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Default Funds in U.K. Defined-Contribution Plans

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Most defined-contribution (DC) pension plans give members a degree of choice as to the investment strategy for their contributions. For members unable or unwilling to choose their own investment strategies, many plans also offer a default fund. This article analyzes the U.K. "stakeholder" DC plans, which must by law offer a default fund. The default funds are typically risky but vary substantially among the providers in their strategic asset allocation and in their use of life-cycle plans that reduce risk as planned retirement approaches. A stochastic simulation model demonstrates that the differences can have a significant effect on the distribution of potential pension outcomes.

Defined-contribution pension plans are an increasingly common form of retirement income provision in the United States, the United Kingdom, and many other economies. Most DC plans allow members a degree of choice about how to invest their contributions. Typically, a range of mutual funds is offered and the member may choose one or more of them. Many plans also have a default option in which the member's contribution is automatically placed if the member does not actively choose a fund.

Previous research shows that many employees, often the majority of employees, are inclined to take the "path of least resistance" and passively adopt the default arrangements that exist in their plans. For example, Choi, Laibson, Madrian, and Metrick (2002) reviewed U.S. evidence on the tendency of members to accept plan default options for key features, such as the contribution rate and the investment fund. Even though employees are free to opt out of default arrangements, few actually do. In the plans Choi et al. studied, 42–71 percent of participants accepted the default contribution rate and 48–81 percent of plan assets were invested in the default fund, which was typically a money market fund. In the United Kingdom, consulting firm Hewitt Bacon and Woodrow estimated that more than 80 percent of members in DC plans accepted the default fund choice (Bridgeland 2002).

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Default funds do bring a number of benefits, especially if they are chosen with the needs of the pension plan members in mind. Where plan members have little financial knowledge, default funds simplify the saving process, which in turn, may raise participation rates. The default fund provides an "obvious" choice for the uninformed member, a choice that is seemingly endorsed by the sponsoring employer or pension plan provider and helps such members deal with an otherwise complex decision (Madrian and Shea 2001).

The tendency of DC pension plan members to accept plan default funds does mean, however, that plan providers' or plan sponsors' choices of default funds may have a significant impact on the welfare of plan members. Put simply, well-chosen default funds will benefit members, and poorly chosen default funds will impose a cost on uninformed members. Furthermore, to the extent that there is cross-sectional variation in default funds among pension plans that is not explained by differing membership characteristics, members will face something of a lottery in which they have little chance of the fund matching their characteristics. Financial analysts and planners have an important role to play in helping pension providers and plan sponsors put appropriate default arrangements in place.

We investigated this issue by analyzing the variety of types of default fund offered by stakeholder DC plans in the United Kingdom. We document in this article the range of approaches in use and provide a quantification of what these differences mean in terms of potential pension outcomes for plan members.

Stakeholder pension plans were introduced in the United Kingdom in April 2001 with the aim of providing a simple, carefully regulated, and low-cost saving product that could improve pension

provisions among low- and middle-income employees. In essence, they are personal pension arrangements provided by financial institutions that operate on a DC basis. They share most of the features of other DC pension arrangements, in terms of, for example, permissible contribution rates, the availability of benefits, and tax treatment. Stakeholder plans also have a number of specific features, however, that are intended to make them easy for inexperienced investors to use.[1]

The feature of interest in this article is that the regulations require each plan to have a default fund so that members do not have to make an active choice about how to invest.[2] This requirement and the public availability of data for most plans' default funds make the stakeholder pension market an interesting area in which to study the investment strategies financial institutions offer to so-called uninformed pension plan members.

The stakeholder market is also a significant part of the U.K. pension system. Stakeholder plans are offered by most major insurance companies and asset managers in the United Kingdom. Although the plans can be sold as retail financial products, they are often used by companies for providing "occupational pensions"—that is, plans similar to 401(k) plans in the United States. An employer "adopts" a plan provider, and the employees can then enroll in the plan. All employers with five or more employees that do not provide a qualifying occupational pension plan must make a stakeholder plan available to their employees, but they do not need to contribute to it (Blake 2003).

