

The different types of portfolio stress-testing

By Quintin Rayer | Mar 9, 2017



In previous articles Dr Quintin Rayer of P1 Investment Management gave an overview of portfolio stress testing, what it can and cannot do and offered a definition. In this third article in the series he outlines the range of stress-test methodologies available and offers a classification.

Introduction

To recap, extreme market moves can negatively impact portfolios in ways which may not be captured by conventional risk measures, and diversification breakdown may mean that portfolio values are not protected. With guidance, you may be able to use stress testing to estimate the impact on portfolios and arrange for appropriate restructuring to limit the downside. Typically stress testing may look at significant historical market events, or scenarios that reflect particular concerns.

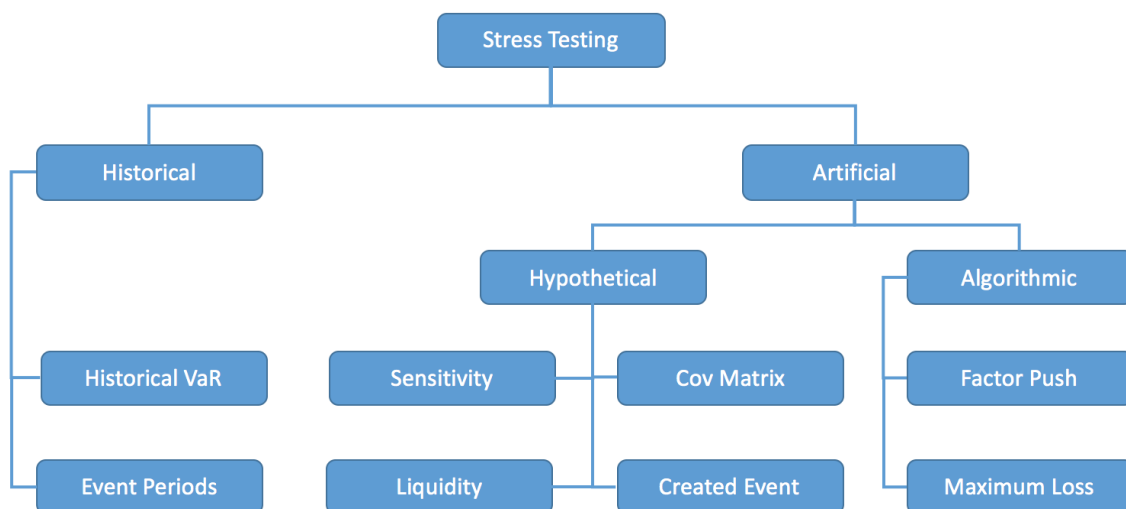
Are there different types of stress testing?

Stress testing covers a wide range of approaches, and various terms tend to be used quite loosely [1], making classification harder. The classification here helps frame discussion [2]. Often historical events provide ideas for stressed conditions; however advisers are free to imagine any damaging situation and attempt to have its impact quantified. Since many stressed scenarios will be motivated by consideration of past

events, those interested in stress testing might do well to make a study of historical market crashes.

A key distinction is between historical scenarios (re-enactments of particular market events) and artificial scenarios (invented to capture a particular concern and often involving assumptions), see the Figure below. Thereafter, classification divisions may become more judgmental. This classification follows by splitting artificial scenarios into hypothetical and algorithmic scenarios [3].

Figure: Stress testing classification



For example, in the run-up to the UK's Brexit vote, a scenario based on the impact of currency devaluation could have been considered, with market response being based on previous currency devaluations; this would be a historical scenario. However, if an adviser had identified a whole range of factors unique to Brexit that they wished to explore, this would have to be an artificial scenario, since Brexit has never occurred before, and so there is no historical precedent.

Historical stress testing's strength is that assets actually behaved in that way, adding credibility. Although, if markets have changed since the historical scenario's date, perhaps due to regulation changes, or other reasons, such response may no longer be possible. Also, historical events can be 'messy', with numerous knock-on effects and proxy shocks which can make it hard to isolate individual aspects.

Artificial stress tests raise the question as to whether the proposed scenario is even possible; it can be difficult to make artificial stress tests realistic. How can the designer possibly include all responses, direct and indirect, to portfolio assets? However, artificial stress tests can attempt to include the impact of changes (or

anticipated changes) on markets, perhaps due to regulatory developments or new currencies. An artificial test can also isolate specific concerns in a portfolio.

Hypothetical tests explore aspects like the robustness of portfolio diversification, look at liquidity events, or shock specific risk factors. Finally, algorithmic stress tests attempt to systematically identify the worst outcome within a defined envelope. Risk factors can be 'pushed' in a direction that results in portfolio losses to help identify changes in market risk factors that would result in the greatest portfolio loss.

How advisers can add value

An adviser can play an important role by working with the investment manager to add value in terms of interpreting test results against portfolio objectives. For stressed scenarios that have little impact on a portfolio, it reassures that the event may be of lesser concern than feared. Conversely, if a portfolio looks to be badly impacted, an adviser can work with the manager to see that the portfolio is restructured to make it more resilient.

This helps demonstrate that advisers are working hard to protect portfolios and clients can be reassured that robust investment processes are in place.

References

[1] M. Crouhy, D. Galai and R. Mark, *"The Essentials of Risk Management"*, 2nd ed., New York: McGraw-Hill Education, 2014.

[2] Q. G. Rayer, "Dissecting portfolio stress-testing", *Review of Financial Markets*, vol. 7, pp. 2-7, 2015.

[3] B. Schachter, "Stress testing", in *The Professional Risk Managers' Handbook*, vol. III, C. Alexander and E. Sheedy, Eds., Wilmington, DE: PRMIA Publications, 2004.

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