

Controversy between Financial Economics and Traditional Actuarial Approach to Pension Funding

¹J.S. Adeyele and ²O.J. Adelakun

¹Department of Actuarial Science & Insurance,
Joseph Ayo Babalola University, Ikeji-Arakeji, Nigeria

²Department of Economics,
Joseph Ayo Babalola University, Ikeji-Arakeji, Nigeria

Abstract

The debate between financial economics and traditional actuarial science has continued to attract the attentions of the academics and practitioners from various disciplines around the world. A survey of literature does not produce much consensus between the two sides of the debate. Actuaries largely seek to place value on cash flow stream, whereas financial economists believe market should do that for them since value is subjective while price is objective. The debate focuses on two main issues: the appropriate model used to value pension liabilities, and how pension assets should be invested. The financial economists contend that pension benefits are bond-like and therefore should be valued by reference to a matching bond portfolio. This study considered these issues with a view to reconciling the actuarial methods to financial economics thinking by exploring the four major principles of financial economics in light of actuarial practice.

Keywords: actuarial practice, financial economics, pension funds, investments

INTRODUCTION

The debate between financial economics and traditional actuarial science has continued to attract the attentions of the academics and practitioners from various disciplines around the world. A survey of the literature does not produce much consensus between the two sides of the debate (Day, 2004). A basic difference identified between traditional actuarial thinking and the philosophical framework of financial economics is encapsulated in the difference between value and price. Actuaries largely seek to place value on cash flow stream, whereas financial economists believe market should do that for them. In the view of financial economists, value is a subjective concept, whereas price is objective. However, a problem with this is that price, if it exist in a market where there is buying and selling, is, in fact, determined by the players on the margin who are willing to buy and sell at marginal price. There remains the fundamental problem that different players should hold different ideas of the intrinsic value of an investment, because they are holding the asset for different reasons. While actuaries do not need to *accept* the conclusions that economists reached when they apply financial economic theory to pension plan management, it is imperative for actuaries to *understand* the arguments and perspective behind those conclusions (Society of Actuaries and American Academy of Actuaries, 2006). Pemberton (1998) anticipated the replacement of the complex models in actuarial science with conceptual framework or intuition. However, actuaries do seek truth from facts and not facts from received 'truth' which suggests that economists have more to benefits from actuaries than

actuaries have to learn from economists. The discovery of approaches and solutions developed for today's financial markets is also a subject of argument. It was noted that, it is difficult to understand why the approaches and solutions developed for today's financial sector, which are clearly orientated towards mathematics, or to be more precise towards probability theory, did not originate from the breeding ground of actuarial thinking" offends the advocates of traditional actuarial practice (Bühlmann, 1997). Whelan (2002) argued that actuarial science was the first to develop these approaches and solutions in financial economics, and tries to explain why actuaries failed to capitalised on their century-old head start in the field of financial economics. The author reveals that actuaries did not circulate actuarial discoveries to other professions simply because actuarial profession created its own language which was ignored by wider world journals. The use of prior assumption and deductive logic within economics, suggesting the instability of economic data makes a historic generation problematic (Pemberton, 1998). Similarly, the use of discretionary judgements often called actuarial conservatism tends to make modern finance theory and actuarial science incompatible. Also, actuarial intuition and judgment seems to be hopelessly out-of-touch with financial economics.

Over time, financial economists have perhaps been too dismissive of actuarial science, but recent work by Geoffrey Poitras and others as revealed by Whelan (2006), is attempting to redress this oversight. The authors argued that the techniques in actuarial science

have been both mathematically rigorous and supported by careful empirical studies," and that because financial economics has paid so little attention to fixed income analysis and immunization theory that the important intellectual and historical connection to actuarial science has been ignored.

Also, the successful publication of *Financial Economics with Applications to Investments, Insurance and Pensions*, a 669-pages textbook in 1998 by *The Actuarial Foundation* has sent a powerful communication to other professions that actuaries have the intellectual tools to solve modern financial security problems. The book comprised of eleven chapters written by a ten-member team of distinguished academic authors from three continents, four nations, and eight universities.

The authors of the book succeeded in presenting the principal ideas underlying financial economics, including: financial markets; derivative securities; interest rate risk and immunization; equilibrium pricing; no-arbitrage pricing theory; options and derivatives; term structure models; portfolio selection; investment return models; and option pricing in continuous time. The book was immediately recognised as a significant contribution to the actuarial literature by a small number of actuaries, mainly in the academic community, and those PhD actuaries engaged in pension, insurance and social security work, but was not widely acknowledged or perhaps, understood, by many practitioners who did not immediately recognise the significance of financial economics or what its implications would be for traditional actuarial models and practices.

Bell et al cited in Pemberton (1998) characterises actuarial science as an applied science which is based on generally accepted concepts and observations distilled from the experience of practitioners.

