The Trustee toolkit downloadable

Investment in a DB scheme

Tutorial three: Future projections and scenario analysis

By the end of this tutorial you will better understand:

- what scenario analysis is
- how scenario analysis can be used to assess the risks in the scheme with the current investment strategy and in different economic and 'stress' scenarios
- what a projection model is
- how projection models can be used to understand how the scheme finances may evolve in the future

This tutorial is part of Scenario two.

Glossary

A detailed glossary of technical terms can be downloaded from the Resources tab when you log in at www.trusteetoolkit.com

The Pensions Regulator

Introduction

So far in this module we have looked at two key elements of a scheme's investment strategy and how that strategy might evolve over time.

In this tutorial we explore this further by looking at how changes in economic and market conditions could impact the current investment strategy. This is called scenario analysis.

Reminder: Tutorial one

In the Tutorial: 'Understanding investment strategy' we looked at the duty on trustees to set the scheme's investment strategy so that the assets are able to pay benefits as they fall due. This is achieved as part of an integrated risk management framework where scheme risks across investment, employer covenant, contributions and funding levels are assessed, monitored and managed in a joined up way.

We also looked at the two main types of asset that make up the scheme's strategy - matching assets and growth assets - and how the scheme sets an asset allocation strategy or benchmark allocation to assets in those groups.

Reminder: Tutorial two

In the Tutorial: 'Changing asset and liability values' we turned our attention to the scheme's liabilities and how changes in interest rates and inflation can impact both the cash flows payable by the scheme in future years and the present value of those cash flows.

This provides an estimate of how the scheme's funding level might change if interest rates or market expectations of inflation changed and these were reflected instantly in the valuation assumptions.

In this tutorial

In this tutorial we look at how changes in economic and market conditions could impact the current investment strategy. This is called scenario analysis.

It is important to understand how your scheme's finances could develop over time as market conditions respond to different financial and economic environments. So we will then look at how the scheme may evolve in future years through projection models. If the model is run based on the current investment strategy, this type of analysis will help you understand the risks and potential reward of your current strategy.

As well as considering the current investment strategy, this approach can be used to analyse other investment strategies for your scheme. This is often done in investment strategy reviews, to illustrate the risk and return of different investment strategies in different financial environments. This type of analysis will help you understand the risks and potential reward of other investment strategies that could be adopted following a review.

Scenario analysis

In the Tutorial: 'Changing asset and liability values' we looked at what would happen to the scheme's liabilities if market conditions changed overnight. Although markets don't normally change overnight, it can be helpful to know this as a necessary step to understanding how the scheme's finances might change as market conditions change over time.

Changing liability values

Major influences on the funding level are the levels of interest rates and inflation. In the previous tutorial we looked at how the discount rate and inflation assumptions can be linked to market levels of interest rates and expected future inflation. We also looked at 'interest rate duration' and 'inflation duration' as rules of thumb to understand how sensitive to changes the scheme liabilities are.

As a reminder, our example scheme's interest rate duration was 18.6 years, and we assumed that the discount rate was directly linked to market interest rates. If interest rates were to fall or rise 1% pa the liabilities increased or decreased by 18.6% respectively. A similar calculation was used for inflation but only for the percentage of liabilities that were inflation-linked.

Changing asset values

Similar calculations to those we used for the liabilities were also made for the scheme's bond assets to see how their value changed as interest and inflation rates changed.

Assets	Class	Target weight (%)	Value (£m)
Growth	Global equities	20	60
	Diversified growth strategy	20	60
Matching	Sterling bonds	60	180
	Total	**100**	**300**

The assets are split between matching and growth, with 60% of the portfolio invested in bonds. As a reminder our example scheme's bonds were assumed to have an interest rate duration of 10 years. We saw that if interest rates were to fall or rise by 0.5% pa the value of the bond assets increased or decreased by 5% respectively.

Assumptions

Calculations for assets should be consistent with the assumptions made for the liabilities although the precise level of change may differ depending on the 'duration' of the liabilities and the matching assets. Remember that you can also make assumptions about changes in the value of the scheme's other assets such as rises or falls in the value of equities.

