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Agenda

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How secure is the nest egg? Risk and return for private pension schemes

Private pension schemes remain in the spotlight, as governments look for ways to ensure that people save enough for old age. Decisions about the distant future need to be taken at a relatively early stage in a person's working life, and there is considerable risk in saving over such a long time. What are the main risks that can reduce returns from private pension schemes, which ones can be mitigated through scheme design, and at what cost?

From the viewpoint of the individual saver, the ultimate performance of a pension scheme depends on the contributions they and their employer (and, with collective schemes, other members of the scheme) make, and the returns that the scheme provides (after charges have been applied). The risks that can affect performance over a working lifetime are treated differently by different pension systems, but ultimately they all face the same set of inherent risks:

- contribution risk: the risk that the individual (and their employer and the government) does not provide sufficient contributions to the scheme;
- accumulation risk: the risk of asset values underperforming or schemes defaulting;
- annuitisation risk: the risk surrounding the income stream that the pension provides to the beneficiary until their death (and, often, the death of their spouse).

The principle distinction in private pension schemes is whether they are 'defined benefit' (DB) or 'defined contribution' (DC). With DB schemes, the benefits to retiring members are—in theory—pre-determined, and therefore any unexpected outcomes (such as poor investment returns) will require contributions to be changed. This, in turn, means that the responsibility for the various risks falls primarily on the current contributors to the pension scheme—i.e. the active members and/or the employer sponsoring the scheme. In contrast, DC schemes, in their purest form, place the risk primarily on the individual, who chooses their contributions and faces the full extent of accumulation and annuitisation risk.

In practice there is a wide range of schemes in Europe that combine elements of both systems. For example, Riester pensions in Germany provide a minimum asset real return guarantee of 1.75% per year, which suggests some extent of DB, but savers hope for higher returns in the form of a 'surplus', which makes the pensions more like a DC scheme. In the Netherlands, DB schemes are commonplace, but experience over the past few years in particular has shown that they do not fully insulate individuals from the volatility of asset prices because the regulator (De Nederlandsche Bank) can and does mandate changes in promised benefits to ensure that the schemes remain sufficiently well-funded.

When designing a private pension system to manage and share the risks to final pension incomes, it is necessary to identify the sources of risk and assess their relative magnitudes. This article looks at the extent of some of the primary risks and how different pension systems address them, in order to provide insights into how risk can be addressed through pension system design.

Assumptions in this article

The relative magnitudes of different risks facing pension income are assessed in this article for a hypothetical 'average' worker, for different types of employer-arranged pension scheme. This 'average' worker has an average wage profile that increases in line with an assumed real wage growth rate of 1% per year.1 The worker is assumed to work and contribute to the scheme (as an 'active member') from age 25 to 64 inclusive, retiring at 65. Other assumptions include long-term pension asset growth rates, which (for simplicity) are assumed to be either equities or bonds (growing at 5% and 2% per year respectively);2 the risks surrounding these projections are considered below. The base case for the pension annuity rate for a person retiring at 65 is an assumed annuity rate of 5%. All calculations have been conducted in real terms, in order to avoid having to make adjustments for price inflation over long periods of time.

Note: [1] Due to data availability, data on median wages by age was taken from the UK's Annual Survey of Hours and Earnings. The assumption of 1% real wage growth is broadly consistent with long-term economic growth rate predictions for the EU. 2 These assumptions are based on an assumed real risk-free rate of interest of 2%, an equity market risk premium of 3.5%, and fund management fees of 0.5%. Alternative assumptions could be used.

Contribution risk

The most obvious risk to pension savings is not contributing to the pension in the first place. The relationship between contributing to a pension and the amount received from the pension is straightforward for final-salary DB schemes, but quite different for average-salary DB schemes and for DC schemes.

Pure DB pension schemes typically calculate pension income as a function of the number of years the individual paid into the scheme and their final or average salary, with little room for altering the size of contributions—active members and the employer will typically each contribute a fixed percentage of wages. The scheme will have an accrual rate, for example that one year of contributions provides 1/60th of income at retirement. So, in this example, if a worker drops out of the scheme for five years, their final pension income will be reduced by 5/60ths of the relevant salary level, which (with 40 working years) means that the final pension income is reduced by 12.5%.

