Back to the Future: A Long Term Solution to the Occupational Pensions Crisis

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ABSTRACT

In the UK and elsewhere, defined benefit (DB) schemes are being replaced by defined contribution (DC) schemes. However DC schemes have some substantial weaknesses, and a continuation of current policies will probably lead to another pensions crisis in a few decades. There is an alternative which avoids the major defects of both DB and DC schemes. It is proposed that, if UK employers wish to replace their DB schemes, they should do so with something that looks like a career average revalued earnings (CARE) scheme to the members, but is funded by single premium deferred annuities (SPDAs). The members get what is effectively a DB pension scheme. However pension provision is outsourced to specialist providers (insurance companies), with all the risk (and the decisions that must be made by members of a DC scheme) borne by insurance companies, not by the employer or members.

Key words:- Deferred annuity, defined benefit, defined contribution, occupational pension scheme, crisis.

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Occupational pensions are in a state of crisis. In March 2009 90% of defined benefit (DB) schemes in the UK were in deficit, and the aggregate funding position for the 7,400 schemes followed by the Pension Protection Fund (PPF) was a deficit of £242 billion. This very large aggregate deficit is a manifestation of the crisis in DB pensions. The solution that is emerging in the UK to the crisis in occupational pensions is a switch from DB to defined contribution (DC) pension schemes. However, due to problems inherent in their design (described below), this switch to DC schemes will probably result in another pensions crisis within a few decades. A long term solution to the occupational pensions crisis is needed that is better than a switch to DC schemes. The proposal made here is for the use of single premium deferred annuities (SPDA) by pension schemes. The use of SPDAs enables a DB scheme to effectively replicate a career average revalued earnings (CARE) scheme, with many advantages over a DC scheme, particularly the way in which risks are borne by insurance companies, as well as having advantages over a final salary scheme. About sixty years ago there was widespread usage of deferred annuities by UK occupational pension schemes. So this proposal represents a return to the past, although with a number of important modifications, and in a different environment.

McCarthy (2005) has shown that when markets are complete and there are no frictions, the design of pension schemes is irrelevant. Employers and employees are concerned only with the net present value of the employees’ compensation package. However, in reality, markets are incomplete and frictions exist, making pension design important. Given for the presence of real world imperfections, this paper compares some alternative pension scheme designs.

Section 1 describes the shift from DB to DC schemes, while section 2 presents the shortcomings of DC schemes. Section 3 sets out a long term solution to the occupational pensions crisis using SPDAs, and section 4 has a brief history of deferred annuities. Section 5 contains a summary of the previous literature on the use of SPDAs, and section 6 describes a simple model for pricing SPDAs. Sections 7 and 8 consider the advantages and disadvantages of a pension scheme using SPDAs, and section 9 concludes.

1. The Shift from DB to DC
Since the stock market reached a peak at the end of the last century, UK employers have been increasingly questioning the continuation of their DB schemes. This disenchantment with DB schemes is due to a number of factors (see Board and Sutcliffe, 2007), but the chief reasons are increases in the riskiness of the spread between pension assets and liabilities and in the cost to the employer. In response to these pressures, UK companies are replacing their DB schemes with DC schemes. In 2008 only 26% of UK DB schemes remained open to new members (Pension
Protection Fund and the Pensions Regulator, 2008), with new (and existing) employees usually offered a recently opened DC scheme instead. In 2007 92% of UK private sector occupational schemes (with only one section) remaining open to new members were DC schemes (Office for National Statistics, 2008). This represents a massive shift in UK occupational pensions from DB to DC.

The National Pension Savings Scheme (NPSS), which begins operation in 2012, is a national DC scheme that requires employers who do not offer a more favourable scheme, to automatically enrol employees in the NPSS. It is expected that the NPSS will have more than 4 million members. The continuing switch of occupational schemes from DB to DC, coupled with the introduction of the NPSS, will create a big expansion in DC scheme membership in the UK, such that it will dominate occupational pension provision.

2. Problems with DC Schemes

Replacing a DB scheme with a DC scheme transfers various risks and decisions from the employer to scheme members. Investment risk, and the risk of changes in the expected annuity rates at retirement move from the DB scheme to DC scheme members. DC scheme members must decide the allocation of their pension pot between different investments, and on retirement decide when to buy an annuity, and which annuity to purchase. In many schemes, they also have to choose their contribution rate (subject to limits). In a DB scheme these decisions fall on either the employer or the scheme. Each of these risks and decisions will now be considered in turn.

A. Risk Shifting. With DC schemes the risks of investment returns, interest rates, inflation, longevity, and much regulatory risk are shifted from the employer to individual members until they retire and buy an annuity. In the UK an annuity must be purchased with at least 75% of the pension pot sometime between retirement and age 75. After the annuity is purchased these risks are borne by the insurance company providing the annuity.

A number of studies have investigated the extent to which DC schemes can produce very different pensions for the same contributions. Burtless (2009) analysed the replacement rate for US DC schemes over the 1872-2008 period. Assuming the DC pension fund was invested in equities, the highest replacement rate (in 1960) was 7.4 times higher than the lowest replacement rate (in 1881). This represents a very substantial difference in outcomes, illustrating the potential

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1 Since April 2006, instead of annuitization at 75 alternatively secured pensions have been available. They were introduced to help people with a principled religious objection to pooling mortality risk which prevents them from purchasing an annuity on ethical grounds.

2 The replacement rate is the annual payment from the annuity purchased by the member at retirement with the DC fund, divided by the member’s final annual salary.
riskiness of DC schemes. Blommestein, Janssen, Kortleve and Yermo (2009) also showed that DC schemes can have a highly variable replacement rate. For UK replacement rates over the 1927-2001 period Burtless (2003) found that the rate for the ninth decile was 2.4 times larger than the rate for the first decile. Blake, Cairns and Dowd (2001) analysed UK data and concluded that “DC plans can be extremely risky relative to a DB benchmark”. This conclusion was also reached by Byrne, Blake, Cairns, and Dowd (2007) from a study of the default funds offered by UK DC schemes, and by Blake (2006). Cannon and Tonks (2009) studied the variability of the fund ratio for the UK for 1948-2007. They found that with 100% equity investment, the median fund ratio was 17.9, while the ratio for the lowest decile was only 7.3. For an annuity rate of 0.05, replacement rates of 89% and 36% are implied, again indicating a wide spread in pension outcomes. These studies show that DC schemes have the potential to be very risky, producing very different outcomes for the same contributions and asset allocation.

