The market-based regulatory framework is a source of risk leading to excessive deficits and the closure of pension schemes

Dennis Leech
Emeritus Professor of Economics
University of Warwick
d.leech@warwick.ac.uk

May 14, 2017

> The object of our analysis is, not to provide a machine, or method of blind manipulation, which will furnish an infallible answer, but to provide ourselves with an organised and orderly method of thinking out particular problems ...
>
> John Maynard Keynes

The ongoing crisis in occupational pensions, that is a result of the closure of many company superannuation schemes, and their replacement with inferior alternatives, is a ticking time bomb for society as millions of workers will in years to come face a choice between retirement with inadequate income and continuing to work into old age.

A common complaint that one sometimes hears from experienced trustees and finance managers is that a pension scheme that appeared ostensibly to have been in good shape was closed on actuarial advice, after having been shown to be in technical deficit. I wish to argue in this paper that a major contributor to such deficits are biases inherent in the approach and methods used by actuaries and accountants, based on recent developments in finance theory that are not empirically well founded.

The problems facing Defined Benefit pension schemes

The defined benefit pensions model, whereby members and employers both contribute throughout working life and members draw a pension at retirement defined by years of

contribution and salary, is an efficient way of providing decent and reliable pensions. For many years it has formed an important part of the system of social security, as well as providing funding for financing industrial investment, and its demise without an adequate replacement will prove to be a serious mistake. DB pensions have become problematic in recent years due, in part, to the fact of longer life expectancy making them more expensive.

Increased longevity, however, is not the most serious, reason many schemes are in deficit, since it does not in itself undermine the model to a fundamental degree. It can be addressed, over the long term, by making changes to scheme rules, such as increased contribution rates and raising retirement ages, without compromising the DB principle.The existential threat comes from elsewhere.

A major reason for schemes being in deficit, which strikes at the heart of the DB principle, is the market-based regulatory system, that was brought in ostensibly to protect schemes against the risk of failure. This led to the unintended consequence of increasing the risk, as a result of targeting the wrong indicator: excessively volatile asset market prices. This has had the result of many schemes that might otherwise be perfectly viable being deemed to be in deficit. The consequence of a large deficit and subsequent regulatory requirement for a recovery plan is that either the sponsoring employer must allocate substantial resources - which might otherwise be available for investment or to pay dividends or wages - to the scheme, retirement benefits being curtailed and/or the scheme being closed.

Market valuations and risk

The source of the problem is that the regulatory rules governing pension schemes place fundamental importance on market valuations. The funding requirement is that a scheme must have enough assets - valued at market prices - to cover its liabilities - valued as an actuarial estimate of the discounted present value of its expected future promised benefits. This rule is applied regardless of whether the scheme is open to accrual and accepting new members, or looking to close down. This is fundamentally different from simply requiring that there be enough money to pay the pension benefits when they fall due. That would require an assessment of prospective cash flows of income and outgo for every year in the future.

Some assume that these two approaches to valuing assets are not fundamentally different, because an efficient market ensures their equivalence: after all, theory tells us that the market value of any asset - in a perfect market - is the discounted present value of its expected future returns. Having to calculate the future expected flows of returns from the scheme's assets would therefore entail a lot of unnecessary work, and also risks making estimation errors. It is much simpler to use market prices.

That argument is false. This seriously fallacious reasoning owes more to financial theory than economic reality. In the real world markets are not perfect and asset market prices do not reflect all relevant information, as the textbooks claim. In fact the evidence from numerous empirical studies is that market prices of assets are much more volatile than theory would suggest. Therefore using them to value pension schemes means valuations are also excessively volatile. Basing assessments of funding on these valuations then means that volatility is treated as risk. But this risk is not inherent to the fundamental ability of the schemes to pay the pension promises. The risk has been created by the regulatory regime. It would be removed if valuation were to require scheme assets be valued at the discounted value of projected future dividends.

The thinking behind the regulatory regime currently in operation, and under which the great majority of schemes are in deficit, is financial economic theory that has had a large effect on the thinking of pensions professionals, actuaries and accountants. This is rooted in a rigorous focus on individualistic rational choice economics and mechanistic probability models of risk and return within an overarching assumption that markets are perfect. Methods of valuation based on the belief in market efficiency are deeply problematic because these models are only *theories* that have been put forward in the literature, and are not backed up with solid empirical evidence. On the contrary, not only is there little real-world support, there is considerable evidence that textbook financial models do not work in practice. Therefore their use for the valuation of pensions is unjustified.