The relevant salary level could also be affected, however. For final-salary DB schemes, the pension income is calculated according to the last salary received as an active member of the scheme, which means that the salary level at the time when the worker stops contributing to the scheme for five years should not matter, provided that they return to the same scheme afterwards.[1] In recent years, however, many DB schemes have shifted from final- to average-salary calculations, whereby salary levels throughout the individual's career determine the final pension.[2]

With pure DC schemes, on the other hand, the timing of contributions matters as well as their size. The earlier that contributions are made over the lifetime of the pension, the greater the final pension income will be, as the assets have a longer time to grow?

Based on the above assumptions, Table 1 estimates the impact on final pension income of a five-year 'sabbatical' from making pension contributions. With a DC scheme, missing the first five years of contributions up to age 30, for example, has more than three times the impact on final pension income than missing the last five years (60–64), even though the salary (in real terms) is higher at age 60. With a final-salary DB scheme, the impact is the same in all cases, while the impact with the average-salary DB scheme reflects the income profile, which is assumed to peak when the worker is around 50, in line with the average wage profile.

Table 1 Impact of the loss of five years of pension contributions

Scenario for missing contributions	Final-salary DB scheme	Average-salary DB scheme	Pure DC scheme
Full contributions for 40 years (25–64)	Base case	Base case	Base case
Missing contributions aged 25–29	-12.5%	-8.1%	-17.7%
Missing contributions aged 35–39	-12.5%	-12.2%	-16.3%
Missing contributions aged 50–54	-12.5%	-13.7%	-8.8%
Missing contributions aged 60–64	-12.5%	-13.3%	-5.2%
Scenario for missing contributions	Final-salary DB scheme	Average-salary DB scheme	Pure DC scheme

Source: Oxera illustrative scenarios.

Accumulation risk

The risk surrounding the accumulation of pension assets during a person's working life is most apparent to members of DC pension schemes, although ultimately it must affect members of all schemes.

For members of DC schemes, accumulation risk is primarily about investment performance risk, which in turn depends on the type of pension assets held. There are many asset classes, with different risk profiles, which change over time and could be the subject of considerable debate. Importantly for pension assets, however, a worker in their early years would need to consider risk over a substantial period of time, and asset price volatility over a 40-year timeframe differs from the shorter-term volatility that other investors often focus on.

Consider the returns from investing in nominal government bonds compared with equity markets. Government bond yields are referred to as the 'risk-free rate' of return, as the chance of most European governments defaulting is very low, and returns from these bonds over short periods of time are highly certain. However, real (inflation-adjusted) returns to these bonds over long periods of time have proven to be much more risky, primarily due to periods of unexpected inflation (e.g. in the 1970s).

Tables 2 and 3 present results for the ex post real investment returns on the main equity markets and government bonds for six countries over a series of 30-year periods since the Second World War. After taking account of inflation, average annual equity returns over a 30-year period averaged around 6.9% across the selected countries, but the average annual return varied from as low as 0.4% (1960–90 in Italy) to as high as 12.5% (1980–2010 in Sweden). Average returns from government bonds were typically much lower, at just 3.0% across all countries, with negative returns in the 1970s particularly affecting performance. Indeed, in only two

cases, highlighted in Table 3, were equity returns lower than bond returns over a 30-year period.

Table 2 Annualised real equity returns, 1950–2010 (%)

	1950–80	1960–90	1970–2000	1980–2010
France	5.3	4.9	8.9	8.2
Germany	10.3	4.9	6.9	6.8
Italy	1.9	0.4	2.5	5.5
Netherlands	4.6	5.5	10.5	9.5
Sweden	4.4	7.9	11.5	12.5
UK	6.1	6.6	8.1	8.3

Table 2 Annualised real equity returns, 1950–2010 (%)

	1950–80	1960–90	1970–2000	1980–2010
France	2.1	4.1	6.6	**8.5**
Germany	2.9	3.1	4.0	5.4
Italy	-0.6	-0.6	2.2	**5.8**
Netherlands	-2.3	0.6	3.8	6.0
Sweden	-2.2	0.2	3.8	7.0
UK	-2.7	0.4	4.0	7.3

Note: The highlighted figures are the only examples where the returns to bonds are higher than the returns to equities (by 0.3% in both cases).

