



An tÚdarás Pinsean  
The Pensions Authority

# Information note on the Pensions Authority's defined benefit financial risk measure

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## 1. Introduction

Paragraph 101 of the Pensions Authority's Code of Practice for trustees refers to a defined benefit financial risk measure (the risk measure) to be used in assessing levels of financial risk faced by defined benefit (DB) schemes.

This document provides:

- information for trustees and advisers on the risk measure, and
- information for practitioners about how to use the spreadsheet available on the Authority's website<sup>1</sup> for the calculation and recalculation of the scheme-specific risk measure over time.

The spreadsheet provides an estimate of the risk absorption capacity of the scheme.

## 2. The risk measure

The risk measure is a quantitative estimate of the ability of a DB scheme to absorb financial shocks. More specifically, it provides an estimate of the likelihood that the scheme will meet its funding standard and funding standard reserve obligations and thereby not require supplemental financial support from the sponsoring employer over a one-year time horizon.

The ability to absorb financial shocks is expressed in percentage terms, e.g., a scheme that has a risk measure of 90% is expected to be able to absorb, without supplemental support, financial shocks arising in 9 out of 10 calendar years.

The spreadsheet available on the Authority's website facilitates these calculations.

### 2.1 Risk modules

There are many risks that can have a negative impact on a scheme's finances, by affecting asset and liability values, e.g., the change in the value of assets and liabilities caused by downward changes in the level of the yield curve. The six risk modules considered under the risk measure comprise five market risks and one non-market risk (longevity):

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<sup>1</sup> [Defined benefit financial risk measure](#)

**Table 1 Risk modules**

Risk module	Application
Equity market risk	Equity portfolios that are broadly invested and globally diversified.
Interest rate risk	Fixed rate instruments (corporate and government bonds) and interest rate derivatives.
Spread or credit risk	Corporate bonds only, and not sovereign bonds. The parameters for this risk module vary depending on the credit ratings of the individual corporate bonds
Property risk	Property portfolios that are broadly invested and diversified.
Currency risk	Non-euro denominated holdings.
Longevity risk (also known as mortality risk)	Pensions in payment. Owing to the time it would take for longevity changes to be reflected in the statutory minimum transfer value basis it is assumed to have no impact on non-pensioner liabilities.

## 2.2 Shock size

The size of shocks, i.e., the changes in value of scheme assets or liabilities, for each risk module, is available in the risk measure spreadsheet available on the Authority's website. Some examples of percentage change in asset values and interest rate movements are shown in the table below.

**Table 2 Sample shocks**

Shock sizes		Risk measure percentage levels						
		50%	60%	75%	85%	90%	97.5%	99.5%
Risk modules	Equity	0%	0%	-5%	-10%	-15%	-30%	-40%
	Interest rate (basis points)	0	-10	-20	-30	-40	-60	-75
	Property	0%	0%	0%	-4%	-7%	-15%	-25%
	Longevity	0%	-2%	-5%	-8%	-10%	-15%	-20%

(1) This table indicates, for example, that calculating the risk measure at the 90% level includes shocks of a 15% decline in equity values, a decline in yield curves of 40 basis points, a decline in property values of 7% and a decline in mortality rate of 10%.

(2) The longevity shock parameters represent the level of immediate once-off permanent reduction to assumed future mortality rates.

### 3. Notes for practitioners on the use of the spreadsheet

The notes below include a step-by-step guide on the results that can be derived from the spreadsheet. There is also a simple worked example.

#### 3.1 Calculation of the risk measure

The risk measure is calculated by a sequence of steps:

**Step 1:** Establish the baseline financial position of the scheme at the effective date. For this purpose, the scheme's funding standard liabilities, including the funding standard reserve, are compared with the scheme's resources. For schemes that are on a funding proposal, see the note below in section 3.5.

**Step 2:** Identify the relevant risk modules. Financial risks will arise from both the scheme's assets and the scheme's liabilities.

**Step 3:** Calculate the shocks under each risk module at the 99.5% risk measure percentage level.

**Step 4:** Calculate the diversification benefits arising from the correlation of risks using the formula documented in the spreadsheet.

**Step 5:** Compare the total shocks less diversification benefits with the excess of scheme assets over liabilities.

**Step 6:** If necessary, recalculate the shocks and the diversification benefits at successively lower risk measure percentage levels, until the highest percentage level that the scheme can absorb is found.

This level is taken as the DB financial risk measure for the scheme.

#### 3.2 Identifying the relevant risk modules

The table below illustrates how a typical DB scheme might appear under step 2 of the above, i.e., mapping of the application of the risk modules onto the scheme.