B. Annuity Rate Risk. With a DC scheme the member is exposed to the risk that, due to increases in the expected rates of longevity and inflation, or a decrease in expected interest rates at retirement, actual annuity rates when they retire will be lower than current expectations. In recent years forecasts of longevity have lengthened at an unexpectedly rapid rate, increasing the price of annuities (i.e. lowering the annuity rate). This change in longevity, coupled with a fall in interest rates led to UK annuity rates falling from 16.2% in 1981 to 8.2% in 2002 (Cannon and Tonks, 2004), and by 2009 they had declined further. This reduction in annuity rates greatly reduced the size of the annuities that could be purchased by members of DC schemes with a given size of pension pot to far below what was expected when they joined the scheme.

Economic theory suggests that individual employees are unsuitable economic agents for bearing the investment and annuity rate risks during their working lives, and that it is preferable for these risks to be borne by their employer (or an insurance company). For each employee their pension often represents one of their largest assets, whose risks they cannot effectively hedge. This is because they lack the knowledge to hedge the risk. Even if they had the requisite understanding, the transactions costs they would face when hedging are prohibitive and instruments to hedge

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3 All the money in a DC scheme could be invested in gilts rather than equities. However, while this would remove investment risk, it still leaves scheme members with longevity, interest rate and inflation risk until they retire. They must also decide the timing and nature of their annuity purchase, and probably their contribution rate.

4 The fund ratio is the value of the member’s pension fund at retirement, divided by the member’s final salary.

5 The annuity rate is the annual annuity payment divided by the sum of money paid by the annuitant for the annuity.

6 The replacement ratio equals the fund ratio multiplied by the annuity rate, which is roughly 0.05. So a replacement rate of 0.6 (i.e. a replacement rate of 60%) implies a fund ratio of 12.
some of the risks do not exist. Their employer (or the insurance company providing the SPDAs) is more likely to have access to a knowledge of hedging, and cheap access to the available hedging instruments. In addition, these companies are probably owned by a large number of shareholders for whom shares in this company represent a tiny fraction of their total wealth. Therefore, if shareholders rather than scheme members bear these risks, they are better diversified than scheme members. A survey by the Association of Consulting Actuaries (ACA, 2009) found that 76% of UK employers thought their employees were uncomfortable bearing the investment, inflation and longevity risks of DC schemes.

C. The Asset Allocation Decision. Usually DC scheme members must select the asset allocation of their pension pot. The main determinant of the investment performance of UK and US pension funds has been shown to be asset allocation, rather than stock selection (Blake, Lehmann and Timmermann, 1999; Brinson, Hood and Beebower, 1986; Brinson, Singer and Beebower, 1991; and Ibbotson and Kaplan, 2000). Members show little interest in this decision, with the vast majority ending up in the default fund. Levy (2009) reports that in 2008 96% of UK DC schemes offered members an investment choice and, where a default fund was offered, 82% of members ended up in the default fund (Byrne, Harrison and Blake, 2007, NAPF, 2009a). Default funds in the UK typically have a high equity content, generating considerable risk and variation in outcomes between different cohorts of members (Byrne, Blake, Cairns and Dowd, 2007).

Some of those DC scheme members who do make choices select an unwise asset allocation. Over time scheme members age, their personal circumstances change, and their asset allocation is altered by movements in relative asset prices. Theory suggests that DC scheme members should adjust and rebalance their portfolio in response to these changes, but the empirical evidence shows they do not (Agnew, Balduzzi and Sunden, 2003, Ameriks and Zeldes, 2004). Tang, Mitchell, Mottola and Utkus (2009) analysed the asset allocations of one million 401(k) schemes and showed that poor asset allocation by members resulted in an average 20% reduction in the value of their pension pots at retirement. Benartzi and Thaler (2007) discovered a wide range of behavioural biases in the asset allocation and contribution rate decisions made by US members of DC schemes, while an Association of Consulting Actuaries (2009) survey found that 81% of UK employers felt employees were not capable of determining how they should manage their DC funds.

Depending on the investment decisions made by the member, the investment of a DC pension pot can involve substantial charges and fees. The NAPF (2009a) report the average investment

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7 An NAPF (2009a) study in 2009 found that 71% of UK default funds were invested entirely in equities, while the average equity allocation of default funds was 91%.

8 401(k)s are a type of US defined contribution scheme.
management fee for active investment in a multi-asset class fund in 2009 was 58 basis points per year. Over 25 years these charges reduce the size of the final pension pot by about 13%. This shows both that charges and fees have a substantial effect on the size of the final pension pot. The annual investment costs of large DB schemes are about 25 basis points per year (Munnell and Soto, 2007), giving a reduction in the size of a DB fund of about 5.7% after 25 years, which is appreciably lower than for DC schemes.

In addition to inadequate decision making by members, some DC schemes offer members an inefficient menu of possible investments. Elton, Gruber and Blake (2006) analysed the investment choices offered by 401(k) schemes, and discovered that only 53% offered a menu which permitted the formation of an efficient portfolio. After 40 years the average value of the portfolios formed from the inefficient portfolios was 57% lower than would have been the case if an efficient menu had been available. So, whether it is due to an inefficient menu of choices offered by the scheme, or sub-optimal decision making by the DC member, DC schemes tend to produce low pension pots with a high level of risk.

D. The Annuity Decision. Since 1978 DC members have had the right (called the open market option) to buy their annuity from a supplier other than their pension provider. However, only about half of UK annuitants shop around for a better annuity deal (HM Treasury, 2006), with just 23% actually changing their annuity provider (NAPF, 2009b). Many annuitants have some medical condition which means they could qualify for an enhanced annuity, but do not buy one. Since the price of a standard annuity is over 20% higher than for an enhanced annuity, these pensioners have chosen a poor deal (MGM Advantage, 2009). There is also considerable variation in the price of identical annuities. MGM Advantage (2009) compared prices for standard annuities in the UK and found that a top quartile annuity is 20% cheaper than a bottom quartile annuity. For enhanced annuities, the difference in prices was even larger. This means that some annuitants are making very poor annuity choices.

DC pensioners in the UK must annuitize at least 75% of their pension pot at a time of their choosing between retirement and the age of 75. This gives them an American style option to delay annuitization, and this option can be valued using an option pricing model (Milevsky and Young, 2002). In the UK 62% of annuitants buy their annuity on retirement (Taylor, 2004), and only 5% annuitise in their 70's (HM Treasury, 2006). Of the 38% who delay purchasing an annuity, 39% give their lack of need for a pension as their reason for delay, with only 13% waiting to see if annuity rates improve (Taylor, 2004). This suggests that annuitants are not

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Blake (2006, p. 126) reports that over 25 years, the reduction in the final value of the pension pot due to investment charges and fees was 19.0% on average. The lowest reduction was 9.8%, while the highest was 27.8%.
making rational decisions on when to annuitise, as the main factor driving their decision to delay should be annuity rate expectations.

