

Pensions and Growth: Smoothing in Pension Scheme Funding Valuations*

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Pension Scheme Deficits

Deficits in U.K. defined benefit pension schemes have been attributed to poorly performing stock markets and to increased longevity. An additional reason for the large deficits since the early 2000s has been low bond yields. This has been exacerbated by the economic crisis dating from 2008 which saw a flight of capital into the relative safety of government bonds, and by the effect of the monetary policy of quantitative easing.

Pension liabilities are measured by discounting promised pension benefits using long-term interest rates. Very low bond yields therefore inflate liabilities. On the other hand, pension scheme assets consist of bonds as well as equities, property and other asset classes, and these assets are on the whole less sensitive to long-term bond yields than pension liabilities. Because the deficit in a pension plan equals its pension liabilities net of assets, any mismatch between assets and liabilities means that low bond yields will inflate the pension deficit. This then triggers special contributions to be paid by pension scheme sponsors in order to fund these deficits, at the very time when many of these sponsors may be struggling in difficult economic conditions.

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Smoothing in Pension Scheme Valuations

Various parties have recently asked the UK Government to consider allowing pension schemes to calculate liabilities using a smoothed average of bond yields over several years. The aim is to moderate the impact of what are perceived to be extraordinarily low bond yields, and therefore to moderate both the size of the deficits that emerge and the size of the required contributions from sponsors.

Evidence from Pension Accounting Research

During the last 20 years, pension accounting standards around the world have adopted a fair-value approach, eliminating any smoothing in income statements and balance sheets. Much of the evidence in financial research indicates that this is beneficial to investors in the sense that it improves transparency of corporate finances. There is also some evidence, however, that non-smoothed fair-value accounting may actually impair the value relevance of pension accounts.¹ Smoothing can separate persistent income from volatile gains and losses, thereby helping investors assess fundamental value.

Evidence from Corporate Finance Research

The Call for Evidence from the Department of Work and Pensions² states that “some companies have suggested that high deficits are restricting their ability to raise finance, although there is little firm evidence to demonstrate this”. Recent research³ in the U.S. does in fact provide clear evidence of this: financially constrained firms facing an increase in mandatory contributions also face an increase in cost of capital. If this affects a large enough number of firms, then this is likely to constrain economic growth.

There is also evidence of a significant negative association between mandatory pension contributions by companies and their capital investment. Indeed, in the U.S., increased mandatory contributions⁴ by firms are followed by depressed stock returns. On the other hand, companies with well-funded pension schemes can use their *discretionary*

¹Hann R.N. et al. (2007) Fair-value pension accounting. *Journal of Accounting and Economics*, 44, 3, 328-358.

²<http://www.dwp.gov.uk/docs/pensions-and-growth-call-for-evidence.pdf>

³Campbell J.L. et al. (2012). Financing constraints and the cost of capital: evidence from the funding of corporate pension plans. *Review of Financial Studies*, 25(3), 868–912.

⁴Mandatory contributions are defined in the U.S. Pension Protection Act 2006.

(cf. mandatory) contributions to their pension plans to their advantage: discretionary pension contributions are a source of tax savings and of flexibility, helping firms to lower their financial and operating leverage. This may create value for firms, in the presence of market imperfections.

All of this suggests that the call from companies in the U.K. for greater smoothing to be allowed in their pension funding valuations is grounded in financial realities. This does not mean, however, that smoothing is effective or desirable.

International Evidence from the Financial Crisis

Pension plan sponsors around the world have been under pressure since the financial crisis of 2008 and, with this international perspective, it is unsurprising that there are demands in the U.K. for greater smoothing of funding valuations and an alleviation of funding exigencies. In Denmark, the valuation of pension liabilities using unsmoothed market interest rates was temporarily suspended in 2008. There were also suggestions that the swap rates used in Dutch pension funds should be averaged (or smoothed over longer periods). The U.S. and Japan both use liability discount rates which involve an average of the last few years' long-term bond yields, but it is arguable whether their pension funds have weathered the downturn better than in other countries.

Smoothing is Widespread in Retirement Funding

To some extent, the smoothing of pension cash flows is intrinsic to the funding of pensions. A major motivation for companies to pre-fund pension benefits is to spread over time the required contributions towards these benefits, and hence to reduce the strain on cash flows.

In many countries, smoothing is *explicitly* recognised. For example, countries such as Norway and Switzerland have separate contingency reserves, known variously as “premium funds”, “asset fluctuation reserves” or “employer contribution reserves”. In the U.S., asset values may be averaged over a few years, in addition to the smoothing that is permitted on liability values through averaged discount rates. Counter-cyclical measures are a key part of the Solvency II regime in the E.U., and it is proposed that this be applied to European pension funds. Capital requirements are adjusted when there are large market falls relative to an averaged value of equity prices, thereby inducing an element of smoothing.

