

At quarter one:

- The underlying hedge fund grows to €1.10. A performance fee of €0.02 is taken.
- The hedge fund, the units in the internal fund and A's unit holding of 1 unit are all worth €1.08.

At quarter two:

- The underlying hedge fund assets fall to €0.90. No performance fee is due.
- Investor B invests €1 in the internal fund and receives 1.11 units.
- This is new money and the hedge fund manager is entitled to take a performance fee on any growth on Investor B's money.

At quarter three:

- Assume the hedge fund assets grow by 20%.
- No performance fee is due on Investor A's money as it is only reaching the HWM.
- However for Investor B's underlying funds must have 20% of the growth deducted. Therefore the value of B's units should be €1.16.

Therefore the total fund is worth €2.28. The total number of units is 2.11. Traditional pricing methodology would lead to the value of each unit being €1.08. In reality, A's 1 unit is worth €1.10. B's 1.11 units are worth €1.16 or €1.044 per unit.

Therefore standard unit pricing methodology will lead to inequity as the accrual of the performance fee is allocated between both investors rather than only to Investor B.

7.3.2.2 Example 2

Investor A invests €1 at the beginning of a quarter and is allocated 1 unit. Asset values rise by 20% by the middle of the quarter. The price after the deduction of the performance fee is 1.16.

Investor B invests €1.16 in the fund and buys 1 unit.

Asset values then fall by 16.67% (i.e. 1/1.2) so that the gross value of assets at the end of the quarter is (1.2+1.16)/1.2 = €1.967.

The unit price at the end of the quarter is €1.967/2 = 0.9833.

Investor A's unit price should be 1 as he has achieved no growth in the quarter. Investor B's unit price should be 1.16/1.2 = 0.967.

The problem here is that the rebate of the accrued performance fee has been allocated between Investor A and Investor B whereas it should have been allocated to Investor A only.

7.3.3 Potential Solution

How does the life office ensure that the price of the units in the fund is equitable to both investors?

The simplest method, but not necessarily the most practical, is for the life office to create a new generation of units each time a new investment is made. This is consistent with the practice of many hedge fund managers who issue a new tranche of shares when new investors are allowed in. This tranche acts as a "mini fund" with its own HWM.

7.4 Forward Pricing

Investing in external unitised vehicles such as hedge funds or other external investment funds raises another issue. Carrying out units-based type transactions which are subject to normal forward pricing constraints is further complicated if the underlying investments are also subject to forward pricing constraints.

This is the case where the life company is investing an internal linked fund into a SICAV or other type of external investment fund. The complication arises because the external investment fund provider will generally require a cash-based (as distinct from units-based) instruction prior to dealing for the fund.

To ensure equity among policyholders in respect of units-based transactions, e.g. surrenders, and to ensure the correct investment/disinvestment in the underlying funds at each pricing date the life company must create a rolling box position which will be liquidated at the next pricing date.

Strict equity would require that the shareholders take the profit/loss on the box position. Where this profit/loss is being passed to the fund the Appointed Actuary will have to consider the materiality of the impact on the fund.

8 Pension Fund Investment in Hedge Funds

8.1 Background

It is widely expected that the coming years will bring an extended period of moderate growth and low inflation in major worldwide economies. This may be expected to fuel greater interest from pension funds in non-traditional investments such as hedge funds, as pension fund trustees, like other investors, broaden their investment universe in an attempt to gain superior returns.

In the US, corporate investors and endowment funds remain the most significant institutional contributors to hedge funds. However, US pension funds are currently regarded as being amongst the quickest growing segments of the hedge fund market. By contrast, in Asia and Europe this market segment is yet to grow substantially and remains inconsequential to the overall market size. The primary reason for the failure of hedge funds to make a significant impact in these markets has been the fact that many are unregulated and unwilling to complete the extensive due diligence documentation required by many pension fund trustees.

The hedge fund industry is still in its infancy in the UK and Ireland. Derivatives markets, if accessed at all by pension fund investment managers here, are accessed primarily with the aim of hedging or managing risks rather than seeking additional returns. Funds do not generally hold significant derivative positions unless they are linked to an investment in one of the standard asset classes, for example equities or fixed interest, and are not leveraged.

8.2 A Compelling Case

Diversification using certain types of hedge funds can give higher expected returns and lower levels of risk. This means that pension funds get better returns and the value of the portfolio of pension fund assets fluctuates less. This is good for defined benefit pension schemes and their sponsoring employer in the context of the proposed FRS 17 accounting standard and its implications for balance sheet and P&L volatility.

The paper "Hedge Funds"[8] shows pension trustees and their advisors the techniques for assessing the extent of risk reduction and return enhancement in pension schemes using certain types of hedge funds.

8.3 Implications of Investing in Hedge Funds for Irish / UK Pension Funds

Before the Trustees of an Irish pension fund sanction investment in hedge funds, they would need to ensure compliance with:

- The provisions of the fund's trust deed in relation to investment powers
- The provisions of general trust law
- The provisions of specific pension fund legislation

Furthermore, trustees must also consider the nature of the vehicle to ensure that it does not put at risk the plan's tax exempt status.

While the present legal framework does appear to allow a pension fund to invest in certain hedge funds, there are obvious legal obstacles to some highly leveraged and speculative investment vehicles. On the other hand Trustees are fiduciaries and the members they serve might reasonably expect that their trustees take action to enhance portfolio returns while lowering risk. Trustees may need to take investment advice from advisors who specialise in this area.