As of May 2006, more than 2.7 million stakeholder pension accounts had been opened since launch of the plans in 2001 (DWP 2006). Figures from HM Revenue and Customs show that 1.5 million individuals contributed to stakeholder pension plans during the 2004–05 tax year and that total contributions were £2.4 billion.[3] The corresponding figures for employer-sponsored group personal pensions, which are similar to stakeholder plans in many respects (including the investment strategies used), were 1.8 million contributing members and £4.0 billion of contributions.[4] Assets under management in personal and stakeholder plans were estimated to be £300 billion at the end of 2005, which can be compared with an overall funded pension market (including DB plans) of £1,400 billion (UBS 2006).

Previous Literature

A number of studies have investigated the effects of alternative investment strategies on the anticipated outcomes of DC pension plans. For example, Booth and Yakoubov (2000) used historical return data from the annual Barclays Capital "Equity Gilt Study" for the United Kingdom to investigate the retirement income implications of five investment strategies. The authors assumed that the "standard" fund had a constant 70 percent equity/20 percent bond/10 percent cash mix. This standard fund was combined with four life-cycle strategies—a switch to bonds for the 10 years preceding retirement, a switch to cash in the final year before retirement, a switch to cash for the final three years, and a switch to bonds for the final three years. Booth and Yakoubov found limited support for the superiority of life-cycle approaches and also found that an equity-based fund in the 10 years preceding retirement "stochastically dominates" both the cash- and fixed income–based strategies—principally because of the higher expected return.

Blake, Cairns, and Dowd (2001) investigated similar issues by using the PensionMetrics stochastic simulation model. Among the asset allocation strategies they investigated were a "pension fund average" approach—which was invested among a range of asset classes in proportions typical of U.K. occupational pension funds in the late 1990s—and a life-cycle strategy that switched from the pension fund average into a 50 percent bonds/50 percent U.K. T-bills portfolio over the final 10 years before retirement. They also found that the overall distribution of potential outcomes was wide. In line with the Booth and Yakoubov (2000) findings, Blake et al. found that a well-diversified high-equity strategy (i.e., the pension fund average strategy) produced the best overall outcomes and that, although the life-cycle strategy avoided some of the worst potential outcomes, it did so by significantly reducing the expected level of pension.

A third study, by Hibbert and Mowbray (2002), used a stochastic model to investigate the outcomes of a variety of asset allocation strategies (including 100 percent cash, 100 percent bonds, and 100 percent equity) and various forms of a life-cycle strategy. They also found that the 100 percent equity strategy produced the highest expected value for the pension annuity, albeit with a wide range of potential outcomes. The life-cycle strategies significantly narrowed the range of potential outcomes but at the expense of reduced expected value, particularly when the life-cycle switch began 15 years before retirement.

Our work differs from these papers principally in that it focuses directly on the fund structures actually offered as the default funds in U.K. stakeholder pension plans. The next section describes these fund structures in detail.

Data on Default Funds

U.K. legislation requires stakeholder pension plans to be registered with The Pensions Regulator, which makes the register available to the public. As of December 2006, 45 plans were listed on the register, and these plans form the universe for our analysis. Of the 45 plans, 14 are closed to new business (e.g., because of mergers between providers) and so no longer provide public information on their fund structures, leaving 31 plans on which we were able to collect data. This sample, in effect, represents all of the stakeholder plans actively marketed in December 2006. The key variables of interest are the basic asset allocation of the default fund and the nature of the life-cycle profile used by the fund. [5]

We wish to stress that the term "plan" here refers to a pension arrangement offered to the marketplace by an insurance company, asset manager, or in some cases, membership organization, such as a trade union. An employer can adopt a plan and offer it to its employees. Thus, each of our plans is probably used by many employers and groups of employees. Equally, many of the plans are offered on a retail basis and any individual can join, either by arranging to do so themselves or via a financial adviser.

