Instability in USS valuations: the importance of the discount rate

The statutory valuation of the Universities Superannuation Scheme went from a deficit of £14.1 billion to a surplus of £7.4 billion in three years between March 2020 to March 2023. What explains this massive change?

The strongest factor causing instability in pension valuations is the **discount rate** used by the actuary to estimate the scheme's **liabilities**. Although the name - 'discount' - sounds rather innocuous: a mere detail that implies a small technical adjustment somehow that only actuaries and accountants need worry about - in fact the discount rate is of huge importance because it has an enormous effect on the valuation. It is therefore central to the whole stability question and we need to understand it and how it works. So what is it and how has it had such a powerful effect on USS valuations?

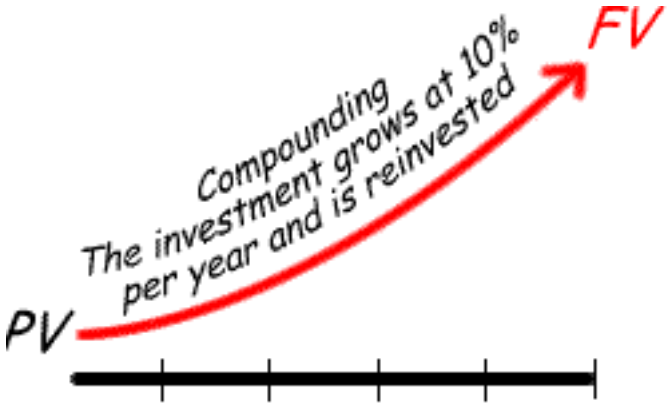
It is used in a calculation to convert a long sequence of future pensions payments that the actuary expects to be needed into a single equivalent number (their **present value**).

Discounting has the same mathematics as **compound interest** - which the legendary investor Warren Buffett called "the strongest force in nature" and Albert Einstein reputedly called the eighth wonder of the world. The present value is therefore very sensitive to the precise value of the discount rate used.

Discounting is simply compound interest in reverse and uses the same mathematical formula. This is illustrated by the following diagram.

Compounding and discounting

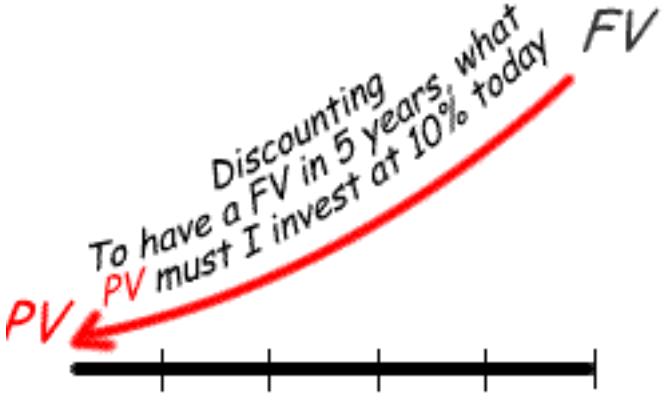
Compound interest



Compounding

You put money in an account today (its present value - **PV**) for a promised rate of return (interest - eg 10%) for a number of periods (eg 5 years). The interest received is reinvested at the end of each period - it compounds. The future value (**FV**) is the value of the investment compounded at the end of a given number of periods. We know the value of our initial investment and the interest rate, and can calculate the **FV** at the end of any period.

Discounting



It is the reverse of compounding. We know how much we need on a specific date in the future (**FV**) and calculate how much we need to invest today, **PV**, at an interest rate. Work from the future back to the present.

The choice of discount rate

Pension Trustees are legally required to choose an appropriate discount rate for their scheme taking account of all its specific circumstances especially risk.

The **Pensions Regulations** say that the trustees must choose a discount rate **prudently** (having taken actuarial advice) from a range between (1) returns on low risk investments such as corporate or government bonds (‘**gilts’**) which pay fixed income with very low risk of default, and (2) the higher **expected returns on its investment portfolio** (‘**best estimate’**), allowing a suitable margin for prudence.

The Regulations do not mandate schemes to use a gilts-based discount rate. Since the USS is an open, immature scheme with a strong covenant and long covenant horizon, its investments are (wisely) mainly in long term growth assets. It makes sense for it to base its choice of discount rate on the expected returns on these investments (because they pay pensions in the future). That means it can use a **high discount rate** while complying with the Regulations.