8.4 Characteristics of Suitable Pension Funds

Hedge fund vehicles, clearly, may not be suitable for all pension funds. While analysis suggests the potential to decrease volatility by incorporating hedge funds in a diversified portfolio on a selective basis, the Trustees must be prepared to commit themselves to understanding and monitoring the progress of their investments, if they are to invest in a hedge fund vehicle.

In particular, the volatile nature of the returns on some hedge funds, coupled with the long-term, illiquid nature of the investment makes hedge funds inappropriate for:

- poorly funded schemes; or
- those with short-term investment horizons.

In general, pension funds should avoid unregulated hedge funds, with opaque investment strategies, investing in illiquid assets and which have long lockup periods.

Investment in hedge funds should therefore be regarded as a strategic decision - hedge funds are, and should be treated as, a separate asset class.

However, there may be demand for such products from pension funds willing to adopt a longer investment horizon in return for higher absolute returns and who do not have a foreseeable need to draw upon assets invested in these alternative investments. It is important to understand that some hedge funds invest in highly liquid assets and can offer daily liquidity. These are the kinds of hedge funds that might be suitable for pension schemes.

It is reasonable to presume that pension funds may commit assets to these types of investment vehicles in proportions that are necessary to lower the risk of the pension scheme and increase its returns but this proportion is unlikely to exceed 10%-20% (see section 3.9.5).

8.5 Managed Products – Multi-Manager Funds

For pension funds seeking to invest in hedge funds, a multi-manager (fund of funds) vehicle may be the most appropriate method through which to obtain exposure to these investments. A well-diversified fund of funds approach has the potential to provide investors with a method of overcoming many of the concerns commonly raised in respect of risk management.

Such an approach involves engaging a fund of funds manager to:

- expend time and expertise identifying investment strategies that will yield solid investment results;
- select the individual funds to implement these strategies.

The investor may also benefit from the substantial due diligence undertaken by the fund of funds manager in analysing the strategies and underlying managers.

Adopting such a strategy may enable consistent results to be achieved with reduced volatility as well as a reduction in the probability of substantial capital loss. These funds also offer the opportunity to access certain global markets that would not usually be open to many investors.

There are, however, disadvantages with adopting a fund of funds approach:

- Such a structure imposes an additional layer of costs on an investment (typically in the region of 1% p.a. over the fees charged by the underlying managers).
- The investor must be comfortable that the fund of funds manager has the ability to select the most appropriate vehicles for investment.
- A fund of funds structure may be more illiquid than other investment structures if general market illiquidity is compounded by carrying an investment in several vehicles.
- A fund of funds structure has the potential to be less transparent than an account with an individual manager if the investor is not informed about the underlying funds.

In addition, it often difficult to find funds of funds which have their good and bad outcomes at different times to the existing portfolios of pension schemes and can therefore deliver the risk reduction and return enhancement features of certain types of pension schemes. Apart from this problem there are also problems of finding funds of funds that are regulated in an OECD country and offer reasonable levels of liquidity.

For some pension funds, a fund of funds vehicle may not therefore provide the most appropriate option.

8.6 Constructing a new portfolio

A portfolio of hedge funds with the desirable attributes, i.e. PDF's which also offer reasonable liquidity and are OECD regulated, can be built up by a pension scheme and specialist hedge fund advisors.

8.7 Conclusion

Whether Irish pension funds adopt these types of investments in the future will depend on numerous factors. As members realise the risk reduction and return enhancing features that certain types of hedge fund offer, trustees may come under more pressure to implement such strategies. Given the recent poor performance of global equity markets (and the high correlation between these markets) this may happen sooner rather than later.

9 Appendix 1 - Summary of FSA Derivatives Regulations and Relevance to Ireland

9.1 Background

On 22nd September 1998 the DETE sent a letter to all life companies they regulated attaching a copy of a 'Dear Director' letter from HM Treasury. The letter from the Treasury does not directly impact on Irish companies, but the point was made that Irish companies selling into the UK should take its contents into account.

The main thrust of the letter was that multi-index bonds had become popular in the UK and in particular bonds where the payout was linked to the worst performing of two or more indices. In the view of the Treasury the derivatives backing these products were inadmissible.

It would appear that the letter was intended more to stamp out these multi-index bonds than to ensure compliance with derivatives regulations.

9.2 Overview of UK derivatives regulation

UK regulation of the use of derivatives by insurance companies has been consolidated into the FSA Interim Prudential sourcebook: Insurers - IPRU (INS). Previously regulation was spread across insurance regulations, 'Dear Director' letters and DTI Guidance notes.

Broadly it appears that the UK derivatives regulation is very similar to our own. The admissibility of a derivative instrument depends on passing one of the following two tests:

- reduction of investment risks
- efficient portfolio management

Other admissibility criteria apply similar to the Irish regulations which briefly are that a derivative:

- is listed on a regulated market or transacted with an approved Counterparty
- is covered (i.e. the company has sufficient assets of the right type earmarked to meet any obligations it has under the instrument)
- is capable of being readily closed out
- is based on assets that are themselves admissible
- have a prescribed pricing basis

In addition to the above the FSA have issued guidance on the interpretation of the regulations. IPRU (INS) Guidance Note 4.2 in particular deals with the interpretation of the derivative guidelines.

9.3 IPRU (INS) Guidance Note 4.2 - Use of derivative contracts in insurance funds

This guidance note is based on the previously issued DTI Guidance note 1995/3 and gives very detailed guidance on how the FSA would interpret the regulations in

practice. It contains many examples to assist understanding. What follows is a brief summary of the core points raised in the note.

9.4 Outline method to determine derivative admissibility

Probably the most significant section of the note deals with the method that the FSA believes companies should use to determine if a derivative strategy is admissible (or permissible in the context of linked funds). The steps are as follows:

9.4.1 Identify a broadly comparable non-derivative investment strategy

This involves assessing what equity or bond investments the company could make that would be similar overall to the proposed derivative strategy.