In the occupational context, the employer chooses a financial institution to offer a stakeholder pension product to its employees. The choice will be based on factors such as brand, track record, and cost. Each financial institution will have a standard default fund that it typically uses when implementing a plan for an employer. The employer may accept this standard plan as the default fund or ask the financial institution to use another fund as the default for its employees. An employer might do the latter if it felt the standard default fund was inappropriate (e.g., too risky) for its employees, but our industry contacts suggest few employers actually do so. So, in most cases, the financial institution's choice of default fund prevails.

Because the financial institution's standard default fund will be implemented in most cases and the stakeholder plans are, in most cases, generic plans offered to the whole marketplace, rather than tailored for any specific group of employees, one would expect the default funds of plans to be similar. These default funds must be suitable for the average employee in the economy who randomly chooses, or is randomly allocated to, one of the available default funds.[6] Our data, however, do not show this kind of similarity.

Table 1 shows the range of default funds in terms of fund type and style of management. The "balanced managed" type (which is typically invested 50–60 percent in U.K. equities, 20–30 percent in non-U.K. equities, 10–20 percent in bonds, and up to 5 percent in cash) was used by 13 of the 31 plans. Most of the balanced managed funds were actively managed, but four used a passive approach. A total of 18 plans offered a 100 percent equity fund as the default; 13 of these were invested globally, and 5 were invested only in domestic U.K. equities. The most common asset allocation for the global funds was 60 percent U.K. equities and 40 percent (capitalization-weighted) non-U.K. equities, although 50/50 and 70/30 splits were also in use. The majority of the 100 percent equity funds used a passive management approach.

Table 1. Number of Default Funds by Type, December 2006

Type	Total	Actively Managed	Passively Managed
Balanced managed	13	9	4
Global equity	13	5	8
U.K. equity	5	1	4
Total	31	15	16

Since April 2005, all stakeholder default funds have been required to use some form of life-cycle asset allocation profile.[7] **Table 2** shows that there was variation in the manner in which providers implemented the requirement for the life-cycle profile. The most common structure (used by 13 of the 31 plans) was to start switching from the equity or balanced fund five years prior to retirement, moving progressively to a final-year allocation of 75 percent long-dated bonds and 25 percent cash. A further 11 plans used the same 75/25 final-year allocation but began switching between 6 and 10 years prior to retirement.

U.K. pension legislation requires that the benefits from DC pensions be taken via a (taxable) life annuity with the option to take up to 25 percent of the value of the fund as a tax-free lump sum at retirement.[8] This law explains why many life-cycle products switch from equities to a final pre-retirement allocation of 75 percent long bonds and 25 percent cash; the cash is to protect the portion of the fund likely to be taken as a lump sum, and the bonds are to hedge the interest rate risk in the annuity price.[9]

Table 2 shows, however, that 75 percent long bonds and 25 percent cash was not the only approach in use. Some plans used different final-year asset allocations: Two plans switched to a final allocation of 100 percent long bonds, and four plans offered life-cycle profiles with a final-year asset allocation of 100 percent cash.

Table 2. Number of Default Fund Life-Cycle Profiles, December 2006

	Years to Retirement When Life-Cycle Switch Starts						
Final-Year Allocation	5	6	7	8	10	15	Total
75% Bonds/25% Cash	13	2	3	1	5	—	24
100% Bonds	1	—	—	—	12	—	2
100% Cash	3	—	—	—	—	1	4
Total	17	2	3	1	6	1	30

Note: One fund, not shown in the table, was a "target date" fund, in which the manager managed the risk level with a specified year of retirement (e.g., 2040) in mind.

For comparison, the extent of similarity between default funds in U.K. plans and those in use in other markets is interesting. In terms of the U.S. 401(k) market, data from a small survey by the Profit Sharing/401(k) Council of America (PSCA 2001) show that conservative strategies dominate U.S. default funds. The survey found 46 percent of plans using a "stable value" fund (or guaranteed investment contract) as the default and 21 percent using a money market fund. Balanced funds, with holdings in stocks and bonds, were used by 21 percent of plans, and life-cycle funds by 13 percent. Sweden's statewide Premium Pension Scheme provides another comparison. As a national scheme, it offers only one default fund, which is allocated 82 percent to equities, 10 percent to bonds, and 8 percent to alternative assets (Cronqvist and Thaler 2004). Interestingly, scheme members who actively chose their portfolios in the early years of the scheme tended to have portfolios with higher equity content, a higher home-country bias, higher fees, and lower returns than the default structure. Apparently, just as U.K. pension providers fail to agree on what constitutes an appropriate default fund, there is little consensus internationally.