Combining changes

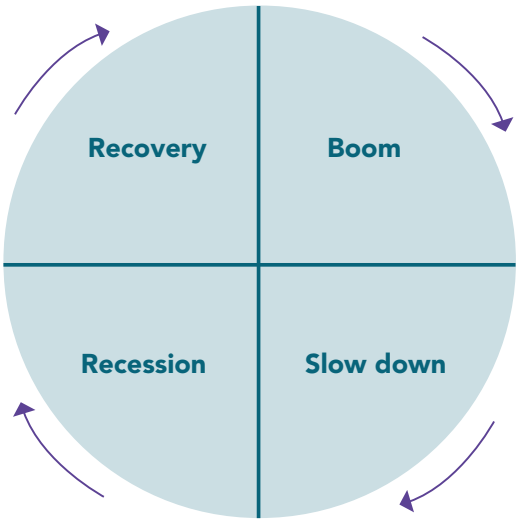
Putting these together enables you to estimate how the funding level might be impacted by overall changes in market conditions.

This is done by asking questions like, what if:

- interest rates fell by 0.5%?
- inflation rose by 0.5%?
- the global equity holdings fell by 10%?
- the diversified growth strategy fell by 3%?

A set of assumptions like this for a range of market variables is called a 'scenario'.

Scenario analysis: Economic conditions



It is possible to generate a large number of scenarios just by altering the assumptions for each variable in the previous example. However it's important to ensure that the overall combination of variables is realistic. For example, it would be odd to have very high inflation and very low interest rates at the same time.

Therefore it is normal to consider 'economic scenarios', such as a boom, slow-down, recession and recovery. The market variables are then set to be consistent with the chosen economic scenario.

Example: Recession to recovery

Interest rates typically remain low but there are expectations of increases to come in the future. As investors move from 'safe havens' like bonds to equities in anticipation of growth, bond prices begin to fall. Assuming that the central bank has inflation under control, this remains at a moderate level.

To consider how this change might impact your scheme's investment strategy and asset and liability values you might change the assumptions made for the variables so they reflect:

If you haven't already, you can learn more in the Module: 'An introduction to investment' in the Tutorial: 'Capital markets and economic cycles'.

- higher levels of growth in equity markets
- higher interest rates
- moderate inflation rates

Scenario analysis: Stress testing

As well as considering scenarios based on particular economic situations, it can be helpful to consider adverse movements in individual variables (sometimes called 'stresses') separately from any particular economic scenario.

The level of stress to apply to each variable can be chosen to reflect the assumed likelihood of its happening. For example, based perhaps on past market movement data, you could assume that individual stresses have a 5% (1 in 20) chance of happening, such as:

- interest rates falling by 0.7% pa
- inflation rising by 1.0% pa
- equity markets falling by 20%

These 'stresses' could then be applied to the scheme's assets and liabilities to examine the impact of each on the funding level.

Stress testing like this helps trustees to understand more about the financial risks their scheme faces, and their relative importance. The trustees' monitoring arrangements can then be focussed on the risks that matter most. Triggers for action, based on the variables stressed, can then be set at appropriate levels.

Projection models

So far, we have considered the effect of an overnight change in market conditions, as part of either an economic scenario or a stress test on both the scheme's assets and liabilities. However, it is important to understand how the scheme finances may evolve in future years. This applies to the current investment strategy and also when considering potential alternatives.

How is this beneficial?

Projections into the future will give more insight than just considering overnight changes. For example, if the sponsoring employer is paying deficit repair contributions, it will show how quickly the funding level is expected to improve. In order to make these projections, your advisers may use a simplified model of the scheme which is not as complicated as the actuary's full valuation model.

How do they work?

Projection models vary in points of detail, and some can be quite complex. However, they generally treat assets and liabilities separately and build up (or 'roll forward') the scheme's finances.

Assets

To arrive at the asset value at the end of each year you:

- take the asset value at the start of each year
- add new money (eg contributions)
- deduct outgoings (eg benefit payments)
- add the investment return (or deduct if there is a loss)
- make adjustments for any changes in market conditions

The adjustments for changes in market conditions are relevant if it is assumed that market conditions at the end of the year are different from those at the start. The adjustments will be similar to those made as for an overnight change in market conditions.