**Table 3 Identification of risk occurrences in a typical DB scheme**

Risk sources	Equity	Interest rate	Credit Stress	Property	Currency	Longevity
Pensioner liability		✓				✓
Non-pensioner liability		✓				
Equity holdings	✓					
Property holdings				✓		
Non-Eurozone property				✓	✓	
Euro sovereign bond holding		✓				
Non-euro sovereign bond holding		✓	✓		✓	

- (1) In calculating Pensions Authority risk measures, holdings of cash on deposit with credit institutions are assumed to be risk free.
- (2) The funding standard reserve and windup expenses are taken as not being sources of risk and do not need to be recalculated in calculating the risk measure.
- (3) Non-pensioner liabilities are assumed to carry no longevity stress.
- (4) Government bonds are assumed to carry no spread/credit risk.
- (5) Shocks can be negative due to risk mitigation or hedging positions held by the scheme.
- (6) A variation on the interest rate module is included in the spreadsheet to account for the effect of changes in market value adjustments (MVAs) and the impact on non-pensioner liabilities.

### 3.3 Risk module calculation example

An example of how to apply the six-step calculation process for a simplified DB scheme is given below:

**Step 1:** Establish the scheme liabilities and assets under the funding standard.

*Example: The liabilities and assets are established as €100m and €105m respectively.*

**Step 2:** Identify the relevant risk modules.



*Example: It is determined that the material risks arise from the liabilities (mortality and interest risks) and, on the asset side, from the equity, bond and property holdings.*

**Step 3:** Calculate the shocks under each risk module at the 99.5% risk measure percentage level.

*Example: The market-related (non-mortality) shocks are calculated at €17m. The most significant component of this is a shock of €12m arising from a €30m equity holding (40%, from Table 2, of €30m). The mortality related shock arising from pensioners is calculated in the spreadsheet at €5m.*

**Step 4:** Calculate the diversification benefits.

*Example: The diversification benefit is calculated using the formula in the spreadsheet as €2m, leaving a net shock of €15m.*

**Step 5:** Assess the shock absorption ability.

*Example: The excess of assets over liabilities is €5m, which is less than the net shock of €15m, so the scheme is not funded to the 99.5% level.*

**Step 6:** The calculation is repeated as may be necessary at the lower risk levels.

*Example: The scheme was found to be not funded to the 99.5% level, so the calculations are repeated at the 97.5% level, and at lower levels as necessary, until a level is found where the excess of assets is greater than the shock total.*

### **3.4 Risk measure spreadsheet**

The spreadsheet has several tabs. Below are notes on the tabs related to the calculation steps listed above.

#### **Balance sheet tab**

The completion of this sheet achieves Step 1 above, i.e., establishing the funding standard assets and liabilities. The critical information derived from this sheet is the difference between the total assets and liabilities. Further on in the process, this amount is compared with the calculated shock amount to see if the scheme can absorb the shock without further assistance.

## Shocks tab

Completion of this sheet achieves Steps 2 and 3 above. In general, the practitioner needs to create at least one 'shock row' on the Shocks tab to correspond with each material risk identified (see Table 3 above).

It will frequently be the case that there is more than one row on the shocks tab for each material risk identified. For example, in the case of longevity risk, there could be four rows for pensioners, covering two genders and two escalations, or separate rows for different age bands. As another example, for a scheme that had bond holdings with significant amounts classified under different credit quality steps, there would need to be a separate row for each credit quality step where there is a material holding. The practitioner needs to input the following information into at least four columns for each row to enable the spreadsheet carry out the shock calculation. These columns are:

- Description.
- Euro risk amount (nominal). This is the base amount that the spreadsheet will use to apply the stress parameter to generate the shock value. For assets other than derivatives, this will be the open market value of the assets. For derivatives, the amount entered should reflect the nominal risk exposure.
- Risk-type. This is a drop-down menu of the available risk types.
- Shock calculation method. This is a drop-down menu of the available calculation methods for the different risk modules. For some risk modules, there may not be a choice. For example, the equity risk module is always calculated on a percentage basis. However, when using the interest rate risk module, two choices are available: basis point movements (bps) and MVA changes.
- Parameter values. For each calculation type, there may be further values to input (such as weighted average terms). When input of a parameter is required, information is displayed beside the input cell indicating the data expected.

## Results tab

There is only one field where input is required on this tab, the risk percentage level.

### 3.5 Notes on specific issues

- Schemes on a funding proposal: in the 'Balance sheet' tab, the practitioner will note just one item, an amount equal to the excess of assets over the minimum

required for the funding proposal to remain on track. The Shocks tab will be completed in the usual way, i.e., including the financial risks arising from the actual assets and liabilities.

- As the objective of the measure is to assign the scheme to one of a limited choice of stress levels, the Authority does not expect accuracy beyond what is required to achieve this.
- For multi-asset funds, a look-through approach covering as much of the holding as possible is preferable, in order not to understate or overstate the risk significantly.
- Second-order or passage-of-time effects are not considered., e.g., there is no need to recalculate a post-stress funding standard reserve, or the passage-of-time effect on liability calculations.
- Fixed income assets without a credit rating should be assigned a credit quality step appropriate to their yield.
- If the practitioner is in doubt about the appropriate risk modules to apply to a material aspect of the scheme's finances, the practitioner should apply a risk module or combination of risk modules that would approximate the risk.

If further information is required, please email [info@pensionsauthority.ie](mailto:info@pensionsauthority.ie).