In the U.K., and elsewhere, pension funding rules and practice contain *implicit* smoothing mechanisms. A key example is, of course, the flexible recovery periods over which

companies are required to make good shortfalls from statutory funding objectives. Another example is the latitude in the choice of actuarial funding methods and assumptions under the Scheme Specific Funding regime. The decision over whether to smooth liability discount rates and asset values must therefore be regarded in this wider context.

Smoothing Increases Tail Risk

Given the deep losses experienced by pension funds worldwide in the financial crisis, and given that smoothing is widespread in pension funding internationally, it is natural to ask whether smoothing moderates volatility (at least partially), or whether it actually contributes to risk. Recent research at Cass Business School⁵ addresses precisely this issue and concludes that *smoothing increases tail risk in pension funds*.

Tail risk is defined here as the occurrence of extreme losses with a higher probability than may be normally expected. The evidence, both in a stylized mathematical model and in more realistic simulations, suggests that smoothing and deferring pension cash flows increases the frequency of large losses and deficits in pension schemes. Indeed, tail risk increases if smoothing is more pronounced.

Our starting premise in this research is that pension liabilities are not completely marketable and therefore not fully hedgeable. Losses arise from imperfect, albeit optimal, hedging. In seeking to smooth these cash flows inter-temporally and counter-cyclically, pension funding rules and practice delay the emergence of possible funding problems, which may then accumulate with adverse dynamic effects. More specifically, the presence of background (unhedgeable) risk means that this delayed feedback skews and enlarges the distribution of outcomes for a pension fund, making extreme losses more likely.

This has three important implications:

1. *Regulators* should be aware that smoothed funding methods must be monitored as they may engender risk that may not be observable in normal financial circumstances. This may manifest itself in the form of rare but large losses, which will adversely affect the security of employee retirement benefits. Pension funding rules should be carefully designed to limit the extent of smoothing that is permissible.
2. *Policy-makers* should consider all in-built sources of smoothing and counter-cyclicality, and the combined dynamic effects caused not just by funding rules but also

⁵Owadally, M.I. (2013). ARCH models, bilinear processes, and tail risk in pension plans. *Review of Quantitative Finance and Accounting*, Conditionally accepted.

by funding practices and by discretionary employer contributions being managed for tax or operational reasons. Smoothed values may work under normal circumstances but, when markets are distressed, nonlinear dynamic effects may entail unpredictably large but rare losses, both systemically and in individual pension funds. This will eventually divert funds away from investment by firms and slow down economic growth.

3. *Investors* should also be aware of the total amount of smoothing implemented in the pension funds of firms which engage in counter-cyclical deferral and smoothing of pension cash flows. Large pension losses, should they occur, are likely to affect capital investment in these firms and lead to depressed stock returns.

Smoothing Methods

If smoothing is to be implemented, a number of rules should be adhered to.

First, it is crucial that *smoothing methods are transparent and simple*. Without transparency and simplicity, it is difficult for investors, employees and indeed regulators to value correctly the pension promise made by the sponsor. This could then lead to more expensive finance, sub-optimal decisions made about retirement, inadequate pension insurance (PPF) levies etc, all of which represents a drag on economic growth.

Second, assets and liabilities must remain comparable. Consistency means that both *assets and liabilities must be smoothed on the same basis*. Smoothing one without the other risks a distortion of the investment policy of pension schemes, particularly when they have large deficits on a statutory basis, which may militate against the recovery of the pension fund.

Third, *it is more effective to smooth or defer contributions* rather than smooth assets and liabilities separately. For underfunded schemes, particularly at times of market distress, it is more effective and generates greater transparency if the Pension Regulator allows (i) more flexibility in recovery plans, (ii) longer recovery periods, and (iii) deferral of special contributions. The Pension Regulator therefore takes the right approach when emphasising the flexibility of the current funding regime.⁶

Fourth, there are various *systematic smoothing methods* which may be applied to pension funding, with suitable allowance for cash flows and discounting adjustments.⁷ In earlier

⁶Pension Regulator (2012). Pension scheme funding in the current environment. April 2012. <http://www.thepensionsregulator.gov.uk/doc-library/statements.aspx>

⁷Owadally, M.I. and Haberman, S. (2004). The treatment of assets in pension funding. *ASTIN*

research at Cass Business School^{8,9}, we have shown that exponential weighted moving averages, with smoothing periods of no more than 13 years (based on U.K. data), are optimal in the sense that they apply more weight to current market conditions than to past data, and they generate less volatility in the pension fund, for a given amount of contribution stabilisation. More recently, other researchers have suggested shorter recovery periods, by analysing pension fund insolvency through Parisian options and by using simulations to determine the optimal recovery period which regulators should allow in order to maximize employees' utility.¹⁰ They suggest recovery periods of between 1 and 5 years depending on pension plan features and other assumptions, although their work is not parameterised using U.K. data.