Source: Oxera analysis, based on Dimson, E., Marsh, P. and Staunton, M. (2012), 'Global Investment Returns Yearbook 2012'.

An alternative perspective on equity and bond returns can be obtained by considering how cumulative returns for the hypothetical average worker would have varied over time. Figure 1 presents the results of an illustrative analysis of UK equity and bond returns over the period 1950 to 2012. The funds grew (or shrank) over time in line with the real asset returns,[3] with the final value of the pension pot reported (in real, inflation-adjusted terms).

Figure 1 Accumulated pension pot over time: equity versus bonds (UK)

Source: Oxera analysis, based on Dimson, E., Marsh, P. and Staunton, M. (2012), 'Global Investment Returns Yearbook 2012'.

The variation in the final value of the pension pot for equity investments is quite striking. Based on savings in the 40 years up to the start of 2000, the pension pot would have been worth approximately £1.2m, while based on the same savings up to 2003, it would have been worth around £615,000, not much more than half the previous value. This variation over three years would be due entirely to the variation in equity returns.

The short-term variation in the final value of a pension pot invested entirely in bonds would have been much less, although there have been large changes in real returns over longer periods of time. Real returns on bonds in the 40 years up to 1990 were poor, primarily due to the poor returns on nominal bonds during the high inflation periods of the 1970s. Bond returns for later periods benefited from the relatively high real returns of nominal bonds in the 1990s.

Historically, therefore, equity returns have been much more volatile than bond returns in the short to medium term, but have outperformed bonds over long periods of time. This highlights the importance of making the right investment decisions early on.

Annuitisation risk

Upon retirement, DC pension holders may use the accumulated pension pot to purchase a lifetime annuity, which will provide a guaranteed income for the rest of their lives. The use of pension annuities varies by country, with the Netherlands, the UK and Germany having the most-developed markets. However, annuities are expected to become more common in other markets as an increased number of DC pension schemes mature.

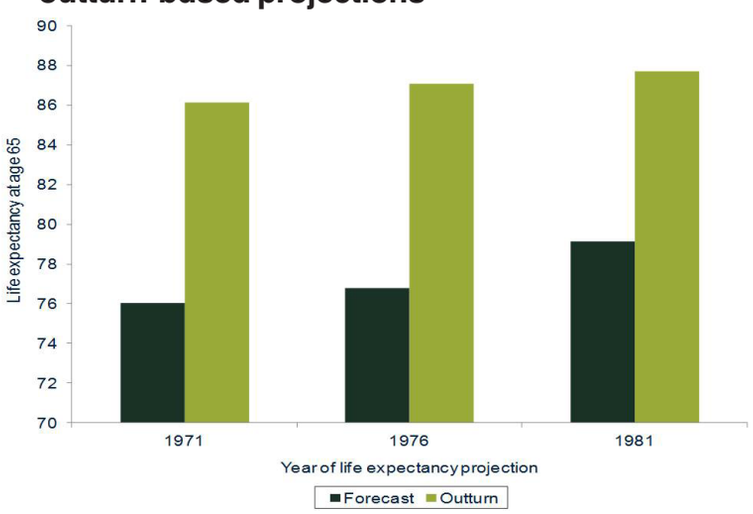
The size of the pension paid by an annuity depends on the annuity rate, typically calculated as the annual pension income over the value of the pension annuity. This in turn depends on:

- charges for providing the annuity;
- the prevailing bond yield (as the insurance company will typically invest the sum in a low-risk asset);
- projected longevity (as the indicator of the likely lifespan of the beneficiary).

Pension annuity rates have fallen significantly in recent years due to falling real bond yields and increased projected longevity. The fall in real yields has been mostly unexpected,[4] while the increase in longevity was expected but has been underestimated.