E. The Contribution Rate. In addition to the problems outlined above, the level of contributions to DC schemes is much lower than for DB schemes, and this will greatly amplify a DC pensions crisis. Many DC schemes allow each member to choose their contribution rate, which offers a further area for mistakes by members, i.e. seriously under-contributing. A substantial number of employers tie their contribution rate to that chosen by the member, and so a low member contribution rate often leads to a low employer’s contribution rate, exacerbating the problem. In 2007 the average UK employer and member contribution rates for DB schemes were 15.6% and 4.9% respectively, while for DC schemes they were only 6.5% and 2.7% respectively (ONS, 2008). So the total contribution rate for DB schemes was 123% higher than for DC schemes. Choi, Laibson and Madrian (2007) looked at seven 401(k) schemes and found that 30% of older members chose to under-contribute to their pension, even though an arbitrage profit was available from higher contributions, resulting in the loss of up to 6% of their salary each year.

Given these serious problems with DC schemes, future experience (possibly destitute pensioners) may well lead to the widespread realization that they are unsuitable. Since companies want to shed the risks inherent in running DB schemes, some alternative entity is needed to bear these risks and take these decisions, other than the members themselves, as is the case with DC.

3. A Long Term Solution
In order to avoid the problems with DC schemes outlined above, a different scheme design is required. One possibility involves the use of deferred annuities. The proposal is to use SPDAs to create a pension scheme. Each year the employer and the employee pay a pension contribution which is some proportion of the member’s salary (as for DB and DC schemes). This sum is used to buy a SPDA from an insurance company on behalf of the employee. This annuity should offer at least limited price indexation, and preferably provide full indexation. The SPDA will probably be a group annuity, so reducing the adverse selection cost inherent in voluntary annuities. When the employee reaches retirement age the payments under these deferred annuities provide their pension. Once a deferred annuity is purchased, the corresponding portion of the ultimate pension is locked in. As well as providing pensions for employees, SPDAs could also be used by the self-employed and those wishing to top-up their occupational DB or DC pension. A NAPF (2009a) survey suggests that DC pension pots could be invested in deferred annuities.

10 US 401(k) schemes have additional problems: members may invest large amounts of their pension pot in the shares of their employer, members can take cash out of their pension pot, and there is no requirement to annuitize.
Figure 1 shows that these SPDAs involve a specified investment return (which removes investment risk until retirement), followed by a specified rate for converting the lump sum (or final value of the pension pot) into an annuity (which removes longevity risk, inflation risk and interest rate risk) for the annuitant.

To the member, a pension scheme based on SPDAs can be made to look like a final salary DB scheme, a CARE DB scheme or a DC scheme, depending on the revaluation rate for investments (pension contributions) built into the SPDAs. If the contractual rate of return during the investment phase is inflation, then a SPDA scheme resembles a typical CARE scheme, where inflation is usually used as the revaluation rate. If the revaluation rate for investments is final salary, an SPDA-based scheme resembles a final salary scheme. If the revaluation rate is the rate of return on the stock market, it will look like a DC scheme with a fixed annuity rate. However, since not subjecting scheme members to stock market risk is a key aim of using SPDAs, the ability to replicate a DC scheme is of no interest. If members want equity exposure, they can do so outside their occupational pension provision. Sutcliffe (2009) argues that CARE schemes have many advantages over final salary schemes, making the replication of a CARE scheme an attractive choice. It will be assumed that the contractual revaluation rate in the SPDAs is inflation.

The basic SPDA can be modified to include various other benefits to make it look like a typical DB scheme, e.g. death grant, ill health early retirement, dependents benefits, lump sum on retirement, index linking, etc. It is possible to transfer some of the risks to the annuitant by offering a bonus related to the returns actually achieved on the pension contributions (or SPDA consideration), and expectations at retirement for longevity, inflation and interest rates. However, the introduction of such option-like features would make the SPDAs more difficult to price and hedge, and increase the chances of default by the insurance company, e.g. the very severe problems experienced by Equitable Life and the insolvency of eight Japanese life insurance companies (Davis, 2004). It also makes the SPDA risky for the employer and the members. For these reasons a simple SPDA without guarantees and bonuses is proposed.

The widespread adoption of SPDAs by individual schemes would collectively have a number of economic effects. Competition between insurers could lead to unrealistically low annuity prices.

\[\text{Figure 4: Single Premium Deferred Annuity}\]

Many of the details of a SPDA-based scheme are unspecified, and in fleshing out these details there is a danger of creating some minor conflicts with existing regulations.
If pension schemes select the SPDA provider, they have an incentive to choose the cheapest. A number of life insurers in the US have failed, indicating that US annuities have a default risk, and the cheapest SPDA provider may have a relatively high default risk, Perun (2007). Such suppliers may not be desired by members, as it is the members who bear the default risk (excepting any industry-wide compensation scheme). UK insurers are highly regulated to prevent failure, with a compensation scheme to cover defaults. In addition, members may require higher wages or pensions to compensate for an increased default risk, and this would reduce or remove the incentive for schemes to choose low-cost, high-risk SPDA providers, should they emerge.

Another likely consequence of the widespread use of SPDAs is a big increase in the size of insurers operating in the UK, probably making them ‘too big to fail’. However, UK insurers are heavily regulated and have a good record of not defaulting on their liabilities. In addition, the PPF currently insures 90% of UK DB liabilities, and so these liabilities may be viewed as already carried by an organization that is ‘too big to fail’.

The final aggregate effect concerns the type of assets in which the pension fund is invested. Insurance companies usually match their annuity liabilities by investing largely in bonds. So a switch from DB (and DC) schemes to SPDAs would reduce the demand for equities, and increase the demand by UK pension schemes for gilts and corporate bonds. Applying the Modigliani-Miller result to the entire UK corporate sector, and assuming a closed economy, this would cause a rise in equity returns and a fall in interest rates, but no change in the overall cost of capital for UK companies (Exley, 2005). Over time the average gearing of UK companies is likely to rise, increasing the probability of failure during recessions, while the higher gearing may also affect the way companies are managed, as suggested by Jensen and Meckling (1976). The rise in demand for gilts, coupled with a fall in corporate bond rates would probably be accompanied by a fall in gilt rates.