9.4.2 Compare the risks inherent in the two strategies.

The comparison involves identifying where the derivative strategy could under-perform the non-derivative strategy and deciding whether the under-performance is significant or reasonably unforeseeable. Performance in this context means both risk and return. Risk must include both investment risk and *counterparty* risk.

9.4.3 Identify reasons why the comparison in 9.4.2 above is unfair and whether the unfairness results in the under-performance.

The idea here is that the derivative strategy may under-perform the benchmark non-derivative strategy in terms of expected return over five years, say. However, this could be because the derivative strategy offered a capital guarantee not provided by the benchmark strategy. In this case the guarantee is the reason for the under-performance and it is appropriate to make an allowance for this in the comparison.

The idea is that in order to determine if the strategy reduces risk or is efficient you must compare it with something. The FSA concede in the note that much of the exercise is subjective (particularly what constitutes significant under-performance), but nevertheless require it be followed. To help they give some examples of what they might consider *significant under-performance*.

An important corollary of the above is that if a comparable benchmark strategy cannot be constructed then the derivative strategy is inadmissible. This would immediately rule out the so-called 'precipice bonds' where the payout is linked to the worst performing of two or more indices. This is explicitly highlighted in the 'Dear Director' letter referred to earlier (now incorporated into IPRU (INS) Dear Director letter - DD1).

9.5 Continuing test

The FSA view is that the test is a continuing test and it is not sufficient for the derivative to be admissible when first entered into - it must remain so, which means that the above analysis must always be valid for a derivative.

9.6 Interpretation of reduction of investment risk

The FSA make the point that when considering investment risks that this must include consideration of policyholder investment risk. Therefore a derivative that provided an exact match to a company liability could be considered to reduce the company's risk. However, the FSA guidance argues that it could still be inadmissible if it adversely affected the *policyholder's* risk.

9.7 In connection with test

The FSA view is that a free-standing derivative is inadmissible as on its own it cannot reduce risk or be efficient portfolio management. Therefore derivatives must be used 'in connection with' other assets. It is conceded that several derivatives together could be considered to be in connection with each other and thus together pass the in connection with test. There are similar requirements in Irish regulations.

The main goal of this requirement is to restrict derivative use for speculative purposes.

9.8 Gearing (Strategies which significantly increase risk)

Following on from above the FSA guidance has a theme running through it of preventing speculation and controlling gearing. Their view is that gearing significantly increases risk. As a result, they are specifically trying to ensure derivatives are not used to gear the return on a fund or portfolio.

9.9 Quasi derivatives

The guidance singles out what it views as 'quasi-derivative' for particular attention. The main thrust being that if it looks like a derivative then it is a derivative, thereby closing the door on any strategy of using alternative wrapper types to avoid derivatives regulation. This is not only guidance but is specifically covered in UK regulations (IPRU (INS) 4.13 - Contracts and Assets having the effect of derivative contracts). This has particular relevance for investments where a derivative is embedded into a Medium Term Note (MTN) by the issuer.

9.9.1 Structured products

In considering an MTN with embedded derivative the requirement is to notionally split the note into its component parts and then apply admissibility rules to each part.

9.9.2 Futures and options funds!!

A somewhat surprising inclusion as a quasi-derivative is 'futures and options' funds. What this means is that you would have to attempt to de-compose the futures and options fund and try to find a comparable non-derivative strategy, then (if you could find a comparable non-derivative strategy) compare the risks of both.

However, a discussion in the guidance of how this might be achieved is notable by its absence.

9.9.3 Others quasi-derivatives

- Some stock lending and stock repurchase arrangements can have the effect of derivatives and must be considered as such.
- Investment in bonds convertible to equity
- Entering an agreement to underwrite or sub-underwrite a share issue

The treatment of quasi-derivatives would appear to be an area where UK and Irish regulations diverge significantly.

9.10 IPRU (INS) Guidance Note 4.4 - Linked contracts

In addition to the above guidance this some note covers *permissibility* of derivatives in internal linked funds of UK Insurers, however it doesn't add anything new over the previous guidance for admissibility of derivatives.

9.11 Practical Examples

Some of the following examples have been drawn directly from the FSA Guidance note.

9.11.1 Extra Income bond backed by an MTN (a)

This bond pays an additional 5% p.a. income over current market rates, but if the FTSE falls by more than 5% over the 5-year term then the capital return is reduced to 50% of the capital invested. The product is backed by an MTN issued by an investment bank.

This will be treated as a fixed interest bond plus derivative. The derivative will then be subject to the test of benchmarking against a comparable non-derivative strategy. This would probably be investment in the FTSE index. This would then fail the test as it significantly increases *policyholder* risk compared to direct FTSE investment, even though the Company's investment risk is eliminated by matching.

9.11.2 Extra Income bond backed by an MTN (b)

This bond pays an additional 5% p.a. income over current market rates, but if either the FTSE or the S&P 500 fall over the period then the capital return is reduced by the drop in the index which fell the most. As before the product is backed by an MTN issued by an investment bank.

This will be treated as a fixed interest bond plus derivative. Therefore derivative regulation applies. However, it doesn't appear to be possible to construct a comparable non-derivative strategy so it is inadmissible.

9.11.3 Futures and options fund

It would appear that an internal futures and options fund would not be possible unless the derivatives taken together had the effect of non-derivatives. In practice this probably defeats the purpose of these types of funds and thus rules them out.

More surprisingly it would appear that a fund which bought units in a collective investment that was itself a futures and options fund would most likely also not be allowed.