Modern corporate finance considers how institutions make decisions about raising and deploying capital. Firms exist in order to "add economic value" and, in theory, all firm decisions should add value and some or all of that value should be familiar to the firm's owner shareholders. Thus firms are often described as value maximizers.

Asset pricing and portfolio selection (also called *investment*) is the branch of financial economics that studies the risks and rewards faced by savers who invest in the capital markets. Because they balance risks and returns, investors are described as *expected utility maximizers*.

The purpose of this study is to reconcile the actuarial methods to financial economics thinking by shedding light on how variation in models by the two side of debate generate controversy. In order to do this, it is important to know that *financial economics* is a subset

of microeconomics which focused on the capital markets by studying how individuals and institutions acquire, save and invest money. Below is the over view of the study.

Over View

Financial economics has been applied to investment and management of pension funds for a long time by the actuaries. The fundamental role of actuary is to help organisation plan for the future and manage risk using technical models (Orszag and Piggott, 2005). According to Pemberton (1998), actuaries are professionals who identify and analyse the implications of future possibilities, especially with respect to risk. In conducting their analysis, actuaries developed one or more models to estimate the financial impact of future uncertain events.

Recently, however, pension actuaries are facing some strong challenges from financial economists over their approaches to the funding and investment of pension plans (Moriarty, 2005). Day (2004) also revealed that the idea of financial economics has largely failed to engage actuaries until recently. The debate between financial economics and pension actuaries focuses on two main issues: the appropriate discount used to value pension liabilities, and how pension assets should be invested. The former contend that pension benefits are bond-like and therefore should be valued by reference to a matching bond portfolio. Also, if pension benefits are indeed bond-like, then not only is backing those obligations with equality investments imprudent, the common actuarial practice of discounting those obligations using the expected rate of return on the assets, without considering the risk of not achieving those returns, is unacceptable (Moriarty, 2005). The differing motivations of financial economics and pension actuaries to liabilities valuation and pension investment result in taking different approaches and evaluating the same view differently. Actuarial science has always relied on assumptions in developing its models. The major challenge of these models developed is the determination of the appropriate assumptions. In real world, the assumptions are not given, and actuaries have to select their own. It is easily shown that the results obtained from most actuarial calculations are sensitive to the assumptions employed; and hence that the answers received depend upon the assumptions chosen (Trowbridge, 1989). However, Whelan (2004) cautions that it is unreasonable to ask theoretician to come up with applicable models – it is the practitioner that must fashion tools since the theoretical models in actuarial science will never capture the detail of reality.

Assumptions of Financial Economics

It has been observed that much of the theoretic work is concerned with 'relaxing' assumptions. Theorists are aware that precise assumptions do not hold exactly in reality, and therefore seek to explore what happens if

an assumption is removed (Pemberton, 1998). The assumptions of financial economics are considered in light of this by looking into four main principles that surround the debate.

The No-Arbitrage principle: This principle means that financial models should be free of situations where an individual could simply and easily earn a profit without risk. In other words, two identical cash flows must have the same price - one naira of bonds has the same value as one naira of equities. The main point about this assumption by the financial economists is that, market gravitates towards an arbitrage-free state.

The law of One Price: Financial economists contend that if assets and liabilities have the same matching cash flow, then they should have the same value. This law implies that the liability and the matching asset should yield the same value. The insight from this principle is that since pension liabilities are bond-like, their fair value should be determined by reference to a bond portfolio with cash flows that match both in terms of timing and probability of payment.

This principle is an extension of No-Arbitrage principle - that is, investors must not have opportunity to buy the higher value asset and sell the lower valued one for an easy arbitrage gain. The liabilities of a well-funded pension scheme, sponsored by a firm with a good balance sheet, should be valued using high-quality corporate and government bonds with matching cash flows.

The value of asset is independent of how that asset is financed. The expected return on assets to fund debt should not affect the value of the debt. If a company borrows N100 million to invest in its business, the value of its debt is N100 million, not the discounted value of expected future profits. To the financial economist, therefore, the typical employer sponsored defined pension plan (the old pay as you go in public service in Nigeria for example) is a debt obligation backed by financial assets that make up a significant amount of equities. By using a discount rate to value the liabilities that reflects the expected long-term rate of return on assets, actuaries are effectively creating a risk-free arbitrage opportunity for the current generation of shareholders and passing on the risk to future generations.

For short, the traditional actuarial approach to valuing pension plan liabilities violates the above three financial economics principles.

The irrelevance principle - Stakeholders, and Asset Allocation: This principle implies that debt/asset equity mix of a company is irrelevant in determining its value when considering first-order factors only. For instance, if a firm decides to increase its debt/equity ratio and the shareholders disagree with that decision, firm can rebalance its own portfolio to reflect its overall debt/equity preferences. In this regard, financial economists have observed that: "The people making

the decisions about capital structure are not always the people who own the company. The management's interests are not perfectly aligned with those of the shareholders. The company represents only a small portion of a shareholder's wealth, but is a significant player in the employees' lives. Broadly, management will prefer company growth in shareholder value" (Whelan, 2006).