The magnitude of these changes in the allocation of pension fund assets on equity and bond returns depends on the relevant price elasticities. These changes may be modest because UK and foreign asset markets are highly integrated. For example, in December 2006 40% by value of UK shares were owned by foreign investors (National Statistics, 2007). The UK equity market has successfully accommodated considerable changes in the proportion of UK equities owned by UK pension schemes. Until the 1940s UK pension funds invested most of their money in government bonds (Sutcliffe, 2005). In 1963 the proportion in UK equities was only 6.4%, but by 1992 it had

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12 In 2009, the average large UK scheme had 28% of its assets in UK equities, 26% in foreign equities, 39% in domestic government debt and corporate bonds and 1% in foreign bonds, Mercer (2009).

13 Davis (1995, p. 243) has argued that the cost of capital will rise because international bond markets are more integrated than international equity markets.
quintupled to 32.4%, while by the end of 2006 it had fallen by 60% to 12.7% (National Statistics, 2007). There is also considerable cross-section variation between European countries in their pension fund asset allocations. For example, in 2009 only 6% of German pension fund assets were invested in domestic equity, while 83% were in domestic bonds, Mercer (2009). These facts suggest that the UK capital market could successfully accommodate a gradual move of pension assets out of UK equities and into bonds (both domestic and foreign, sovereign and corporate).

4. The Development of Deferred Annuities
Deferred annuities have a long history, having been sold in the UK for at least a quarter of a millennium. A sale of deferred annuities was proposed in 1739, while between 1766 and 1771 eleven insurance companies were formed in the UK to sell deferred annuities (Lewin, 2003). By 1952 about a quarter of UK life assurance business took the form of deferred annuities (Ogborn and Wallas, 1955). Group insured pension schemes using deferred annuities probably appeared in the UK in the early 1920s, and by the later 1920s they were being widely marketed (Butt, 1984, Supple, 1970, pp. 435-6). This market expanded during the 1930s and 1940s, and grew by 14.5% per year between 1951 and 1955 (Johnston and Murphy, 1957). By 1956 over half the members of UK private sector pension schemes were in insured schemes (Hannah, 1986).

After the 1960s the size of the UK market in group deferred annuities decreased, and at the turn of the millennium various authors described this market as small. Booth et al (1998) noted that group deferred annuity contracts had become rare in the UK, while Blake (1999) stated that this market was “extremely thin”. The Actuarial Education Company (2002) thought there may be difficulties in finding a deferred annuity supplier for a large group of members on competitive terms in the UK and, while non-profit deferred annuities could be purchased by schemes, this was rare.

In recent years the market for deferred annuities in the UK has increased in size. When a DB scheme is wound-up, the rights of active members can be discharged by the purchase of deferred annuities from an insurance company on behalf of the affected members. This buy-out market was a duopoly, with most of the business coming from scheme wind-ups. But since 2006 new companies have entered this market, and by 2009 eleven companies were offering bulk insured pensions solutions in the UK. These companies have targeted the new market of employers who wish to dispose of part or all of their DB scheme via group annuities. The proposal in this paper to use SPDAs is similar to a pension buy-out in which an insurance company provides SPDAs to the active and deferred members of a DB scheme and immediate annuities to pensioners in return for a payment by the employer and the transfer of the scheme’s assets. By the end of 2008

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14 For example, section 74(3c) of the Pensions Act 1995. Since 2005 only schemes which have not entered the PPF have purchased annuities on wind-up.
UK buy-outs covered half a million members and £22 billion of assets under management, (Association of British Insurers, 2009).

Light can be shed on whether a substantial market in SPDAs will develop by looking at the reasons for the decline in this business from the levels reached in the 1950s and 1960s. From the mid-1950s onwards competition from DB schemes was strong, particularly among large companies who had the staff and resources to run their own schemes (Hannah, 1986). This led to group deferred annuities being increasingly concentrated in small and medium-sized companies. Hymans (1950) argued that in the 1950s the costs of running DB schemes were substantially lower than the costs included in the annuity prices charged by insurance companies, so reducing the relative cost of DB schemes. By 1950 a quarter of all employees were in the public or local government sectors, and pension schemes for these sectors were very largely DB (Hannah, 1986). Consulting actuaries extolled the virtues of DB schemes, possibly because DB schemes created work for consulting actuaries, while insurance companies handled their own actuarial work (Hannah, 1986). The terms and conditions of DB schemes are usually under the control of the employer, and can be altered (at least for future accruals) to suit changing business needs and circumstances. The terms of group deferred annuities in the 1950s and 1960s tended to be under the control of the insurance companies who usually offered only standard terms and conditions (Hymans, 1950).

Early leavers from DB schemes usually had just their own contributions returned, sometimes with accrued interest; while their employer retained all the employer’s contributions, together with the investment returns on this sum (Hyman, 1950, Owen, 1952-3, Polman, 1939, Turner, 1931). For insured schemes early leavers also had their own contributions returned in most cases, and maybe the accrued interest, rather than retaining a deferred annuity. Typically the employer received back 90% of the employer’s contributions in respect of an early leaver, with the remaining 10% being retained by the insurance company (Hyman, 1950, Polman, 1939). If the employer had a high labour turnover this 10% retention increased the cost of using group deferred annuities, relative to a DB scheme.

In 1950 the Prudential Assurance Company, a leading provider of group deferred annuities to UK companies, decided to cease selling these annuities on a non-profit basis, and to sell only the new

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15 Presumably this comparison involves DB schemes that had actually been set up, mostly by large companies; and excludes small companies where the costs of a DB scheme would probably have been higher.

16 This limited the market for SPDA-based schemes.

17 Some schemes in the 1920s and 1930s were tailored to meet the employer’s requirements (Butt, 1984).
product of group deferred annuities with-profits. This switch has been attributed to the exposure of insurance companies to interest rate and longevity risk over very long periods which were difficult to hedge, and because annuity prices were high (i.e. annuity rates were low), due to low interest rates (Dennett, 1998, Layborn, 1952). Many other providers of group deferred annuities also switched to with-profits deferred annuities. In 1928 the insurance companies supplying group pension schemes had formed an ‘inner circle’ to fix prices (Butt, 1984), and the switch to with-profits deferred annuities weakened this price fixing, leading to greater competition, higher selling costs, lower prices and smaller profits for insurance companies (Hannah, 1986). The introduction of with-profits annuities also created risk for the employer and members with schemes based on such deferred annuities, removing an important advantage of deferred annuities over DB schemes (Hannah, 1986).

