



Using derivatives to manage life company risk and capital

Abbey Financial Markets provides an update on significant advances in the use of OTC derivatives to reduce life company risk and capital requirements under the new UK regulatory regime

Financial guarantees embedded in policies can carry very significant market risks for a life company. Management of these risks is a vital part of the risk management cycle. This article explains the main drivers of this requirement and explores alternatives for managing such risk: in-house dynamic hedging or outsourcing to an OTC derivative provider.

Need for dynamic risk management

The FSA is implementing the Integrated Prudential Sourcebook (PSB) at the end of the year. This is followed closely by other changes in accounting and regulatory frameworks, such as Solvency II and IAS39. Each of these changes is a move towards market consistent valuation of assets and liabilities, either for purposes of accounting or capital management. Such requirements reflect changes to business processes, and especially those relating to risk management, that should occur within firms if they are to pursue best practice.

Under the PSB, UK with-profits funds with liabilities in excess of £500 million must calculate capital on three different bases and meet the most onerous. These are the so-called "twin peaks" within Pillar 1, which are rules-based, and the Pillar 2 requirement, which is calculated using a firm's internal models. Evidence is emerging that in a majority of cases, the Pillar 2 Individual Capital Assessment (ICA) is expected to bite.

Under Pillar 2, firms are required to develop their internal approach to modelling risk and managing capital, focusing on a variety of risk areas: market, operational, insurance, liquidity and group risks. It is likely that for a typical with-profits fund with a material exposure to equities, the market risk element of the risk-based capital (RBC) requirement will be a key driver of the overall ICA.

These two factors combined, a higher capital requirement and the importance of market risk, suggest that market risk will be a significant source of volatility to a fund's realistic balance sheet and required capital. It is likely to lead to an increased business focus on capital optimisation through dynamic risk management or hedging.

Management actions

A variety of actions are available to management to mitigate the effect of risks arising on the capital position of a fund. Importantly, the value of

these can be captured in internal models, reducing the Pillar 2 capital requirement. These can be broadly characterised as:

- discretionary bonus policy;
- discretionary smoothing policy;
- applying charges for guarantees (subject to legal constraints);
- asset allocation actions (e.g. switching from equities to bonds); and
- hedging of guarantee exposures.

The first three of these are effectively employed on an annual basis, as firms assess policyholder benefits and declare bonuses. While these actions undoubtedly play a part in managing guarantee value, they are unable to defend a fund against the volatility introduced by the PSB, which practically requires funds to mark their portfolios to market.

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The fourth action, asset allocation, can have a material, but limited, impact on a firm's value of guarantees, about which more below. It is the fifth action of hedging that is specifically focussed on guarantees and is the main focus of this article.

The asset management cycle

Put simply, an asset manager's role is to optimise fund performance by investing in diverse risky asset classes, operating against a defined risk budget and within the bounds of a benchmark based on yield, maturity and credit quality. The asset manager should apply his knowledge and expertise to determine the optimal mix of assets, within the constraints of his mandate. The risk budget and other constraints should be set by

management, informed by matters of asset and liability duration, new business initiatives, and the availability of free capital.

Yet in recent times, it is the availability of capital, or lack of, that has often been the overriding factor in determining strategic asset allocation policy. Funds exited equities in 2002 and 2003 as markets continued to fall and fund solvency weakened. It seems unlikely that equity backing ratios (EBR) will return to the levels of 70% and 80% that was common in the 1990s, due to a renewed understanding of the inherent riskiness of equity markets and the introduction of risk-based capital measures, which bring additional capital cost.

The reduction in EBRs was mostly reactive and, to a large extent, guarantee costs had already been incurred before the risk mitigating action was taken. To be used as a proactive risk management tool, investment policy would necessarily stipulate switching before market falls. While this statement is obvious, it recognises the limitations of investment strategy in managing guarantee exposures.