I will look first at the assumption of market efficiency in asset pricing.

Asset prices and the belief in efficient markets

A belief that is central to pensions valuation today under the existing regulations is that the market price of an asset - on the assumption of an efficient market - is a true reflection of the expected future earnings represented by that asset. To find the value of an asset, one therefore only has to look at the market.

For example the theory - as set out in all finance textbooks - says that the price of a company share is the discounted present value of the infinite stream of future dividends.[1]

[1]This can be represented by the formula:

$$P(0) = P^*(0) = \frac{D(1)}{1+r} + \frac{D(2)}{(1+r)^2} + \frac{D(3)}{(1+r)^3} + ... \quad (1)$$

P*(0) is the theoretical price of the share at any particular moment in time, D(t) is the dividend t years into the future, and r, the appropriate discount rate, the investor's required rate of return. The theory states that equation (1) holds true in every time period.

Thus the assumption is that the price of an asset incorporates all the information about its expected future earnings. Asset prices can therefore be used in the valuation of a pension fund because market prices always reflect fundamental value.

But this is nothing more than a theory. It cannot be assumed from it that variations in market prices reflect changes in fundamental value as if that were a matter of solid empirical fact. When this efficient markets theory has been subjected to empirical testing against data taken from the real world, it has received very little support. There is much evidence that in fact the theory is pretty much a myth.[2]

But, as far as it affects pensions regulation, this is more than just an error. For example, it could be claimed by its adherents that, while, yes, the theory might not always exactly fit the data in all circumstances, nevertheless it is usually a reasonable approximation, and besides it saves a lot of work to use market prices as values rather than have to estimate economic values.

Traditionally pension schemes adopt a long term investment strategy, aimed at dividends. Thus the investment risk that matters is how variable future dividend payments going into the distant future are going to be. An analysis of the funding security of a scheme is fundamentally a matter of understanding whether the forecast dividends are likely to be enough to pay the pension promises as they fall due. Variation in market prices - price volatility - makes little difference to this calculation and is a secondary consideration.

The problem is not that using market prices involves a rough approximation, but that it entails a basic methodological mistake, whose implications for pension schemes are severe. The mark-to-market approach has the effect of greatly increasing risk because we know that asset prices are excessively volatile. This is because asset price volatility, which ought to be a matter of only secondary importance because it is not inherent to the economic fundamentals, is elevated to the status of risk, which is a matter of primary importance. The approach essentially introduces market risk into the valuation which requires an increase in the schemes' liabilities to maintain the same level of prudence. If the valuation can be thought of as a matter of statistical estimation of the true situation, it introduces a bias into the valuation, not merely estimation error.

Figure 1 shows the basic issue very clearly. There are two graphs of values of a real

[2]The hypothesis of market efficiency, the efficient markets hypothesis, has been studied by numerous scholars, most notably by Shiller (1981, 2015). He was awarded the Nobel prize for economics in 2013 for this work. See also Haugen (1999a,b); Thompson *et al.* (2009). The efficient markets hypothesis has also been pretty comprehensively refuted on purely theoretical grounds - in other words on its own terms - by Grossman & Stiglitz (1980)

equity portfolio against time: market prices and estimates of the discounted present value of subsequent dividends earned by those assets. It is clear that prices shown in the first graph are substantially more volatile than the estimated values in the second.