After the Second World War, George Ross Goobey promoted the cult of the equity for pension schemes, and there was an expansion of equity investment by DB schemes to enable employers to benefit from the equity risk premium (Sutcliffe, 2005). Insurance companies had a strong interest in setting group deferred annuity prices at realistic levels, but DB schemes had considerable scope to offer unrealistically high benefits (Hannah, 1986). This was possible because DB schemes are permitted to continue operating with a substantial deficit, and had considerable latitude in valuing their assets and liabilities, allowing them to choose the size of their deficit or surplus. This situation allowed employers with DB schemes to offer attractive benefits to employees, and hope that in the long run the equity risk premium would fund their generous pensions promise. DB schemes have been said to have some of the characteristics of a Ponzi scheme, as the contributions of active members can be used to pay the pensions of retired members (Vermeulen, 2009). These features helped DB schemes continue operating when investment returns were poor. Due to high post-war inflation, the performance of group deferred annuities was seen as poor because they were generally not index linked, giving them a low replacement rate (Hymans, 1950, Booth et al, 1998). DB schemes with equity investment were able to offer pensions based on final salaries that were expected to at least match inflation.

Having examined the factors that led to the decline in the usage of SPDAs, the issue is whether these negative factors remain important, and whether they will prevent SPDAs from staging a recovery. Competition from DB schemes has ceased and they are being closed not opened, while consulting actuaries are no longer pushing DB schemes. The cult of the equity and the ability of DB schemes to offer the employer a bet on equity prices has taken a severe knock, with the full risks of DB and DC schemes being better appreciated. Despite lobbying by employers, in 1980 it became compulsory for all UK schemes to preserve the pension rights of early leavers; that is,
to create deferred pensions, up-rated by limited price indexation, Hannah (1986)\(^\text{18}\). So the penalty for leaving a DB scheme early has been much reduced, while that for leaving an SPDA-based scheme early no longer exists, as members retain their SPDAs. Therefore the employer still receives a benefit when a member leaves a DB scheme early, but no benefit for early leavers from DC or SPDA-based schemes.

For large schemes the terms and conditions of SPDAs should now be open to negotiation, rather than offered on a take-it-or-leave-it basis\(^\text{19}\). Insolvencies of insurance companies and risky outcomes have demonstrated that with-profits annuities have problems, making non-profit SPDAs (as proposed in this paper) more attractive. Modern SPDAs that offer an inflation indexed revaluation rate have become available, removing inflation risk. With the widespread use of computerized systems, the administrative costs of providing deferred annuities should now be broadly similar to those for a DB scheme. With developments in financial markets the ability of insurance companies to hedge their annuity risks has improved (see section 8). The only areas where DB schemes remain invulnerable are the public and local government sectors, and at present this does not look like changing. So it appears that circumstances have changed to favour SPDAs, and that SPDAs can be adapted to modern conditions, making them once again an attractive way of creating a pension scheme. A sign of this is the appearance in the last few years of nine insurance companies specializing in the buy-out market.

Although the market in SPDAs in the UK is currently fairly small, but there are some notable examples of provision elsewhere. For example, in Denmark half of Danish pension contributions are used to buy deferred annuities (Andersen and Skjødt, 2007). These are usually group deferred annuities with a preset minimum conversion rate (i.e. a guaranteed annuity rate or GAR). If mortality, interest rates or investment returns are higher than expected the annuitant receives a bonus payment. Since about 1980 deferred annuities have been sold in the US as a tax-advantaged savings vehicle for individuals, which are seldom held to maturity (Shankar, 2005). By 2005 most annuities sold in the USA were deferred, with SPDA being the most popular annuity product. In 1996 few new group deferred annuities were issued in the US, but many such agreements remained in force, having been sold in earlier years, McGill et al (1996). Belgium also has an important market in deferred annuities, while more modest deferred markets exist in Germany, the Netherlands, Switzerland and Singapore, amongst others (Rusconi, 2008).

5. Previous Literature

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\(^\text{18}\) Salaries generally increase faster than inflation, and so employers gain from the difference between the rate of salary increase and the rate of limited price indexation (capped at either 5% or 2.5%).

\(^\text{19}\) The terms of pension buyouts are carefully tailored to the needs of the employer, Monk (2009).
In a seminal contribution, Yaari (1965) showed that, given various assumptions, complete annuitization is optimal for all consumers. This result depends on consumers having access to deferred, as well as immediate annuities (Cannon and Tonks, 2008, Davidoff, Brown and Diamond, 2005). Therefore, in theory, deferred annuities play a key role in enabling consumers to maximise their inter-temporal utility. The purchase of SPDAs has previously been suggested for a variety of reasons:- (a) benefitting from the mortality discount\(^{20}\), (b) providing longevity insurance to pensioners, (c) reducing the variance of the cost of an annuity by pound cost averaging, and (d) reducing the cost of adverse selection\(^{21}\). It has also been suggested that the presence of behavioural biases increases the attractiveness of SPDAs, relative to immediate annuities (Hu and Scott, 2007).

Bateman, Doyle and Piggott (2002) proposed buying a deferred annuity at retirement that begins payment in late old age, e.g. 80 or 85 (called a longevity annuity)\(^{22}\). Dus, Maurer and Mitchell (2005) also suggested buying a longevity annuity as this provides longevity insurance at a low cost. Scott (2008) argued that, for consumers who do not fully annuitize at retirement, the purchase of a longevity annuity is very likely to be superior to the purchase of an immediate annuity. Scott, Watson and Hu (2007, 2009) also showed that buying a longevity annuity gives consumers a higher utility than is available from purchasing an immediate annuity on retirement. Antolin (2008) argued that the purchase of longevity annuities should be mandatory, while Turner (2008) proposed that US Social Security should provide an index-linked longevity annuity to low income pensioners when they reach the age of 82.

Brugiavini (1993) suggested the incremental purchase of SPDAs throughout a person’s working life, in preference to buying an immediate annuity on retirement. Since adverse selection increases with the age of the annuitant, this strategy reduces the cost of buying an annuity. Sheshinski (2003) showed that a sequence of SPDAs gives higher utility than buying a single immediate annuity on retirement. This is because the annuitant may die during the deferral period, leading to a better price for SPDAs than for immediate annuities due to an increase in the mortality discount. Milevsky (2005) and Gong and Webb (2007) examined the incremental purchase at a relatively young age of an index-linked deferred annuity which does not commence

\(^{20}\) The mortality discount is the reduction in the price of an annuity, relative to the cost of purchasing bonds to give the same annual payment, due to the probability of death each year of the annuitant and cessation of the annuity payments. The higher is the probability of death at a young age, the greater is the mortality discount.

\(^{21}\) Adverse selection in this context refers to the fact that consumers who are more likely to live for a long time tend to choose to buy annuities, Finkelstein and Poterba (2004).