9.11.4 Tracker bond linked to FTSE

The product provides for a minimum return of capital or capital plus 50% of the return in the FTSE over a 5-year period backed by an MTN.

Again this must be treated as part derivative. This one would likely fail as the under-performance of the derivative strategy vis-à-vis investment directly in the FTSE is significant.

9.12 Conclusion

In conclusion the UK regulations appear to go much further than the Irish regulations as far as derivatives are concerned. The guidance accompanying the regulations is very detailed and quite restrictive in places. In addition the FSA have chosen to use the regulations to restrict some products they viewed as undesirable, rather than use more direct consumer protection arguments.

10 Appendix 2 - Long Term Capital Management

10.1 Beginnings and Strategy

10.1.1.1 "Prophesy as much as you like but always hedge" Oliver Wendell Holmes, 1861

LTCM was founded in 1994 by John Meriweather after he left Solomon Bros after the U.S. Treasury Bond scandal involving him and a number of others.

The core strategy of LTCM was to use "relative value" or "convergence arbitrage" trades to generate profits for its investors. These strategies took advantage of small differences in closely related securities which would be expected to converge in the long run. For example, new issues in US Treasury Bonds ("on the run") have a slightly lower gross redemption yield than older issues as the new issues are more liquid and less tightly held. Therefore "on the run" issues and "off the run" issues may have the same coupon and maturity date but have a different yield. Shorting the on the run issue and buying the off the run issue would lead to a profit at maturity. In the interim there would be some liquidity risk.

However LTCM expanded the core strategy to include more risky convergence trades such as convergence trades between mortgage backed securities and US Treasury Bonds and arbitrage between equities and convertible bonds. This added credit risk and basis risk to the liquidity risk.

Over time it also got involved in non-arbitrage strategies such as taking short positions in equity options, bets on takeover stocks, emerging market debt.

The problem with a lot of arbitrage bets is that they generate tiny profits. Therefore LTCM geared up by a factor of 25. This was to target volatility to be similar to that of US equities.

The initial capital raised by LTCM (including that placed by its founders) was $1 billion. LTCM charged investors 2% per annum plus 25% of any profits that arose. These charges were quite large relative to other hedge funds (1% + 20% was more common).

10.2 1994 to 1997 – The Wonder Years

"They [LTCM] are in effect the best finance faculty in the world" Institutional Investor

Over this period, the fund was very successful. Capital grew from $1 billion in 1994 to $7 billion in 1997. Assets increased to $125 billion on an equity base of $5 billion on average. The "off balance" sheet position was $1.25 trillion. However this number overstates the net interest of LTCM as many positions offset each other.

Over the period $1.9 billion was invested by the partners who, in turn, collected fees of $1.5 billion.

LTCM financed its leverage using "repos". Under repo agreements, the fund sold some of its assets in exchange for cash. It agreed to repurchase them at a fixed price at a fixed point in the future. Normally brokers require collateral that is worth slightly more than the cash loaned. This is called the "haircut" and is designed to provide some protection against decreases in the collateral value. LTCM was viewed as being "safe" by lenders and was able to obtain next to zero haircuts. In addition, institutions taken in by the "magic" of LTCM and were afraid that they would not get business from LTCM if they did not provide good terms.

LTCM also secured a $900m credit line from Chase Manhattan and other banks. However they were loath to use that as repo agreements would provide much cheaper financing (close to the risk free rates).

To avoid liquidity pressure on the asset side, LTCM insisted on a 3-year "lock up" period for investors. This would avoid poor sales in the event of poor performance.

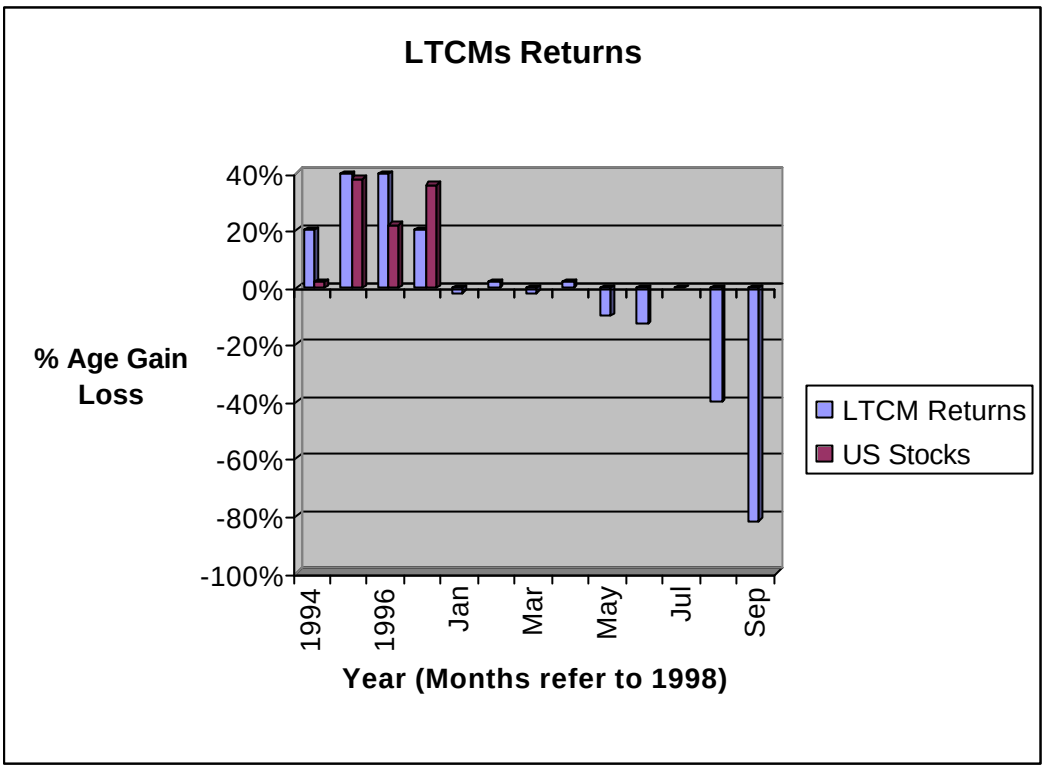
In 1995 and 1996 the fund produced after fee returns greater than 40%. The fund had placed large bets on the convergence of European interest rates prior to monetary union and these produced large profits.