The arguments above are easily applied to an asset allocation decision for a defined benefits (DB) plan so that the first-order effect of the asset allocation decision can be seen as irrelevant. From the point of view of a shareholder, a decision to increase equity exposure in a DB scheme simply transfers equity risk to the market value of the company. If a shareholder disagrees with this decision they can simply sell equities to reverse the risk increase. From a shareholder point of view, there is, thus, no ideal asset allocation for DB plans. Instead, the asset allocation should be decided on second-order effects such as taxation, surplus ownership and agency effects (Whelan, 2004).

The "matching asset" argument is that DB liabilities are mostly affected by salary inflation, equity returns are also affected by salary inflation, and thus the best matching assets for salary related liabilities are equities. This argument is consistent with the proposition that asset allocation first order effects are irrelevant and that DB schemes should hold the matching asset (Whelan, 2006).

Relaxing the assumptions

It is a common knowledge that, stocks and bonds trade openly in markets. That makes it easy to determine their current value. However, there are some cash flow items that do not trade openly, such as pension payments, whose values are not easily determined. In the latter case, economists look for openly traded item that are equivalent to the un-traded item to help determine its value. If a N1000 ten-year, zero-coupon bond is currently trading at N950, the economist has basis for valuing other types of payments that are due in a lump sum ten years. The major challenge for pension actuaries is to determine the present value of expected cash flows from a pension plan. Pension actuaries do this differently from the way in which capital markets value similar cash flows using various methods and assumptions, depending on the purpose at hand. When this happened, the financial economists challenge the actuaries for placing different values on future cash flows than capital markets.

The possible answer to this question is that actuaries are often concerned with future values more than current values. As shown by financial economics value, actuarial models tend to underestimate or ignore the information contained in current or economic values. Any resolution of financial economics and actuarial

practice must first distinguish between current values and future values. Given this distinction, we should then ensure that models of future values do not contradict current values, for example, by creating arbitrage opportunities (Whelan, 2006). Sometimes, financial economics also tends to avoid solutions involving subjective judgement. One rationale for this is that allowing a subjective or judgmental approach to assessing value is prone to certain risks. For instance, people tend to overrate their ability to forecast asset prices and returns. Arguing that the value of an asset is different from the economic or market value is effectively stating that an arbitrage situation exists. If this belief holds, then actuaries should argue this explicitly rather than have perceptions of value embedded implicitly in valuation advice.

Allowing a range of subjective interpretations of value allows the possibility that a stakeholder will take advantage of the range to further their own interests at the expense of the other stakeholders. The most common example is where management makes decisions that do not increase shareholder value. This is known as agent cost. For example, a weak valuation basis may be desired by management to lessen the accounting cost of DB funding in current accounts or otherwise disguise the DB operating result in order to maximise their bonuses.

CONCLUSION

This study has explored the empirical and conceptual framework that forms the basis of debate between financial economics and traditional actuarial approach to pension funding. Actuarial science use powerful models for valuation of pension plans. However, both models and conceptual framework are ways of making an informed decision. In most cases, models will only serves as a guide to management for an informed decision blend with flavour of experience and exposures.

This study also revealed that the application of financial economics is been too short-term, individual contracts and the experiments have repeatedly shown the limitations of too strong a belief in the models. This is not the case with actuarial science, because it is dealing with long-term and collective problems. However, the long-term have not allowed us to evaluate the validity of actuarial models. Ideally, the use of long-term appears to be unrealistic since long-term is a future that will never come. In the lively debate over empirical validity of capital asset pricing model, it has suggested that the theory may, even in principle, be unsuitable (Pemberton, 1998). One reason for dispute concerning the validity of such claims is a lack of clarity to suggests that the claims of neo-classical economics are to be interpreted as being qualified by some vague *ceteris paribus* clause which

are not explicitly stated (Hausman, 1992). There are certainly instances where the deduced claims are regarded as truths, that is to say as precise and universal descriptions of reality. The proposition that the value of an option does not depend on the expected growth of the stock price is one example. The lack of reliable regularities in financial realities means that counter examples are always readily available to prevent the credible claims of such propositions as truths.

One of the consequences of the difference in philosophy between value and price is the fact that actuaries are often concerned with control systems and with managing risk in the long run. Actuaries have often been concerned with those types of control issues. Pension funding presents a similar type of problem. However, the market approach of the financial economists crystallises a view of the future into a snapshot view, through the use of market or fair value of asset and liabilities.

There is urgent need to undertake an interdisciplinary research between financial economics and actuarial science as well as other related disciplines to address the inflation problems not encapsulated into their approach to valuation of liabilities and pension investment. This will assist in a long way in addressing the pensioners' problems as well as addressing the variations in valuation approaches.

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