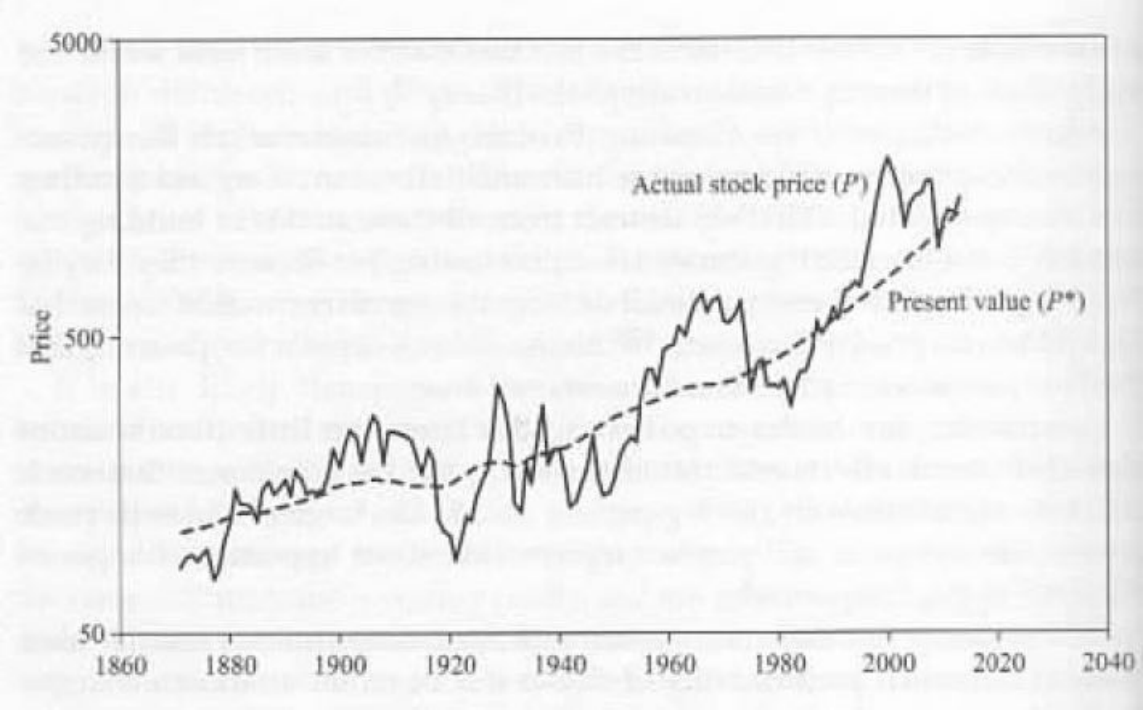

Figure 1: Stock market prices versus fundamental values [3]

The amount of excess volatility evident in 1 is clearly quite large. It has been quantified by a number of studies. Shiller (1981) estimated it within a range of between 5 and 13 times. That is, the volatility of market prices P exceeds that of the underlying value P^* by a factor of between 5 and 13. A study using British data and similar methods by Bulkley & Tonks (1989) obtained a factor of 5.08.

Treating volatility as risk creates a valuation bias towards deficit

Let us consider an ideal stylised case of an open pension scheme, receiving new members and new accrual, in which the profile of contributions and investment income exactly match the profile of liabilities. Any regulatory regime that is fit for purpose should show

[3] From Shiller (2015), p210. The graph shows the S and P Composite Stock Price Index, 1871-2013, January of each year, plotted on a logarithmic scale. The present values P^* are estimated as the subsequent real dividends calculated with a constant discount rate. Further details of the calculations are in the text.

a valuation that gives a 100 percent funding level. Valuation should therefore be based on P^* and not P. This makes a fundamental difference to the amount of risk the scheme is deemed to face since, as we can see from the graph, P^* is much less volatile than P.

If assets are valued at market prices P then the funding level will be very volatile. In most years there will be either a deficit or a surplus. Yet the fundamental economic value of the assets matches the liabilities. When there is a deficit as a result of market prices being down, the current regulations will require the scheme to take action in the form of a recovery plan. This entails making additional payments over an agreed number of years. But this is a result of the excess volatility in asset prices, not the fundamental economic value of the assets.

The excess asset-price volatility, regarded by the regulator as risk, will induce a bias towards the scheme being in deficit. The current pension regulations ThePensionsRegulator (2014) allow the trustees to choose a discount rate taking account of the return on the assets or use a so-called risk-free rate, AA corporate bonds or gilts. The main requirement is for the trustees to be prudent. Whatever they choose there will still remain excess volatility/risk because that is due to the use of market prices to value assets. If the trustees choose to use gilts then that will increase the liabilities under present circumstances where gilts are exceptionally low. That will tend to increase deficits.

The use of value at risk calculations by trustees will tend to increase deficits because the standard deviation that is used as a measure of volatility is much larger for market values P than for the fundamental economic values of the assets, P^*.

Pensions valuation and financial economics

The actuarial profession was persuaded that they ought to follow the economists and adopt a microeconomic perspective backed up by rigorous theory. Partly they did this in response to particular problems, for which the profession was criticised (notably the Maxwell case and underestimating longevity), but also because of unrelated new ideas about investments (the rise of financial economics). It saw the adoption of finance theory as modernisation and there was considerable literature arguing that actuaries should change their methods and become financial economists. A clear statement of these issues and the case for change is, for example, Gordon & Jarvis (2003). The seminal contribution was probably Exley *et al.* (1997) that claimed to show the superiority of methods based on recent developments in financial economics.