Credit spreads narrowed considerably between 1995 and 1996 producing large profits for the fund. However they were at historical lows and had not much further to go. In 1997 the fund produced a return of 17%. This was below the return achieved by US stocks. The leverage of the fund had reduced to 18x.

To return the leverage to 25x, the fund returned $2.7 billion of capital to investors in 1997. Assets were kept at $130 billion. This increased the leverage to 28x, amplifying returns to remaining investors. Some investors who were forced out of the fund were upset that the partners did not reduce their own equity.

10.3 1998 - Troubles

"Markets can remain irrational longer than you can remain solvent" J. M. Keynes



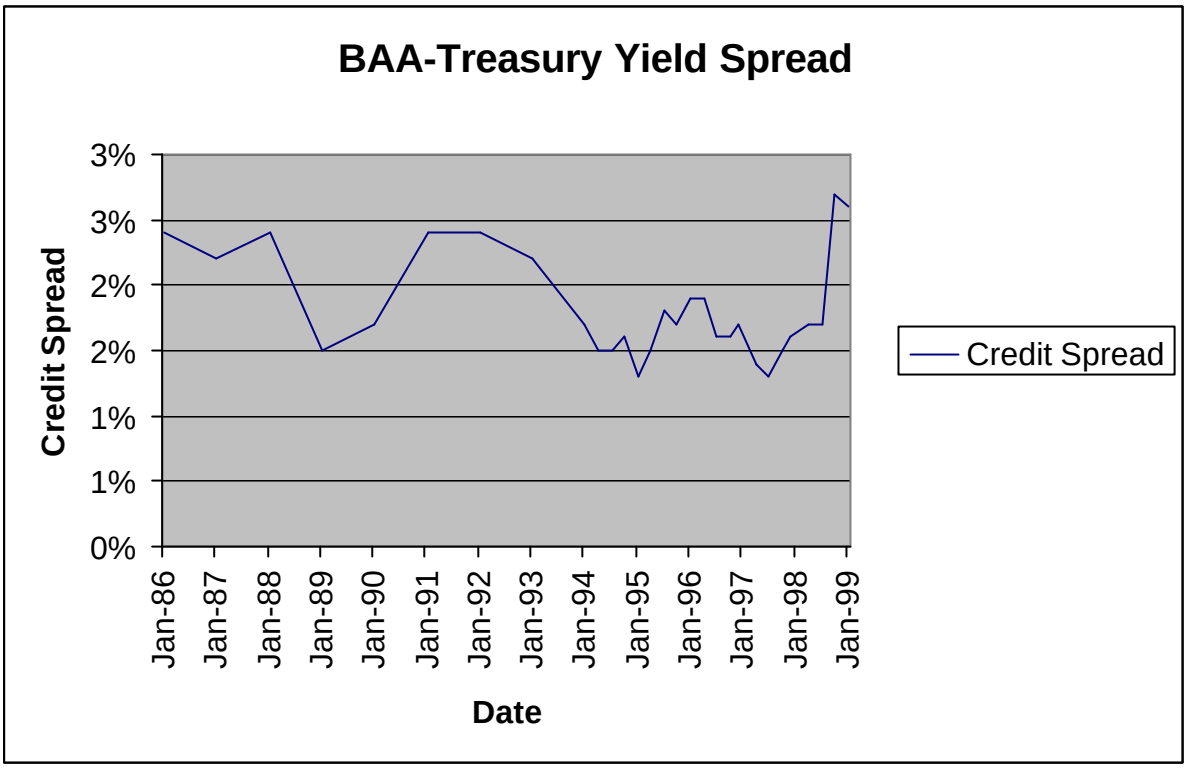
In May and June of 1998, the mortgage-backed securities experienced a downturn leading to a 16% loss in LTCM's capital.

On 17th August, Russia "restructured" its debt. Credit spreads, risk premia and liquidity spreads jumped with stock markets falling. LTCM lost $550m on 21st August alone. By the end of August the fund had lost 52% of its 31st December 1997 value. LTCM badly needed new capital and Meriweather wrote to investors requesting it. There were no takers.

With assets still at $126 billion, the leverage of the fund had increased to 55x. On 21st September the fund lost another $550m. Collateral requirements from brokers increased which further depleted the funds resources. Counterparties feared that if LTCM could not meet further margin calls, they would have to liquidate their collateral at a loss to themselves (as there was no haircut). Indeed there was some debate as to whether they could liquidate collateral at all as the fund was registered in the Cayman Islands where the laws may not have allowed it.

After 21st September the New York Federal Reserve acted. On the 23rd September 14 banks invested $3.6 billion to bail out LTCM taking a 90% stake in the fund. This was just in time. Excluding the refinancing, the funds equity had dropped to $400m by the end of September. Of the $4.4 billion lost, $3 billion came from interest rate swaps and equity volatility.