It is the availability of risk capital that determines the aggregate risk budget available, as well the amount of asset liability matching required.

Lack of capital has often been the overriding factor in determining strategic asset allocation

This tension between an asset manager's remit to optimise returns and the need to satisfy capital requirements has arguably constrained asset managers from fulfilling their potential. And it may get worse: unless financial guarantees are dynamically managed, the additional balance sheet volatility introduced by market consistent valuation could lead to further constraints.

Unconstrained, the asset manager might be able to more fully employ his skills, delivering truly optimal returns. Rather than being driven by the external forces of capital constraints, a decision to switch from equities to bonds could be made on principles of investment management, with the aim of delivering policyholders the investment profile they were led to expect.

Hedging guarantee costs

The fifth action, that of hedging guarantee exposures, involves the investment of free assets in a strategy designed to specifically offset emerging guarantee costs. In developing an approach, firms can opt for dynamic management of these risks in-house. A number of potential strategies are considered by research in this field.

Such alternatives include:

- a dynamic portfolio investing in short positions in the underlying fund, and risk free instruments;
- the purchase of long dated equity put options, specified to meet modelled guarantee dates and strikes; and
- rolling short-term equity collars, hedging the delta of a fund's exposure;

These approaches have strengths and weaknesses, which space does not permit us to explore. All of them reduce guarantee exposures and capital requirements to some degree, but, applied in practice, they have shortcomings. They may variously be illiquid to execute, or only attack one risk factor, or have a high cumulative cost.

To execute these strategies properly, particularly those involving options (that hedge option related exposures, such as gamma and vega risks), firms will probably need to develop significant trading capabilities, dealing in exchange-traded futures and options in a variety of markets. This would require the creation of full trading desks, with an associated control framework, and the attraction of suitably skilled traders to operate them. It is not a small undertaking and should be considered carefully.

Eventually, development of this capability should logically lead to daily rebalancing of risks. However, risk management cannot take place without risk measurement, and existing, computationally intensive, stochastic valuation systems do not feasibly allow for live valuation of risks. They are designed with detail and accuracy in mind, not immediacy.

OTC derivatives

An alternative is to effectively outsource this risk management by entering into an OTC derivative with an investment bank, passing it a defined market-risk profile. Such an instrument would ideally be designed to replicate the underlying guaranteed cashflows in a fund and eliminate any source of market risk.

The 'replicating asset' is often demonstrated against an individual policy or policy class, backed by a narrow range of investments, such as one equity benchmark and a portfolio of gilts. Indeed, derivatives available until now have also tended to focus on one underlying asset class (such as interest rate swaptions for guaranteed annuity options (GAOs)) or one guarantee type (such market value adjuster (MVA)-free point guarantees), and were sometimes limited in the maturities available.

In practice, a fund is invested in a variety of instruments of differing volatility and liquidity. These might include:

- global equities;
- international sovereign debt;
- international corporate debt;
- index linked bonds;
- real property; and
- alternative investments.

Any derivative seeking to apply the replicating asset principle should therefore be written on a hypothetical portfolio representing the closest match to the actual assets. New instruments are emerging that cover more asset classes and maturities than previously available, and are much closer to this ideal. Such instruments, which aim to hedge the economic value of guarantees, represent a dramatic change from products available in the past, either the single-underlying economic hedges mentioned above, or those focussed on arbitraging the outgoing statutory solvency regulations (sometimes with unusual economic implications).

By definition, replicating asset hedges should reduce risk-based capital requirements very effectively. Adequately specified, these instruments will perform well in the stochastic asset liability modelling that

underlies the ICA, yielding the correct maturity cashflows to meet guarantee costs. Consequently, most of the market risk RBC requirement should be eliminated by the derivative. Residual market risk RBC requirements would be: actively sought, or from unhedgeable assets, or a result of rebalancing friction costs, or from quantifiable error introduced by modelling approximations.

