



CARISMA

A multi-disciplinary research centre focussed on understanding, modelling, quantification, management and control of RISK

- **School of Information Systems, Computing and Mathematics**
- **Brunel Business School**
- **School of Engineering**
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TECHNICAL REPORT

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**Defined contribution schemes: Members alive and kicking!
But is the fund dead?**

Leela Mitra, Katharina Schwaiger

Defined contribution schemes: Members alive and kicking! But is the fund dead?

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As defined benefit schemes are decreasing in number and these are being replaced by defined contribution (DC) schemes, we focus on these: Fund managers of DC schemes do not have to directly consider contingent liabilities. Their objective can be seen as generating the highest return possible for the given income (contributions) taking into account pension fund members' and trustees' preferences. Poor investment decisions may result in small final fund values leading to inadequate pension benefits. The full investment risk falls on the fund members. Though pension scheme members do not have an entitlement to defined benefits they have expectations of their future retirement income. The individual will seek financial advice this may be both from the company scheme which may provide projections for the pension fund and annuities and from an independent adviser. Since the members bear the full risk they are presented with a choice of funds which allows them to match their risk-return profile; this can vary according to the members risk appetite and age. An analysis of current state of affairs indicate that the most common fund management approach is the use of Lifestyle funds, which change their allocation of capital from equities to bonds as the member approaches retirement.

From a quantitative modelling perspective the focus shifts from the liabilities to a guaranteed minimum return or to a benchmark return. Funds differentiate themselves according to their style which defines their benchmark. Quantitative methods as adopted in LDI models allow the investor (or investment consultants) to judge the performance of a particular fund against its benchmark. As well as seeking to meet their benchmark some funds set out to outperform them. The outperformance generation is known as active management (alpha seeking strategies) and is how funds try to differentiate themselves from their competitors by "adding value".

Many fund managers implement quantitative models to make optimum investment decisions. For most people in the finance industry risk is still synonymous with (return) volatility. Mean-variance analysis (Markowitz style) determines the efficient set of portfolios. These are optimal in that they are the minimum risk (maximum return) portfolios for a given level of return (risk). Depending on the investors risk appetite the preferred portfolio is chosen.

A fund is judged by the return it generates, further investment consultants consider the return relative to the risk taken by the fund; this determines the fund's risk-return trade-off. Markowitz style analysis leads to the Sharpe Ratio, which defines the relative fund performance (risk-adjusted). From the investor's perspective risk is the possibility of worse than expected outcomes (lower than benchmark), they are not concerned about better-than expected outcomes. This upside potential is a desirable aspect. Variance treats upside potential and downside risk in the same fashion. Downside risk is an alternative yet important risk measure which is increasingly used in performance measurement. The Sortino ratio replaces variance with downside risk. In the present economic climate investment consultants have no choice but to consider a wider range of quantitative measures such as the Sortino ratio. The understanding of the nature of risk is developing in quantitative fund management; investors should seek to exploit this developing knowledge. As we have seen in recent markets we need to consider worst case outcomes; if the members of the scheme are standing, walking and kicking it is indeed a disaster (downside to be avoided) for the fund not to be standing up as well!