Under the control of the new consortium, LTCM gained 13% by December 1998. By the end of 1999, all the money was repaid to the investors and Meriweather started a new hedge fund!



10.4 How did it all go wrong?

"In a strict sense, there wasn't any risk – if the world had behaved as it did in the past" Merton Miller, Economist & Nobel Laureate

Stating the obvious, LTCM had severely underestimated it risk. With hindsight, the funds management had stated that the events were "beyond the fund's capacity to anticipate". This was a once in a 100-year event. However this was not true. As will be demonstrated in the following paragraphs, the fund was exposed to many different risks of which it was not aware. In addition, the shape of the risk was different from that expected.

In May 1998, LTCM stated that its target volatility was $45m per day on capital of $4.7 billion. It can be proven that this was broadly the same as the volatility on the S&P 500 from 1978 to 1997. However this target volatility involved some heroic assumptions:

- It assumed that volatility would remain constant whereas it can easily double in turbulent times.

- Looking at volatility is useful where there is a symmetrical distribution of profits and losses. However this is incorrect for credit risk where small ongoing profits can easily be offset by huge losses on default.

- Recent time series analyses shows that most financial series have fatter tails than normal distribution. A student t distribution may be more appropriate.

In fact even before 1998, LTCM had been experiencing volatility of $100m per day. Extrapolating this to monthly volatility gives $480m. Assuming an annual 40% expected return, the expected monthly profit should have been $114m. The worst monthly loss at a 99% level should have been c. $600m. In May and June, the portfolio lost $310m and $450m. So, there most have been some evidence that the models were starting to slip.

LTCM tried to reduce its risk profile by selling off less profitable liquid positions. This was a mistake as it left the fund exposed to margins calls on the illiquid positions. After these sales, LTCM estimated that volatility should have reduced to $35m per day. In fact, it remained at $100m. Therefore either the market volatility had increased or there was a problem with the model. In fact, it was a combination of both.

According to Riskmetrics, credit spread volatility doubled during August 1998. Between 1995 and 1997 credit spread volatility remained at historic lows.

During the month of August the fund lost $1.71 billion. Using a normal distribution and a daily volatility of $45m, this was an 8.3 standard deviation event. It would be expected to happen once every 800 trillion years. However using a student t distribution with 4 degrees of freedom and a volatility of $100m per day, this became a 3.7 standard deviation event. It occurred once every 8 years. This is more reasonable.

LTCM relied on recent history of credit spreads and volatility. These were at historic lows.

LTCM had stress tested the model and estimated that it would lose $2.3 billion in a worst case scenario. In fact $4.4 billion was lost in 1998. It failed to appreciate that given its size it was very difficult to manoeuvre once it had lost $2.3 billion.

LTCM put part of its difficulties down to “front running” by other parties who were aware of its exposures.

Front running is the name given to the activity of trying to increase the losses on the position of trader in the hope that the trader will close it out and force a rebound in prices. For example, if company A has a large long position in a future, company B could sell the underlying asset. This would increase company as margin calls (and losses) to the extent that it may close out the position. To close out the position requires the purchase of the underlying stock (or an opposite position), this would cause a rebound in the price of the stock and produce a profit to company B.

Front running has (naturally) been denied by any of LTCM’s counterparties!

10.5 LTCM's Portfolio and Leverage

"This small group…attempted to marry the best of finance theory with the best of finance practice" Robert Merton

To examine the risks undertaken by LTCM a simple model of its portfolio has been put together. This simple model contains two risky assets, a 10-year BAA rated corporate bond and a 10-year US Treasury Bond.

Looking at the correlation matrix for these two bonds over the history of yield changes from 1993 to 1997, these bonds showed similar volatility and a high correlation of 0.9654. As at December 1997, the gap in gross redemption yield between the two was 1.53% ("the credit spread"). For each $1 in fund equity, the positions taken in the two stocks used for the model are

- Buy $19.66 in the BAA corporate bond
- Short $15.60 in the US Treasury bond

This gave borrowings of $3.06 at the risk free rate giving leverage of 20x. The expected return of the portfolio is 3.1% per month or 37% per annum and the monthly volatility was expected to be 8.1%. Both leverage and return were in line with LTCM's stated desires.

Using a monthly volatility of 8.1%, the porfolio would be wiped out if a 12.3 standard deviation event took place ("the Portfolio Safety Level"). However the monthly volatility of 8.1% hinges on the correlation remaining at the very high level of 0.9654. There are two problems with this

- The correlation coefficient is bounded by 1. Therefore there is much more room to fall than increase.

- There could have been some estimation error. Given the level of the correlation, this is likely to have been overestimate rather than an underestimate.

Using different correlations leads to somewhat lower portfolio safety levels

Correlation	Volatility	Portfolio Safety
0.965	8.1%	12.31
0.900	13.65%	7.33
0.800	19.24%	5.20

The actual correlation during 1998 was 0.8. It had fallen to 0.75 in 1992 which was not in the distant past!

Using a student t distribution with 4 degrees of freedom and a correlation of 0.97, a 12.31 standard deviation event would be expected 1 year out of 900 years. Reducing the correlation to 0.8 reduces the probability of ruin to be 1 month out of 306 or once in 26 years!

There was a further problem. The same people who were trading were also carrying out the VAR calculations. This left the fund open to traders "gaming" the system. It may have led to allocations being biased in favour of strategies where the model used does not quantify the risk adequately. Essentially the lunatics were running the asylum.

10.6 Conclusion

"The result was a downward spiral which fed upon itself driving market positions to unanticipated extremes well beyond the levels incorporated in risk management and stress loss discipline" LTCM Confidential Memorandum, Jan 1999

LTCM failed due to its

- Inability to measure and control risk
- Lack of diversification across risk
- Exposure to one large risk factor – namely correlations.

