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A flaw in the ointment?

Dr Quintin Rayer looks at how putting portfolios through stress testing can ensure that trustees are actively working to protect their assets from extreme market events

Stress testing can be used to explore how extreme market events may affect portfolios, helping identify weak points. By addressing these, pension trustees and other asset owners can make an active contribution to their fiduciary responsibilities.

Extreme market moves can negatively affect portfolios in ways that may not be captured by conventional risk measures. Diversification breakdown may mean portfolio values are not protected. With guidance, trustees may be able to determine the impact on portfolios and arrange for restructuring to limit the downside.

Meaningfully assessing portfolio risks is challenging. Conventional measures may not capture all risks, particularly under difficult market conditions. For these conditions it may be worthwhile considering stress testing a portfolio against significant historical market events, or invented scenarios reflecting particular concerns.

Portfolio stress testing helps identify and quantify portfolio risks and can reassure trustees as to how assets might respond to specific market outcomes or other concerns. Early identification of issues helps inform protective measures.

Financial professionals are probably aware of the regulatory stress testing applied to banks and insurance companies to help identify how resilient balance sheets would be to a renewed market crisis. However, the thought may not have occurred that similar approaches can be applied to other portfolios, including pension schemes. Trustees can work with asset managers to ensure their portfolios are better positioned to protect against particular market concerns.

Stress testing includes looking at potential portfolio downside risk, or methods that estimate the expected response under difficult conditions. It does not guarantee to identify actual impacts of future events on a portfolio, but is another tool for risk management. Tests are designed to estimate potential portfolio response to adverse developments, so that weak points can be identified early and preventative action taken. A typical focus is on key risk areas, such as credit, market risk and liquidity.

A wide range of approaches can be used for stress testing, with terms often used rather loosely, making classification harder. Often, historical events provide ideas; however, trustees are free to imagine any damaging situation and attempt to have its impact quantified.

A key distinction is between historical and artificial scenarios, with several techniques for each. Historical tests can include 'historical value-at-risk' and 'event periods', while artificial tests include 'hypothetical' and 'algorithmic' stress tests as well as other approaches.

In the run-up to the Brexit vote, a currency devaluation scenario could have been considered, with response based on previous currency devaluations – making a historical scenario. However, if a range of unique Brexit factors had been identified, this would require an artificial scenario, since Brexit has no historical precedent.

Historical stress testing provides credibility: assets actually behaved as captured by the scenario. However, market changes since the scenario date (perhaps regulation changes) may make such responses no longer possible. Historical events can also be 'messy', with numerous knock-on effects and proxy shocks, making isolation of individual aspects difficult.

A concern for artificial stress tests is whether the proposed scenario is actually possible or realistic. How can all possible responses, direct and indirect, to portfolio assets be included? But they can attempt to include impacts of the development of new markets, perhaps regulations, new currencies and more, as well as isolating specific concerns.

Historical scenarios span an interval when assets performed poorly. Asset price movements are applied to determine portfolio response. Approaches include 'value-at-risk' (VaR) and 'event period' tests.

VaR may assume Gaussian returns distributions, which may prove inadequate during stressed periods, making 'historical VaR' more appropriate. Historical VaR uses actual returns, usually over some period to date. Historical VaR stress-tests incorporate earlier period returns to see how these affect the result. Suppose returns from 2014 to 2016 were used. If returns in 2008 caused concerns, one could include these and recalculate the result. Criticisms include using an arbitrarily shaped distribution, loss of returns path-dependency and historical events not being a guide to the future.

> Managers should see stress testing as reassurance of the quality of their investment decisions

Event period tests require crisis start and end dates, which may be less obvious than initially appears. Historical events may evolve over extended periods with market linkages and feedback. In portfolios, decline in one asset may occur while another rises, then the second may collapse while the first recovers. This suggests two approaches; either selecting fixed dates and allowing the rise in one asset to offset the other's decline, or applying maximum declines in each simultaneously. Preserving time-lines makes better economic sense, but is less demanding. Simultaneous price falls make little economic sense but a tougher test.

Artificial stress-testing

These can explore diversification, liquidity events, or shock-specific factors.

Diversification requires de-correlated assets. Correlations often increase during market crises. Stress-testing diversification involves increasing selected correlations, then quantifying portfolio impact using volatility, VaR, or other measures. However, correlations can link so it is important to use mathematical techniques to target individual correlations while ensuring necessary mathematical properties for the overall correlation matrix.

Hypothetical, created-event stress tests use invented scenarios, giving freedom to choose 'shock' factors. A weakness is the difficulty of inventing economically meaningful scenarios. An envelope approach helps promote consistency and inclusion of important factors. Factors and worst shocks are determined, with scenarios using shock magnitudes within envelope maximums. However, there is no guarantee that scenarios are economically realistic, possible or sufficiently extreme. The advantage is flexibility to assess any imagined scenario, including regulatory changes or new developments in markets or geopolitics, potentially adding real value.

Implementation

Stress-testing tends to be more practical than theoretical. Guidance may be required on turning initial concerns into a useful stress-test, requiring experience and judgment. Thereafter, implementation of the stress test can become more scientific. Scenario selection depends on assumptions, generally regarded as 'unlikely but plausible'.

Judgmental aspects when defining stressed scenarios make stakeholder involvement essential, especially investment managers. Their input will be invaluable in helping identify issues and the appropriate severity of stressed scenarios. Managers should see stress testing as reassurance of the quality of their investment decisions. By making investment outcomes more robust, reputation should be enhanced.

The following steps outline implementation:

1. Risk identification
2. Stressed scenario definition – stakeholder involvement, integration within the investment process
3. Execution of stress-test scenarios, and
4. Analysis and reporting of results.

Scenario definition should not be a one-off activity. Existing scenarios should be reviewed and adjusted to maintain their usefulness. Periodic reviews assist with establishing discipline and learning from experience.

Stress test outcomes can be considered against portfolio objectives. If a test scenario has little impact, trustees have reassurance that the event is perhaps a lesser concern than feared. However, if the test scenario suggests the portfolio may be unacceptably affected, discussions can follow regarding restructuring the portfolio to make it more resilient against the events considered.

By including an ongoing programme of stress testing, with scenarios, methods and outcomes documented, it will be clear that trustees are actively working to protect portfolio assets against extreme market events. Such a programme helps demonstrate that trustees are seriously considering their fiduciary responsibilities.

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