\(^{22}\) From 2005 MetLife, Hartford and the New York Life Insurance Company have been selling longevity annuities in the US (Antolin, 2008).
payment until the annuitant reaches an advanced age, such as 80, 85 or 90 (a longevity annuity, but purchased incrementally). There would be no payout if the annuitant died before the annuity commenced, with the resulting savings reducing the price of these annuities (the mortality discount). Burtless (2002) and Blake (1999) suggested buying a sequence of annuities during the five or so years before retirement, rather than waiting until retirement, thereby reducing the variance of annuity rates - a form of pound cost averaging. Alier and Vittas (2001) examined this idea and, using US data from 1871 to 1995, found that this strategy reduced the standard deviation of the replacement rate by 25%.

These previous studies have examined using SPDAs as an alternative to immediate annuities, while the present paper proposes using SPDAs to create a pension scheme. The only previous proposal for SPDAs to be used to create a pension scheme is Boskin, Kotlikoff and Shoven (1988). They suggested that US social security should be restructured with the social security tax paid by a worker each year used to accrue an index-linked annuity for that individual. These deferred annuities would be payable from retirement. Past accruals would be locked in, but the annuity rate for new contributions would vary from year to year, depending on experience. While largely unfunded, this scheme for personal security accounts bears strong similarities to the proposal in this paper to use a sequence of SPDAs in occupational pensions.

6. Pricing SPDAs

In a competitive market, the price of an immediate annuity on a single life paid with a single premium is given by equation (1).

\[ V_{\text{I}} = \sum_{i=1}^{n} \frac{A \cdot P_{xi}}{(1 + r)^i} \]  

where \( V_{\text{I}} \) is the current price of the annuity, \( i \) is the number of years since the annuity began payment, \( r \) is the rate of interest (assuming for simplicity a flat yield curve), \( A \) is the annual payment under the annuity, \( n \) is a number greater than the remaining years of life of the annuitant, and \( P_{xi} \) is the probability that an annuitant aged \( x \) when the annuity begins payment survives for at least \( i \) years.

For the corresponding deferred annuity, the probabilities used to value the annuity are based on expectations at the time the SPDA is sold, not when the annuitant retires and the annuity comes into payment. It also incorporates the investment of the purchase price of the SPDA during the deferral period at the contractual revaluation rate (\( e \)).
where \( m \) is the number of years for which the SPDA is deferred, and \( P_{xm} \) is the probability of the annuitant surviving the deferral period (assuming that if the annuitant dies during the deferral period there is no payout).

Equations (1) and (2) assume that both real interest rates and the mortality table are deterministic. However, in reality, both interest rates and mortality are stochastic and this complicates the pricing problem. The effects of allowing for stochastic mortality and interest rates on SPDA pricing have been studied by Dowd, Blake and Cairns (2008), Toplek (2007) and Post (2009).

Changes in longevity, inflation, interest rate and investment return expectations during a member’s working life affect the price of SPDAs to be purchased for them in future years. This is similar to DB pensions, where future accrual rates can be changed, although this is seldom done. Insurance companies will probably vary the price of SPDAs from year to year as expectations change. Reducing the accrual rate for a DB scheme often leads to opposition from scheme members and threats of strike action. Variations in the accrual rate for SPDAs will be less contentious, as changes (both up and down) will be generated by the market, not by the employer. This represents a modest degree of risk sharing between the pension provider and the member, relative to a DB scheme. It can be viewed as a form of pound cost averaging, as the member buys their annuity at approximately the average expected annuity rate during their working life, not the actual rate at retirement. It also means that, if there is a steady increase in longevity expectations, the cost is shared between the member and the insurer.

Some previous authors have assumed that an initial agreement is reached with the insurer which specifies the price of subsequent SPDAs, thereby offering a guaranteed accrual rate. In which case, the annuitant has a lapse option and, if interest rates rise or expected longevity shortens, this option may move into the money (Nielsen and Zenios, 1996, Asay, Bouyoucos and Marciano, 1992). This embedded option does not apply to SPDAs where the annuity rate is revised each year, as suggested here.

7. Benefits of Using SPDAs

The use of SPDAs offers two important advantages over both DB and DC schemes. First, investment risk, longevity risk, interest rate risk and inflation risk are borne by an insurance company. There is no salary risk as a SPDA-based pension is not determined by the final salary (unless the revaluation rate used is the final salary), while regulatory risk is borne largely by the
insurance company and the members. If inflation is used as the SPDA revaluation rate, instead of the pension varying with final salary, a pension based on SPDAs is fixed in real terms when each year’s deferred annuity is purchased. This makes such a pension highly predictable in real terms. Therefore, with a SPDA-based scheme the employer bears virtually no risk, and nor do the members. In contrast, the terminal value of a DC pensions pot is highly variable, and so is the resulting replacement rate, while members of most DB schemes get a pension which is a specified proportion of their final salary, and so their pension varies with their final salary. Table 1 summarises who bears the risk during the stages of a member’s life for different types of scheme.

<table>
<thead>
<tr>
<th>Type of Scheme</th>
<th>Working</th>
<th>Retirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defined Benefit</td>
<td>Employer</td>
<td>Employer</td>
</tr>
<tr>
<td>Defined Contribution</td>
<td>Member</td>
<td>Insurer</td>
</tr>
<tr>
<td>SPDA</td>
<td>Insurer</td>
<td>Insurer</td>
</tr>
</tbody>
</table>

*Table 1: Risk Bearing For Different Types of Scheme*

Second, insurance companies are specialists in the management of financial risk and have greater knowledge and access to expertise than individuals or DB and DC pension schemes. The employing company will probably be operating in an economic sector that does not involve any special expertise in pensions and fund management, and most trustees (who are usually employees of the company) also lack this expertise. Insurance companies also enjoy considerable economies of scale, together with low transactions costs. These advantages should enable them to do a better job managing scheme assets and liabilities than achieved by either DB or DC schemes. DC schemes usually require the member to choose the asset allocation and contribution rate, and then which annuity to buy and when. The evidence is that members often do a poor job when making these choices.

SPDAs are superior to DC schemes because they offer the possibility of inter-generational risk-sharing, as do DB schemes. Insurance companies providing SPDAs may suffer losses on those retiring this year, but have made a profit on those who retired ten years ago resulting in an inter-generational transfer. The risks borne by members in DC schemes are not shared with other members, and inter-generational risk sharing and transfers are not part of such schemes.

