Seeking diversification through efficient portfolio construction (using cash-based and derivative instruments)

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My disclaimers

• A foreword

• The views represented are my own as are any errors

• I work for Standard Life Investments on multi-asset and fixed income investment solutions
  – Mainly for defined contribution and defined benefit pension plans

• I am a qualified actuary…
  – ..but I am not a regulatory actuary focused on insurance capital management issues
My investment background

• Equity investor
  – 1990-1994  Japan’s bear market beginning

• Fixed income investor
  – 1999-2003  The birth of the Euro debt markets
  The start of the credit boom
  Regulatory capital efficient investment strategies

• Investment solutions
    The advent of Absolute return investment solutions
    The growing breadth of bond investing
    The increasing attraction of less liquid investments and solvency 2

The investment world is rarely boring and always challenging
Background

- Initial Working party paper prepared presented at Risk and Investment Management conference, UK, June 2012
- Sessional paper presented to actuaries in Dublin, London and Edinburgh in 2013

Themes
- Measurement of portfolio diversification
- Diversification benefits of ‘unconstrained’ multi-asset investment
- Use of derivatives to implement investment strategies
- Risk measurement of an unconstrained multi-asset portfolio

Question
- Where does the actuarial profession believe it has most to add in the realm of portfolio construction?
Traditional approach fails to deliver consistent returns

**Annualised rolling 3 year returns – Traditional Balanced Fund**

*Source: Standard Life Investments*

**Uncertainty is the only certainty there is**
Portfolio diversification measures

• No single measure of diversification

• Growing academic literature on measures of systemic risk

• Need for some definite measures of diversification:
  • Assess current state of the world
  • Observe how it is changing through time

• We want to consider measures for:
  • Diversification in a given portfolio
  • Diversification potential in an investment universe
Measuring diversification – different methodologies

• Principal Components Analysis
  – Breaks down total risk of multi-asset portfolios into independent factors
  – **Effective factors** answers the question
    • “how many factors do you need to explain the risks of the portfolio?”
      – uses Entropy principles to determine optimum number

• Iterative Beta Removal
  – Breaks down the variance of portfolio by underlying componentry of the fund
  – Statistically, this is similar to forward-stagewise regression
  – Entropy techniques again used to determine an optimum number of strategies
Effective number of assets in UK pension portfolio

Low number of effective assets reflects dominance of equity and interest rate risk
Effective factors for unconstrained multi-strategy portfolio

Portfolio’s greater number of ‘moving parts’ allows for more return consistency

Source: Standard Life Investments
Defining the investment challenge

• “How can I build a better diversified investment portfolio but without impacting long term return expectations?”

• **Allow a broader global investment universe**
  - currencies
  - asset classes and sectors
  - yield curves across different geographies
  - volatility

• A number of these strategies (such as specific currency pairs) will necessitate the use of derivative contracts

• **Allow unconstrained dynamic asset allocation**
  - offers access to the full diversification potential of the chosen investment universe
Money making strategies and diversification

- Global REITs
- European equity
- Chinese equity
- High yield credit
- Mexican government bonds
- Euro corporate bonds
- Australian forward-start interest rates
- US equity tech v US small cap
- US Dollar v Canadian Dollar

Greater diversification

Shock absorbing potential (Correlation to global equities)

Source: Standard Life Investments, APT, 24 December 2013

Numerous strategies that can make money in down equity markets
Portfolio Themes – choice of implementations

• **Multi-Speed Global Growth**
  • Relative value Duration Europe vs US and Japan
  • US Equity Technology vs Taiwan
  • German vs French Equity

• **Central Bank Policy**
  • European Duration (Forward-Start)
  • Japanese vs Korean Equity
  • US Dollar vs Japanese Yen

• **Earnings Potential**
  • European Equity
  • Global Equity Oil Majors
  • Global REITS

• **Chinese Economic Change**
  • Chinese Equity
  • Mexican Peso vs Australian Dollar
  • Australian Short Term Duration

**Implementation choices**
- Physical and/or interest rate swaps/bond futures
- Physical and/or equity market futures/options
- Physical and/or equity market futures/options
- Interest rate swaps
- Physical and/or equity market futures/options
- Currency forwards / options
- Physical and/or equity market futures/options
- Physical investments
- Physical investments
- Physical and/or equity market futures
- Currency forwards / options
- Interest rate swaps

Maximising insights on global investment markets
Risk-based portfolio construction

Stand-alone risk aligns size of position with its volatility

Source: Standard Life Investments, sample absolute return portfolio, December 2013
Risk-based portfolio construction
Seek a wide range of return-seeking risks

Volatility %

- 100% global equity

Source: Standard Life Investments, sample Absolute Return portfolio, APT system, December 2013
Historical scenario analysis testing for unintentional concentrations of investment risk

- Bank Meltdown 2008
- Equity Sell-Off 2002
- Euro Crisis 2011
- QE jitters 2013
- Emerging Market Sell-Off 2006
- Asian Crisis 1997
- Rate Rise 94

Modelled losses %

Source: Sample absolute return portfolio, US$, Riskmetrics, Dec 31st 2013
Forward scenario analysis

• Typical problems in scenario analysis
  – Over-reliance on historical quantitative relationships
  – Insufficient qualitative expert judgement

• Some overarching principles for improvement
  – Focus on potential portfolio weaknesses, not spurious numerical accuracy
  – Explore extreme outcomes
  – Consider a range of perspectives
  – Do not be constrained by conventional statistical methods

References:
Stress testing at the IMF, IMF (2008)
Principles for sounds stress testing practices and supervision, BCBS (2009)
Stress and scenario testing, FSA (2009)
Macrofinancial stress testing – principles and practices, IMF (2012)

Better to be approximately right than exactly wrong
Forward scenario analysis - China Crisis

Mathematical issues
- How to create ‘fat tails’?
  - Multi-regime Monte-Carlo simulations
- How to blend expert opinion?
  - Entropy pooling

Organisational issues
- How to identify and scope crises?
- How to mitigate ‘group think’ in defining crises?

Equity -37% , Absolute return -6%
Fund Governance

- UCITS regulated
  - ‘Sophisticated fund’
  - Daily VAR calculations

- Maximum permitted investment risk
  - With and without diversification benefits

- Diversification risk parameters
  - Different asset classes
  - Concentration limits

- Leverage
  - Gross exposure limits

Comprehensive set of fund governance parameters
Investment governance and oversight

- Independent risk analysis
  - Forward looking and historical scenario analysis

- New instrument approval controls
  - Modelling and understanding benefits and risk
  - Back-office implications
  - Range of counterparties
  - Regulatory considerations

- Counterparty risk management
  - Counterparty selection
  - Permitted instruments
  - Maximum exposures
  - Collateral management

Comprehensive governance, risk and compliance infrastructure is essential
Summary

• Increasing work focusing on understanding and communicating diversification
  • Line of investment work ideal for actuaries to specialise in
  • Additional input into scenario analysis testing

• Combining traditional assets with derivative-implemented strategies produces more risk efficient portfolios
  • increase the likelihood of ‘good’ outcomes for your portfolio

• Sophisticated funds require a high level of fund-based governance within a multi-level investment risk management infrastructure