This literature however was fundamentally mistaken because, although it focused on risk, and methods for dealing with it, it failed to provide a proper economic understanding of its nature. Risk and price volatility are not necessarily the same thing. This is par-

ticularly true in pensions where investments are long-term in nature, whereas volatility is short-term in nature. Making long-term decisions on short-term considerations leads to mistakes. Unfortunately financial economics argues against the distinction between the short term and the long term for investments.

The financial economics literature, and in particular Exley *et al.* (1997) and subsequent studies, is deeply flawed because of its grounding in the efficient markets hypothesis, and ignores both the empirical and theoretical refutation of it. Risk/volatility of asset market prices does not occur because markets are universally perfect and responding to rational agents. It is a result of essentially irrational elements present in markets: exuberance, animal spirits, poor decision making, and so on. Pensions regulation should recognise this as a nuisance, a form of market failure, and aim to eliminate it, rather than treat it as an inherent aspect of the market system to be respected.

Conclusion

The principle on which pension provision is based is changing fundamentally from collectivist risk sharing to individual responsibility. Instead of workers retiring on a defined pension benefit as part of the employment contract, the assumption has become that each individual must make adequate provision for their retirement. Individuals must manage their own finances within the free market place, and if they do that badly, then they must live with the consequences.

Surveys have shown that up to half of all workers are failing to save enough to provide them with a decent income in retirement. Evidence of non-rational behaviour on this scale suggests there is a societal problem. The prospect of widespread pensioner poverty in the future concerns the whole of society and cannot be simply left as a matter of lifestyle choices by individuals. If millions of individuals have to turn to the state for support, that is a problem for the whole society whatever their individual previous life histories.

As part of this trend DB pension schemes are going out of fashion in the private sector. This is an unfortunate feature of the current situation because DB pensions are an efficient means of supplying decent dependable pensions. Partly this is due to rising life expectancy but also it is partly - in my view largely - due to flawed regulation. The current regulations emphasise market risk in the valuation of scheme assets which is the wrong indicator because market prices are excessively volatile due to irrelevant influences that are intrinsic to the market and not the fundamental economic incomes that ought to drive assets prices. The pension regulations, being based on the mark-to-market approach, are a major cause of pensions failure. It is to be hoped that the government will take action to introduce improved regulations that value pensions on economic fundamentals and not market prices of assets.

References

Bulkley, George, & Tonks, Ian. 1989. Are UK stock prices excessively volatile? Trading rules and variance bound tests. *The Economic Journal*, **99**(398), 1083–1098.

Exley, C Jon, Mehta, Shyam JB, & Smith, Andrew D. 1997. The financial theory of defined benefit pension schemes. *British Actuarial Journal*, **3**(04), 835–966.

Gordon, Tim, & Jarvis, Stuart. 2003. Financial Economics and Pensions Actuaries–The UK Experience. *In: Society of Actuaries Symposium on the Great Controversy: Current Pension Actuarial Practice in Light of Financial Economics, Vancouver, June*. Citeseer.

Grossman, Sanford J, & Stiglitz, Joseph E. 1980. On the impossibility of informationally efficient markets. *The American economic review*, 393–408.

Haugen, Robert A. 1999a. *Beast on Wall Street: how stock volatility devours our wealth*. Bookmantraa. com.

Haugen, Robert A. 1999b. *The inefficient stock market*.

Mehra, Rajnish, & Prescott, Edward C. 1985. The equity premium: A puzzle. *Journal of monetary Economics*, **15**(2), 145–161.

Modigliani, Franco, & Miller, Merton H. 1958. The cost of capital, corporation finance and the theory of investment. *The American economic review*, 261–297.

Shiller, Robert J. 1981. Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends? *The American Economic Review*, **71**(3), 421–436.

Shiller, Robert J. 2015. *Irrational exuberance*. Princeton university press.

ThePensionsRegulator. 2014. *Funding Defined Benefits Code of Practice No.3*.

Thompson, James R, Williams, Edward E, & Findlay III, M Chapman. 2009. *Models for investors in real world markets*. Vol. 581. John Wiley & Sons.