Revisiting Inflation Protection

Given that large deficits and high deficit-repair contributions harm companies and hurt economic growth, and given that smoothing of asset and liability values is likely to increase tail risk, one must look for alternative remedies. It is worth reiterating that deficits arise in the first place because of the mismatch between assets and liabilities, and it pays to consider whether government policy can ameliorate this mismatch, and thus stimulate private sector-led growth.

A key reason for pension asset-liability mismatch is the mandated provision of (partially) inflation-protected pensions. Because of the relative under-supply of index-linked gilts compared to the size of pension liabilities, and because of the cost of RPI/CPI swaps, inflation-related pension liabilities cannot be hedged perfectly. Equity investment provides a poor hedge against inflation. Asking pension funds to provide such inflation protection is tantamount to asking corporations to issue partially inflation-indexed bonds. Corporations are generally reluctant to do this because they have no control on inflation.

Bulletin: Journal of the International Actuarial Association, 34(2), 425–433. <http://www.actuaries.org/LIBRARY/ASTIN/vol34no2/425.pdf>

⁸Owadally, M.I. & Haberman, S. (2003). Exponential smoothing methods in pension funding. *IMA Journal of Management Mathematics*, 14, 1–15. <http://imaman.oxfordjournals.org/content/14/2/129.short>

⁹Owadally, M.I. & Haberman, S. (2004). Efficient gain and loss amortization and optimal funding in pension plans. *North American Actuarial Journal*, 8(1), 21–36. <http://www.tandfonline.com/doi/abs/10.1080/10920277.2004.10596126>

¹⁰Broeders, D. & Chen, A. (2010). Pension regulation and the market value of pension liabilities: a contingent claims analysis using Parisian options. *Journal of Banking & Finance*, 34(6), 1201–1214.

A bold move would be to require pension schemes to provide pension increases of 2%—this being the inflation target¹¹ pursued by the Bank of England—rather than provide partial inflation-indexation.¹² Pensions-in-payment are then more easily matched with conventional fixed-interest assets, reducing the volatility of deficits and addressing partly the call for smoothing to dampen required contributions. Adequacy of pension provision then becomes the responsibility of individuals and of sponsors, but also of the state, in the sense that the state must maintain monetary integrity and economic stability.

Market Inefficiencies

Another cause for asset-liability mismatch and deficits in pension schemes is that *asset prices can deviate from fundamental value* significantly and for prolonged periods. This ‘inefficiency’ can affect different markets, and different sectors of markets, in different ways at different times. For example, credit spreads and inflation risk premiums may tighten or widen in an unpredictable fashion, thereby impacting the valuation of pension schemes. Arguably, the present economic environment is a consequence of major market failures to price correctly a variety of assets, from collateralized debt obligations, to bank equity and debt, and Eurozone sovereign debt.

Thus, inefficiency is an unavoidable feature of markets and cannot be assumed away. Market-based valuation methods are underpinned by the assumption that securities are consistently priced across markets, which signifies that all assets and liabilities can be measured in a consistent fashion. This consistency is clearly lacking and the demand from some quarters for smoothing can be viewed as a demand for *state intervention to counter market failure*. However, the history of state intervention in markets—through capital controls, fixed exchange rates, transaction costs imposed ostensibly to minimize speculation etc.—displays very mixed results.

As in other forms of state intervention, one can expect that agents (pension funds in this case) will ‘game’ the system, and that proposed solutions (such as smoothing discount rates) will only help fight past battles and will become the cause of future battles. The resulting loss of transparency and of confidence in markets and institutions will deter

¹¹Should the target of 2% be changed in the future, pension schemes should not have to retroactively change their funding objective for pensions already accrued. If the remit of the Monetary Policy Committee changes away from inflation-targeting (to nominal GDP targeting, for example), then the pension revaluation rate may be adjusted accordingly.

¹²As a matter of course, active members of final-salary or career-average salary schemes will retain considerable inflation-proofing through the link of their pension to their salary.

investors and raise the cost of capital, damaging both economic growth and the welfare of employees and retirees.

There is no simple solution to ‘market inefficiencies’ but government can help pension funds by encouraging the development of a deeper and broader non-government bond market in the U.K. An ageing population means that income-generating assets will be sought after, providing cheaper finance for corporations and helping to boost growth. Tax incentives, smarter regulation, and measures to boost confidence in indices and ratings agencies can assist with innovation in debt instruments (e.g. commodity-indexed bonds, infrastructure bonds, and municipal bonds). Government could also allow or encourage institutions with long-term financial goals to raise finance through bond markets (e.g. universities, consortia of private schools, housing associations, and hospital trusts). Financing from pension funds could be readily available—specially if the current expensive form of inflation protection of pensions is withdrawn from legislation—with positive implications for economic growth. Better matching of these long-term assets to pension liabilities will also help companies with pension schemes and will obviate the need for smoothing.