SPDAs are preferable to DB schemes in a number of ways. First, SPDA-based pensions have the same portability as DC pensions. As a result there is no problem for members in changing

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23 There is a risk of changes in the price of future SPDAs, and some regulatory risk.
employer as each member takes their deferred annuities with them. Second, subject to the constraints of a group scheme, individual members can customize their deferred annuities, e.g. full index linking, 5 or 10 year guarantee period, joint life, impaired life, etc. While such customization is possible for DC scheme members, DB schemes usually offer a standard set of benefits to all members. Third, the published accounts of the employer are not impacted by pension surpluses or deficits when SPDAs (or DC schemes) are used. Deficits and surpluses on DB schemes affect the employer’s published accounts, making firms unhappy about this volatility which is unconnected to their business operations. Fourth, if the revaluation rate specified in the SPDAs is not the member’s salary (e.g. inflation is used), the redistribution of pensions in final salary schemes from high fliers to those not promoted to higher salary scales is removed (see Sutcliffe, 2009). Fifth, with a final salary scheme, granting a large wage rise revalues all previously accrued benefits, and this can lead to a substantial increase in the value of accrued pension liabilities. However with SPDA-based pensions (as for DC pensions) a wage increase only impacts future contributions, not the value of past accruals (see Sutcliffe, 2009).

Sixth, while there is default risk with SPDAs, it is default by the insurance company, not the employer24. This avoids the double hit to members of simultaneously losing their job and their DB pension when their employer is wound-up25. Insurance companies are less likely to default than many employers and “in almost all scenarios an FSA-regulated insurer provides more security than the sponsoring employer”, Jones, Hunter and Herbert (2009). This increases the attractiveness of group deferred annuities to employees, compared to DB schemes, Hannah (1986). To diversify the risk of default, the SPDAs could be purchased from a range of insurance companies. While it is acceptable for DB schemes to operate with a substantial deficit26, insurance companies must always have sufficient assets to cover all their liabilities and hold the required capital reserves, so reducing the chances of default. DC schemes cannot default.

Seventh, insurance companies can pool the risks from many members who have different employers and occupations, so reducing their risk of default. DB schemes typically cover either a single employer, or a single industry making their members more homogeneous, which reduces the diversification of actuarial risks. Small DB schemes are susceptible to shocks, such as the death of a highly paid member triggering the payment of a large death benefit. Such actuarial

24 The members could be given a claim on their employer if the insurance company defaults.

25 The Pension Protection Fund (PPF) protects 90% of the pensions of active members, subject to a cap of about £30,000 per annum. However, the PPF is an insurance company that lacks a government guarantee, and its insolvency, or a lowering of the rate of compensation it provides, is a distinct possibility, Blake, Cotter and Dowd (2007).

26 If the deficit of a DB pension scheme becomes very large, the Pensions Regulator can require the scheme to produce a recovery plan.
risks are diversified away by large DB schemes, and to an even greater extent by insurance companies. The use of SPDAs by small schemes removes such risks. Eighth, the accrual rate in a SPDA-based scheme adapts from year to year in response to changed investment and annuity rate expectations in a way that is unlikely to generate industrial unrest. Finally, there is no liability for schemes using SPDA to pay the PPF levy on DB schemes. However, there is a Financial Services Compensation Scheme (FSCS) levy on insurance companies, and if the insurance company defaults, the FSCS will cover 90% of the liability. Compensation from the PPF for DB schemes is capped, while compensation from the FSCS is unlimited.

8. Disadvantages of Using SPDAs
The Actuarial Education Company (2002) reported that the prices for non-profit deferred annuities are unattractive because the insurance company is exposed to longevity, inflation and interest rate risk over 50 or 60 years. However, the investment and annuity rate risk of SPDAs can be reduced by hedging. Interest rate risk can be hedged by holding long positions in fixed interest securities (including interest rate swaps), and stock market exposure can be hedged using a range of instruments. There are very few securities available for hedging longevity and inflation risk, and there may be concern over the ability of insurance companies to hedge the risks inherent in sufficient SPDAs to fund the majority of UK pension schemes. However, their life insurance business provides insurance companies with an operational hedge for at least some of the longevity risk (although this involves basis risk), and insurance companies can probably make greater use of OTC inflation swaps than occurs at present. The concentration of these risks with insurance companies should enable them to stimulate the development of instruments to improve their hedging opportunities, e.g. longevity, mortality and survivor bonds, swaps or forwards and life securitization (Blake, Cairns and Dowd, 2008). For example, a longevity swap with a term of 50 years was traded in June 2009 (Jones, Hunter and Herbert (2009)). Any remaining risks are diversified across the insurance company’s shareholders, rather than falling on the members or their employer.

Te pensions whose risks are to be hedged already exist in DB or DC schemes. DB schemes have issued roughly one £trillion of what are effectively deferred annuities, indexed to final salaries (Pension Policy Institute, 2009). The proposal in this paper is merely for the gradual transfer of these risks from employers, together with the risks currently borne by DC scheme members, to

27 In April 2007 Friends Provident transferred the longevity risk of 78,000 annuities worth £1.7 billion to Swiss Re in exchange for an undisclosed payment; while in March 2009 Norwich Union entered into a swap with Partner Re which transferred the longevity risk of Norwich Union annuities worth £475 million to Partner Re. Then in June and October 2009 Babcock International completed two longevity swaps worth a total of £550 million with Credit Suisse for two of its pension schemes. In July 2009 the RSA Insurance Group insured the longevity risk of £1.9 billion of its pension liabilities with Rothesay Life.
insurance companies via the introduction and growth of SPDA-based schemes. Since the total quantity of the risks to be hedged is largely unchanged, the amount of unhedged risk should not be reduced by a switch to SPDAs, and will almost certainly be increased.

It may be thought that the use of SPDAs will produce smaller pensions than either DB or DC schemes for the same level of contributions. However, such comparisons must allow for differences in risk. In final salary schemes each member’s promised pension is a specified percentage of their final salary, and the obligation to pay this pension falls on the employer using the proceeds from investing the contributions. Therefore, in DB schemes the equity risk premium is very largely a matter for the employer. DB schemes under-estimated the cost of their pensions promise because they expected to earn a substantial risk premium from investing the pension fund in risky assets, which did not materialise. They also under-estimated improvements in longevity and the cost of increases in the regulatory burden. Due to these inaccurate expectations, previous pension promises were too optimistic, and in future DB pensions promises will be lower. Using the market price of risk, the cost of bearing each risk is equal to the associated risk premium. Therefore the cost of pensions, allowing for the cost of the various risks, should be calculated using a rate of return close to the riskless rate, making the total cost of a DB scheme to the employer broadly similar to that faced by an insurance company in providing SPDAs. Since the insurance company will probably have slightly lower costs than a DB scheme due to their greater expertise, economies of scale and hedging possibilities, a SPDA-based pension may be cheaper than a fully costed DB scheme.