In practice the USS actuary expresses the expected returns as ‘gilts’ plus an allowance for the expected higher returns it should get from its investments (which are mainly not in gilts) rather than ‘best estimate’ minus a prudent margin. This is problematic when considering stability. In the last two valuations USS set out their assumptions as follows[1]:

2020 valuation:

Return from gilts (%) 0.7

	Return above gilts (%)	Discount rate (%)
Pre-retirement portfolio	2.75	**3.45**
Post-retirement portfolio	1.00	**1.7**

2023 valuation

Return from gilts (%) 3.7

	Return above gilts (%)	Discount rate (%)
Pre-retirement portfolio	2.5	**6.2**
Post-retirement portfolio	0.9	**4.6**

[1] The USS uses two discount rates on advice from the JEP2 committee: separate rates for pre- and post-retirement.

If we only look at the spreads over the gilt yield, these figures seem to imply that the discount rate might not have changed by very much between the valuations. The assumed margin above gilts - 'Return Above Gilts' - are not *very* different in both cases: for both pre- and post-retirement sides of the dual discount rate.

But that would be a serious mistake because, although gilts themselves are risk-free investments if held to maturity, gilt **yields are bond-market determined** and therefore vary to a greater or lesser extent according to market conditions. Over the three-year period 2020-2023 they have been exceptionally so as a result of government monetary policy. So while investing in gilts could be a low risk strategy for a scheme, valuing liabilities with a discount rate based on gilt market yields is high risk whatever the investment assets.

The effect of changing gilt rates

In fact these figures imply a very large change to the USS discount rates and consequently enormous improvement in the liabilities. As follows:

	Pre Ret. DR (%)	Post Ret. DR (%)	Liabilities(TPs)(£bn)	Assets(£bn)
2020	3.45	1.7	80.6	66.5
2023	6.2	4.6	65.7	73.1

The massive fall in liabilities (also known as Technical Provisions in the jargon) by 18.4%, from £80.6 billion to £65.7 billion, has been driven almost entirely by the gilt yield that has increased more than five-fold.[2] Best estimate returns will not have changed by anything like as much.

But the gilt yield has little relevance for the USS investment returns. That is because USS's investments are mainly in equities and other growth assets - whose higher expected returns are not linked to, or strongly correlated with, gilt yields. Just because the Bank of England has increased interest rates as part of its counter-inflation policy, leading to the rise in gilt yields, does not mean that it can be assumed that the returns to investments in the real - productive - economy have also increased to the same extent.

[2] This is strongly confirmed by the detailed analysis of the changes to the components of the valuation, 'Reconciliation of the changes', in the Actuarial Valuation Report 2023, page 6. https://www.uss.co.uk/about-us/valuation-and-funding/2023-valuation?search=abc6f93d-

The correlation between returns on equities and government bonds (gilts) has been shown by many studies historically to be (a) very low, and (b) highly variable depending on macroeconomic and cyclical factors.[3] So it is a serious methodological error to believe expected investment returns - as the basis for a valuation discount rate - can just be assumed to be gilts plus a (constant) margin.

<u>"The 2020 valuation was a long way out" or "Was there really a deficit in 2020?"</u>

This is a really important point with serious implications for the valuation.

In order to see this, consider the returns to equities. Historical data on investment returns shows that world equities returned a mean real rate of 5% since 1900.[4] If we combine this with the projected CPI inflation rates assumed of 2.1% in 2020 and 3% in 2023 valuation reports this would suggest nominal rates of 7.1% and 8% - on equities. Then, roughly, and for illustration, assuming a 60:40 investment strategy between equities and bonds, that might suggest best estimate rates around 5.64% in 2020 and 6.92% in 2023.

These calculations suggest that, even after making a reduction for prudence, the 2020 calculation was a long way out compared with what a Best Estimate discount rate would have given.

These figures suggest that the 2020 valuation was wrong at least as much because the calculation was done using too low discount rates, that had little relevance to the open scheme invested mostly in real growth assets, as to economic recession.[5] The cause of the large deficit was the flawed valuation methodology combined with monetary policy by the government.

The question remains: what is the purpose of linking discount rates to gilts rather than the best estimate returns on the actual investment portfolio?

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[3] For example Timpson, James, Equities vs. Gilts: 118 Years of UK Market Data, Coutiers Research Note, 21 June 2018, http://tinyurl.com/356w2vn8, which reports a correlation coefficient of 0.505.

[4] Dimson, Elroy, Marsh, Paul, & Staunton, Mike. 2020. Credit Suisse Global Investment Returns Yearbook 2020 summary edition. Zurich: Credit Suisse Research Institute

[5] The usual explanation. However the assets at the 2018 valuation had been lower £63.7bn and at 2017 £60 bn.

Actuaries seem wedded to the practice. But should they not perhaps rethink in view of the recent high instability observed in valuations?

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