Liabilities

Likewise, to arrive at the liabilities value at the end of each year you:

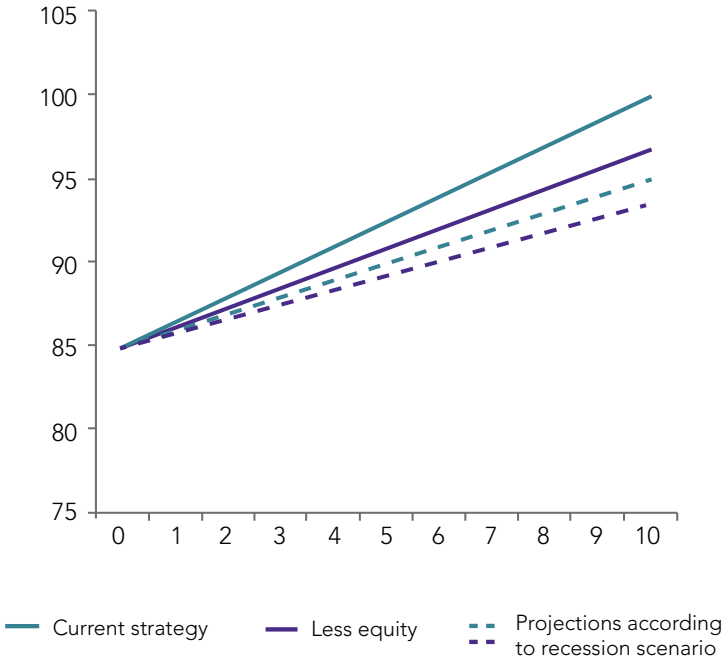
- take the liabilities value at the start of the year
- add the value of any new benefits earned (ie ongoing accrual)
- deduct outgoings (eg benefit payments)
- add interest at the valuation discount rate
- make adjustments for any changes in market conditions
- adjust for the difference, if any, between inflation over the projection year and the valuation inflation assumption

Projection model example

Let's look at our example scheme again. This time we will assume that the scheme is currently 85% funded and there is a recovery plan in place to achieve 100% funding in 10 years.

Current

The improvement in funding level comes from a combination of asset growth from the current investment strategy (assumed to be faster than the growth in liability values) and deficit repair contributions. The growth in assets and liability values reflect a 'slow and steady growth' type of economic scenario.



Alternative investment strategies

Once the model has been set up to reflect the current investment strategy and the central economic scenario (we will refer to this as the 'base case') it can be used to examine alternative investment strategies. For example, this chart shows the effect of assuming a 10% lower allocation to equities, and a 10% higher allocation to index-linked gilts. The base case is shown for comparison.

This change will lead to a lower expected return, so it should be no surprise that the projection no longer shows 100% funding being reached after ten years.

Other economic scenarios

Switching from equities to index-linked gilts (ie from growth assets to matching assets) is likely to reduce risk in the pension scheme. The level of risk in the pension scheme is highlighted by less favourable scenarios.

This problem is what scenario analysis is designed to address, by looking at the effect of various scenarios on different investment strategies. It is good practice to consider a range of scenarios especially, for funding purposes, those illustrating downside risks. This helps to build up an understanding of the riskiness of the current strategy, and of the alternatives under consideration.

Projection models: More scenarios

The example scenarios you have seen so far are fairly basic.

What other scenarios could be considered?

In practice, a wider range of scenarios will be considering including:

- recession
- steady growth
- strong recovery
- stock market fall and subsequent recovery
- deflation (ie inflation falls below zero)
- stagflation (sluggish economic conditions and persistently high inflation)
- temperature change (See scenario analysis requirements under regulations from the Pensions Schemes Act 2021 in the DWP statutory guidance on the Governance and reporting of climate change risk: guidance for trustees of occupational schemes).

(As illustrated by the example of stock market fall and recovery, the scenarios do not have to assume the same market conditions each year.)

Your investment consultant may be able to suggest other topical scenarios. For example, in January 2015 the crude oil price was unusually low compared to previous prices (around US$50/barrel). At that time this could have been used to construct scenarios based on where the oil price went next and the effects on global economic activity, inflation and financial markets.

What scenarios are most relevant?

It is important to focus on the most relevant scenarios, since a wide range could in theory be considered. Your investment consultant should have a good understanding of which risks your scheme is most exposed to, and should be able to suggest scenarios that highlight these.

Some economic scenarios may be especially relevant to your sponsoring employer's business and have a potential impact on the sponsor covenant. A prolonged fall in the oil price is unlikely to be good news for an employer in the oil industry, for example. This should be taken into account when setting investment strategy within an integrated risk management framework.

The trustees and sponsor, together with relevant advisers, should work together to identify appropriate scenarios under which both the sponsor covenant and the scheme's funding can be assessed.

Conclusion

Scenario analysis like this helps trustees to understand more about the financial risks their scheme faces, and the circumstances in which they may materialise.

The trustees' monitoring arrangements, including covenant monitoring, can then be focussed on the scenarios that matter most. Triggers for action, based on the variables being monitored, can then be set at appropriate levels.