An advantage of specifically removing the market risk drivers of RBC is that this frees the investment management mandate from being driven by movements in guarantee value. This allows investment strategy to focus on return optimisation, further meeting obligations to policyholders.

From one perspective, an OTC derivative trade can be viewed as the best use of comparative advantage. A life company is expert at measuring and managing insurance-related risks – mortality, morbidity, surrender risk and such like. An OTC derivative house is expert at managing financial risk, and has the valuation systems and expertise to do so on a near-continuous basis.

This is an advantage recognised in the banking capital treatment afforded to OTC derivatives operations. For different market risks, mod-

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elling (and capital) time horizons can be as little as 10 days, or even as short as one day, recognising that derivative desks are able to manage risk almost continuously in the capital markets. This is in stark contrast to the one-year horizon that appears to be emerging as a benchmark for life company stochastic modelling and economic capital.

Derivative effectiveness and benchmarking

A replicating asset derivative will only be judged effective if it immunises the cost of guarantees as valued on the relevant reporting platform; in other words, the output from a firm's stochastic asset liability model. However, derivative markets operate using separate valuation models for different product and risk types. Such models represent approximations that are adopted to manage the complexity of otherwise creating a 'model of everything' (which is arguably what a life company's stochastic model seeks to do). When widely distributed and adopted, derivative valuation models bring liquidity to markets; if every participant has accepted trading off similar approximations (such as the assumption of lognormally distributed equity returns in the Black-Scholes option pricing formula) then consistent pricing and a liquid market mechanism results.

Because of these features, derivative instruments will inevitably produce results that are not exactly the same as the output of a large stochastic model. But they are capable of being benchmarked to each other. Stochastic models rely upon an underlying economic scenario generator (ESG), which produces random projection scenarios with pre-specified properties. The ESG should be calibrated to reproduce the

price of relevant derivatives that carry similar features of a firm's underlying guarantees, such as interest rate swaptions (for GAO's). So while the results may be different because of the different modelling bases, they are comparable because fundamentally they seek to value the same thing.

Such benchmarking serves a number of purposes. It is a check that the derivative is correctly specified and captures the underlying risk of the fund. It ensures that a derivative (which is held at its mark-to-market price) will truly reduce balance sheet volatility, by offsetting the stochastically generated value of the guarantee liability. Finally, by checking against its internal model, a firm can also gain comfort that the price of the derivative is consistent with its expectation.

Conclusion

The UK life industry is moving quickly towards a management approach linked to risk and capital. Under the PSB, directors are held much more personally accountable than in the past for understanding the business and the actions taken to manage it.

In planning a firm's approach to risk management of guarantee exposures under the PSB, a governing body should consider the capital markets capability that would be required to effectively manage risk, and the potential costs of developing or maintaining this capability. For some firms, there is likely to be a solid argument for outsourcing such risk management, leveraging the comparative advantages of both the firm and a derivative provider.

Use of OTC derivatives can have a number of significant and tangible benefits. It can:

- fill an asset liability mismatch, contributing to the matching within a fund, and reducing exposure to yield curve shifts;
- offset the economic cost of guarantees stemming from a number of market risk drivers;
- reduce the risk-based capital requirement (risk capital margin and ICA) that would otherwise attach to these exposures, enabling finite capital resources to be deployed elsewhere, such as meeting new business strain;
- enable a fund to continue to hold risky assets in line with its obligation to policyholders, while protecting the solvency and capital position from guarantee costs; and
- decouple the link between investment performance and realised guarantee cost, enabling asset management strategy to be determined more wholly on issues of economics and optimisation.

With proven risk transfer capability in suitable asset classes, Abbey Financial Markets leads research and delivery in this field and can help firms design and execute solutions tailored to their needs.

CONTACTS

Brendan O'Flynn
Structured Transactions Group
Abbey Financial Markets
T. +44 20 7756 6870
E. brendan.oflynn@abbey.com