For DC schemes, the equity risk premium is received by the member, and so the risk premium concerns just the member. DC schemes should offer a higher expected return than a SPDA-based scheme for the same contributions because the member is bearing equity and annuity rate risk. When allowance is made for the cost of bearing these risks, the risk-adjusted expected return on a DC scheme will probably be below that for a SPDA-based scheme. This is because, due to its hedging capabilities and diversification among shareholders, the insurance company will probably have a lower cost for bearing risk than individual scheme members. In addition, since many DC members make poor decisions when allocating their assets, buying an annuity, and selecting a contribution rate, the expected return from a DC scheme may well be inferior to that of a SPDA-based scheme. DB and DC schemes only appear to offer higher pensions than SPDA-based schemes when no allowance is made for the risks undertaken by DB and DC schemes.

28 There may be a very small number of members who enjoy the excitement of a big bet on equity markets with their pension pot. However, they can speculate on equity markets outside their pension scheme, or contribute to a personal pension which gives them this freedom.
Once these risks are added to the costs of DB and DC schemes, the value for money is broadly similar to that of SPDA-based schemes.

Insurance companies are more tightly regulated than pension schemes. They must always be solvent, while DB pension schemes can continue operating with a substantial deficit. In addition, insurance companies must comply with the prudential regulations in the Financial Services Authority handbook requiring them to hold capital reserves. As non-profit business, SPDAs affect the size the regulatory peak in pillar 1 and the individual capital assessment in pillar 2 of the solvency requirements. Holding this additional regulatory capital increases the cost of annuities, including the immediate annuities associated with DC schemes, while the forthcoming introduction of Solvency II by the European Union (CEIOPS) is expected to further increase the costs of providing both deferred and immediate annuities. However, if these solvency requirements efficiently reduce risk, all they do is require insurance companies to adopt a lower risk strategy. The risks of insolvency are now priced (via the cost of the regulatory capital), with the company and its customers given greater protection against the risk of insurance company insolvency. Without solvency rules they face lower explicit costs, but higher risks. The solvency rules merely make explicit the cost of the additional insurance company insolvency risk created by the sale of annuities. In December 2009 the application of Solvency II to DB schemes was under active consideration by the European Union. If DB schemes must also comply with Solvency II, this would level the regulatory playing field between DB schemes and insurance companies.

There is a wide range of ways in which SPDA-based schemes are at a disadvantage to DB schemes. First, DB schemes are a convenient tool for managing early retirement, with the costs of granting additional accrued years falling on the pension scheme, while with DC and SPDA schemes the costs immediately fall on the employer as additional contributions. Second, DB schemes can be designed to encourage retirement at a particular age (Ippolito, 1986, Kotlikoff and Wise, 1987), although a compulsory retirement age provides an upper limit for all types of scheme. Third, early leavers from final salary schemes often have their deferred pension up-rated by limited price indexation, not final salary, generating a gain for the employer which does not occur with early leavers from DC or SPDA-based schemes. Fourth, if the revaluation rate implicit in the SPDAs is inflation, a SPDA-based pension scheme (like a DC scheme) does not encourage hard work or reward low discounters because no pension loss is suffered by early leavers. Final salary schemes penalise early leavers because they revalue their accrued benefits by inflation (possibly capped at 5% or 2.5%), not salary increases. Fifth, as for DC schemes, the size of the

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29 Low discounters are people who discount at market rates, while high discounters use substantially higher rates.
pension differs by gender due to the different longevity of males and females built into annuity rates in the UK\textsuperscript{30}. Such a gender distinction is not usually the case for DB schemes.

Sixth, an insurance company (unless it is a mutual) builds a profit margin into the price of its SPDAs, and also charges for its marketing expenses, while DB schemes are not-for-profit organizations and do not incur marketing expenses. The annuities purchased with a DC pension pot also include a charge for profit and marketing expenses, while the accumulation phase of DC schemes involves investment via vehicles which charge for marketing costs and profit. Seventh, the employer can choose to underfund a DB scheme. Underfunding offers the employer the benefits of borrowing from the scheme (Cooper and Ross, 2001, Datta, Iskandar-Datta and Zychowicz, 1996) and bonding scheme members to the long term success of the company (Ippolito, 1985, 1986). However, the creation of the PPF largely removed the bonding benefit, and the remaining benefits may be offset by the need for employers with underfunded DB schemes to offer higher wages. Eighth, overfunding a DB scheme offers the employer a tax-free investment. However, there are legal restrictions on such overfunding, and it is hard for the employer to recover the money from the scheme.

Ninth, the terms and conditions of a DB scheme can usually be set and altered by the employer to suit their changing business needs. SPDAs are purchased from an insurance company, and so are less susceptible to customization and adaption. However, with computerized systems, it should be possible to offer customized SPDAs for large schemes. Finally, because SPDA annuity rates may vary over time, different cohorts of members could receive differently sized annuities for the same contributions, which is not the case for DB schemes (assuming no changes in the accrual rate, retirement age, employees’ contribution rate etc.). This inter-temporal inequality applies in a much more extreme manner to DC pensions than to SPDA-based schemes.

These numerous disadvantages of SPDA and DC schemes relative to DB schemes do not outweigh the attractions of SPDA-based and DC schemes because, despite these advantages, large numbers of employers are choosing to terminate DB schemes in favour of DC schemes.

9. Conclusions
In the UK and elsewhere, DB schemes are being replaced by DC schemes. However DC schemes have some substantial weaknesses, and a continuation of current policies will probably lead to another pensions crisis in a few decades. There is an alternative which avoids the major defects

\textsuperscript{30} There is a requirement that there be no gender discrimination in the pricing of protected rights annuities. However these annuities must be for a joint life, and so do discriminate between married and single annuitants.
of both DB and DC schemes. It is proposed that, if UK employers wish to replace their DB schemes, they should do so with something that looks like a CARE scheme to the members, but is funded by SPDAs. The members get what is effectively a DB pension scheme. However pension provision is outsourced to specialist providers (insurance companies), with all the risk (and the decisions that must be made by members of a DC scheme) borne by insurance companies, not by the employer or members.

The use of deferred annuities was widespread in the UK as a way of creating occupational pension schemes, but has greatly reduced since the 1950s and 1960s. It appears that in recent years circumstances have changed to favour SPDAs, relative to DB and DC schemes. Any substantial move from DB and DC schemes to SPDA-based schemes will take a considerable time as employees gradually build up accrued benefits in newly created SPDA-based schemes. This long adjustment period will provide the opportunity for insurance companies and financial markets to gradually adapt to the provision of occupational pensions using SPDAs.

References