Figure 2 compares projections of UK life expectancy made in 1971, 1976 and 1981 with actual outturns. The data shows the projected life expectancy of a 35-year-old male (at the time of the projection) who reaches the age of 65, to indicate how long they could be expected to claim a pension. So, in 1971, a male who reached the age of 65 in 2001 was expected to live (on average) to 76, but now that same male is expected to live to 86.

Figure 2 Life expectancy of a 35-year-old male when aged 65—UK forecasts versus outturn-based projections



Note: Owing to the limited horizon of the ONS forecast, the forecasts in the table are estimated by extrapolating the exponential trend observed in the ONS forecast for mortality rates. The outturn-based projections are based on observed mortality rates for the years before 2010, and on the 2010 ONS forecasts for subsequent years.

Source: ONS, and Oxera analysis.

Relative importance of risk factors

There is considerable uncertainty involved in building up a nest egg for retirement, as the ability to save, the performance of investments, and even one's life expectancy following retirement are very unclear when a young worker begins to save for a distant future need. Different pension systems tackle these risks in different ways, although the underlying risks are never entirely eliminated. Pension system design must carefully consider how each risk will be tackled, and how the cost will be shared between stakeholders. It is therefore helpful to compare the relative importance of risk factors. Based on the analysis described above, Table 4 presents estimates from various scenarios on pension income for the hypothetical 'average' worker with a standard DC pension scheme.

The scenarios are not directly comparable, as the probability of different scenarios occurring in the future is itself highly uncertain. However, the combination of an unexpected increase in life expectancy and a fall in real interest rates, both of which have occurred in recent years, has a similar impact to the poor equity return scenario.

For reference, the table also presents the impact that a 0.5 percentage point increase in the annual management charge would have on pension income, based on the assumptions used in this analysis.

Table 4 Impact on pension income of selected scenarios

Scenario	Impact on final pension income
Start saving for pension five years later (aged 30 rather than aged 25)	-18%
Poor equity market performance[1]	-38%
Unexpected ten-year increase in life expectancy from current expectations	-22%
Lower real long-term interest rate of 0.5% (rather than base case of 2%)	-21%
Annual management charge of 1% per year (rather than the 0.5% the base case)	-11%

Note: [1] Based on the fifth percentile of the historic post-war UK equity market performance adjusted for today's lower real interest rates, meaning that only 5% of outcomes were worse than this scenario

Source: Oxera analysis.

Conclusion

An analysis of relative risk magnitudes can indicate the proportion of the overall risk that can be allocated to different stakeholders, depending on the design of the pension scheme. There has been some recent debate about alternative possible pension schemes that share risk between employers and employees.[5] For example, a 'cash balance scheme' describes a pension scheme in which the company guarantees a fixed pension pot on retirement (based on years of employment and wage) so that the employee faces only the annuity risk at retirement.

Any economic assessment of alternative pension systems should properly consider the extent of risk to be shared between employers and employees (and government), alongside the costs of mitigating those risks. The analytical framework described here provides a useful guide to the relative magnitude of different risks under consideration.

This article is based on Oxera analysis for the European Commission on the private pension systems in 14 EU member states, although different assumptions have been used in the calculations here (and therefore some results differ). See Oxera (2013), 'Study on the position of savers in private pension products', Prepared for the DG Internal Market and Services of the European Commission and the Financial Services User Group, 25 January. For a discussion of different aspects of pension design and risk, see also Oxera (2012), 'Dutch lessons: defined-ambition pensions in the Netherlands', Agenda, December; and Oxera (2012), 'Weathering the storm—should pension funds switch to low-risk assets?', Agenda, January.

[1] If the worker shifts to a new scheme, or is treated as a new member of the same scheme, their previous pension entitlement will be based on the final salary received before exiting the scheme.

[2] For example, in the Netherlands, between 2000 and 2010 most DB schemes shifted from the final-salary 'eindloonsysteem' to the average-salary 'middelloonsysteem'.

[3] This simple illustration makes no adjustments for pension fund charges, which would reduce the pension pot.

[4] There was some expectation in the 1990s that yields would fall in a lower-inflation environment and due to an ageing society.

[5] For example, see the debate published by Pensions Insight, including Pensions Insight (2012), 'Cash balance schemes merit a second look', White Paper, November.