It was also exposed to risks which it did not know such as

- Catastrophe risk. Credit spreads lead to small continuous profits but with large losses.
- Liquidity risk. LTCM's models assumed that its trades would not influence the market and that it could buy and sell assets with ease.
- Traders "gaming" the system.

It is clear that LTCMs failure did not result from complex theories that did not work or mathematical models that went wrong. It was the information that went into these models and the conceptual misunderstandings about the nature of the risk that led to its downfall. It leads to a sobering lesson that when the risks are misunderstood, believing in models and ensuring that the mathematics is correct can be like moving deck chairs on the Titanic.

One final thought. LTCM relied on probabilities and correlations. The probability of "another" LTCM at some time in the future is pretty good. The name and personalities involved may be different but the fundamental problem will be the same. Furthermore, the arrival of "another LTCM" will have a very high correlation with the next "bull market"!

Sources

Jorion, Philippe, 2000, “Risk Management Lessons from Long Term Capital Management”

Lowenstein Roger, 2001, “When Genius Failed : The Rise and Fall of Long Term Capital Management”

11 Appendix 3-Hedge Funds and Recent Crises

11.1 The 1992 ERM Crisis

Hedge funds were cited as having a major hand in the 1992 ERM Crisis. This idea came from statements made by certain hedge funds at the time (e.g. George Soros).

The prologue of the whole crisis was the flow of capital into high yielding currencies that were participating in the ERM between 1987 and 1991. This was known as a "convergence play". Hedge funds participated eagerly on the basis that the yields from these currencies would outweigh and potential devaluation of the currencies as they were limited to the extent that they could move due to the constraints of the ERM.

The key ingredients for the "convergence play" were as follows:

- Cheap funding in certain currencies (e.g. deutsche mark).
- Attractive yields in other currencies (e.g. lira).
- Poor probability of significant depreciation in currencies.

Hedge funds were early to recognise these trends and position themselves accordingly. They participated in the build up of long positions during the "convergence play" and though they were not the most significant players.

However from the beginning of 1992 certain problems began to arise with this theory as follows:

- Competitiveness problems arose in Italy as labour costs rose by 20%
- Deteriorating current account and business profitability also exacerbated the Italian problems.
- Sterling had appreciated strongly before joining the ERM leading to suspicions of overvaluation.
- Inflation in the UK also increased substantially around 1989/1990.
- Sweden and Finland suffered economic shocks due to the collapse of trade from Russia.
- Denmark rejected the Maastricht Treaty.

The final nails in the coffin of the "convergence play" theory were a substantial depreciation of the US Dollar (eroding European competitiveness) and an increase in German interest rates (increasing funding costs).

They participated again when investors unwound from the long positions. However again, they were not the only players. However they were the first to begin shorting European currencies by entering into OTC forward sales with banks. This had a knock

on pressure on currencies as banks had to hedge out these forwards on the currency markets.

How large were these transactions? Nobody knows. One well-known fund used collateral and margining to fund a $10 billion short position in Sterling. However it appears that other macro funds did not make use of leverage to short sterling. Hedge funds as a group are also reported to have made profits taking short positions in the forward foreign exchange market in Italian lira.

Therefore if hedge funds played a role in precipitating the crisis, they did so by acting as leaders. Other institutional investors followed. The real financial muscle was provided by mutual funds, pension funds, insurance companies and non-financial corporations.

According to a paper by the Federal Reserve Bank of Cleveland (cited earlier), "careful analysis of the 1992 ERM crisis, the 1994-95 Mexican peso crisis and the 1997 Asian currency crisis points to an array of factors contributing to the devaluations. Even when hedge fund activities were a link in the chain of events leading to a crisis, there is no evidence that hedge funds cause the crisis or collapses."

11.2 Bond Market Turbulence in 1994

Hedge funds were again (amongst others) viewed as participating in the bond market turbulence in 1994.

Hedge fund capital had doubled at the end of 1993 as high income investors scoured for yield in the prevailing low interest rate environment. In response to this hedge fund led the march back into European bonds (especially high yielding bonds) once calm returned to the foreign exchange markets in the second half of 1993.

The ERM margins had been widened from 2% to 15%. This led investors to believe that economies would start cutting interest rates to try to stimulate their economies.

Managers funded their bond positions in yen, taking advantage of low interest rates in Japan. With interest rate differentials seen as favouring dollar denominated fixed income assets, they went long on the dollar and shorted the yen and deutsche mark.

Events turned out somewhat differently:

- Expectations of falling European interest rates were dashed by two 25 bps increases in US rates.
- Japanese interest rates stabilised.
- The Bundesbank decided not to reduce official rates.

Bond yields rose sharply throughout mature markets as hedge funds and other investors scrambled to unwind positions. It is likely that hedge funds suffered heavy losses due to this exercise. This is evidenced by the fact that most categories of hedge funds actually lost money in 1994.

11.3 The 1994-95 Mexican Crisis

Hedge funds played a limited role in the next episode of financial market turbulence, the Mexican crisis of 1994-1995. Studies have shown that domestic residents, rather than institutional investors, played the leading role in the crisis. These studies surmised that in a world of many large financial markets, it is difficult for funds with limited resources to keep up to date on developments in a small less significant market. Domestic residents have sufficient knowledge and in relative terms suffer the greatest financial impact if they do not act. The deregulation of Mexican financial markets and financial transactions assisted domestic residents in acting.

In addition, Mexico prevented hedge funds and proprietary traders borrowing the domestic currency from domestic banks against a small margin in order to sell it forward. Even if the funds could have been able to borrow money, they worried about counterparty risk on the forward contract due to prospective capital controls.

11.4 The 1997 Crisis in Emerging Markets

As with the events above, the 1997 crisis in emerging markets has a significant prologue.

For several years beforehand, international investors had been building up a presence in fixed income debt of high growth Asian economies. They funded themselves in industrialised countries where interest rates were low and used the funds to invest in high yielding Asian debt. This strategy was attractive as long as exchange rates did not move against them. In the case of Thailand, this “carry trade” was profitable through 18 out of 20 quarters through to the second quarter of 1997. The pegged exchange rate ruled out any large surprises. Hedge funds participated in this build-up but were not the dominant players in the carry trade in which commercial banks, investment banks, pension funds, mutual funds and other institutional investors all participated.

As ever, this strategy was upset. The first upset came as a result of fears about the stability of the Thai baht.

- The Bangkok Bank of Commerce collapsed in July 1996. This was followed by an injection of liquidity of by the Thai central bank.

- The second episode was in early 1997, following the release of poor fiscal an export data.

International investors began closing out their long positions. At this point in time the liquidation of long positions by banks, pension funds etc. outweighed any short selling of the currency.

The carry trade was also disturbed by increases in interest rates in Germany and Japan. This led to a depreciation in the dollar against the yen which undermined the competitiveness of Asian currencies. It became less attractive to borrow in the industrialised economies and invest in Thailand.

The underlying rationale for the outflow in capital was due to perceived poor fundamentals of the Thai economy. While devaluation was foreseen by most investors, they were not sure of the timing. Therefore they held their short positions and continued closing long positions.

Hedge funds forward sales of baht are difficult to assess. It appears that one quarter of the Bank of Thailand's $28 billion forward book was thought to be made up of hedge fund sales. However this did not include sales through offshore counterparties, onshore foreign banks which then unloaded their position onto the Central Bank.

Although the hedge funds sold long dated forwards on the baht in February 1997, the majority of the sales took place in May at the tail end of this process. Therefore if herd behaviour contributed to the fall in the baht, hedge funds were at the rear of the herd which was led by domestic corporates, banks and international commercial and investment banks.

After July 1997, unhedged corporates rushed for foreign currency which prompted a sharp decline in the currency. These domestic entities seemed to have played a larger role than hedge funds in the currency's future decline.

The baht was the only currency in which the hedge funds held significant short positions. It appears that many of them were taken off guard by the spread of the contagion to other Asian currencies. Van Hedge Fund advisors estimate that offshore hedge funds lost 7% of their value in August 1997 alone.

The main participants in the shorting of Indonesian, Malaysian and Philippino currencies were money centre commercial banks and investment banks and domestic investors who were better able to short due to their superior access to interbroker markets and domestic credit.

Besides the Thai baht the only significant build-up of hedge fund positions was on the Indonesian rupiah. This was after the initial depreciation on the currency had taken place and hedge funds entered by going long on the currency as they believed that the depreciation had been overdone. In fact the depreciation was caused by international corporates and banks. Domestic banks had held a large amount of external debt and had sold options against the rupiah's depreciation using the premiums as a source of income. Therefore if the currency declined they exposed themselves to a "double whammy" effect of increasing debt and options being exercised. International banks had knowledge of this exposure as they have been counterparties to the options. Therefore they were aware that if the rupiah began to depreciate, the domestic banks would rush to close out their options. This knowledge precipitated flows out of the currency by international banks to provoke the situation (the colloquial term is "front running"). This was accompanied by little, if any, activity by hedge funds. The Indonesian banks and corporates changed sides following the depreciating as they attempted to hedge their positions. Hedge funds arrived at a later stage to take long positions.

Despite appearances, it appears that only a few hedge funds took positions on the Malaysian Ringgit. None appear to have profited from the depreciating of the ringgit

from 2.5 to 3.5 ringgit per U.S. Dollar. In fact, most hedge funds were long on Malaysian equities and suffered losses from the ringgit's depreciation.

The initial pressure, again, seems to have come from institutional investors closing out long equity positions, reflecting concern that the stockmarket was overvalued rather than shorting the currency due to concerns about the external debt or position of domestic banks.

For the Philipine peso and Korean won, it appears that domestic investors and banks had the upper hand and hedge funds had little involvement.

12 Appendix 4 - Models & Parameters

Monte Carlo simulation based on 100,000 simulations.

12.1 Equities

Log Normal Model where parameters are as follows

Product	Geared Equity	Bomb & Switch	Uncovered	High Income
Mean	7%	7%	7%	7%
Stan Dev	25%	25%	25%	25%

Note : Uncovered has a log normal variance ~ log N(0,0.25)

The lognormal model tends to understate the "jump risk" actually experienced in the market. However for simplicity this model has been used.

12.2 Interest Rate

For all products where relevant a Vasicek model is used where the differential equation and parameters are as follows

$$dr_t = a(r_t - r)dt + s\sqrt{t}dB_t$$

where

α=0.9
r=0.05
σ=0.009

There is a correlation coefficient of –0.4 between the random variables generated for the equity and interest rate models.

12.3 Charges

Product	Geared Equity	Bomb & Switch	Uncovered	High Income
Initial	0%	0%	0%	7%
Renewal	1% p.a. of fund	1% p.a.	1%	-
Performance	20%	20%	20%	-
Miscellaneous	-	1% p.a.	-	-

The performance fee is a proportion of the "growth" of the fund since the policy commences and/or since its previous highest peak. Therefore if a fund increases by 10%, falls by 10% and increases again by 10% only, the total performance fee payable up until that point is 2%.