The key point in the U.K. data is that an individual joining a stakeholder pension plan and passively accepting that plan's default fund gets an asset allocation and life-cycle profile that depends on which provider his or her employer (or the individual) has chosen. That plan may differ substantially from the default fund offered by another provider. In the next section, we attempt to quantify the significance of these differences by using a stochastic simulation model to assess the impact of the different default funds on anticipated pension outcomes.

Simulation Method

The model we used is the PensionMetrics model of Blake et al. (2001). This model uses stochastic simulation to determine the anticipated distribution of pension outcomes for any given set of input parameters, such as asset allocation strategy and anticipated retirement age.

In a DC plan, pension contributions from the plan member and his or her employer are invested in a portfolio of assets. The returns on the assets will be stochastic, and some assets will have more volatile returns than others. The DC pension fund also, therefore, will grow in a stochastic fashion. The PensionMetrics model uses Monte Carlo simulations to generate a range of outcomes (i.e., a probability distribution function) for the value of the accrued DC pension fund (hence, the pension) at any given future date, conditional on a set of assumptions concerning contributions, asset returns, mortality, and other relevant factors. The model requires assumptions about both control factors and risk factors.

The three control variables are set by either the pension plan member or the pension plan provider in each period of the model. The first is the pension fund contribution rate, which we assumed to be a constant proportion of the plan member's income for the whole period.

The second control variable is retirement age. For the purposes of our modeling, we assumed that the plan member was a man who joined the plan at age 25 and retired at age 65—the current state pension age for a man in the United Kingdom. We also assumed that he contributed 10 percent of his salary each year to the stakeholder pension plan. We used this figure because the Pensions Commission (2004) reported typical contribution rates of this magnitude from surveys conducted in the United Kingdom by the National Association of Pension Funds (NAPF) and the Association of Consulting Actuaries. Average U.S. contribution rates appear to be similar; Munnell and Sunden (2006) suggested 9 percent as the typical contribution rate for a 401(k) plan member (6 percent from the employee; 3 percent as the employer match).

The third control variable is asset allocation. It is the key control variable in the model because previous research has shown that it dominates the distribution of pension outcomes. In this study, we assumed contributions were invested in the default fund, and the fund allocations were based on the asset allocation profiles we found to be in use in the stakeholder pension marketplace.

Based on our analysis reported in the previous section of default funds offered in the United Kingdom, we created a number of stylized strategic asset allocation profiles, as follows:

- Balanced Managed—invested mainly in equities (with a weighting of 81 percent) but somewhat in fixed income (16 percent) and cash (3 percent),
- Global Equity—with a 60/40 split between U.K. and non-U.K. equities, and
- U.K. Equity—100 percent U.K. equities.

We used the median asset allocation of the relevant funds as the basis for the Balanced Managed profile. For comparison, we also show the results of a conservative—that is, 100 percent bonds—investment strategy, although none of the plans in our sample offered such a strategy as the default. The asset allocation profiles are shown in **Table 3**.

Table 3. Stylized Default Fund Asset Allocation Profiles
(percentages)

Type	U.K. Equities	Non-U.K. Equities	U.K. Bonds	Sterling Cash
Balanced Managed (BM)	52%	29%	16%	3%
Global Equity (GE)	60	40	—	—
U.K. Equity (UK)	100	—	—	—
100% Bonds	—	—	100	—

Each initial asset allocation strategy, with the exception of 100 percent bonds, was combined with four life-cycle variants, which are summarized in **Exhibit 1.** In each case, we assumed the switch would take place in a linear fashion over the relevant time horizon. Together with the three initial asset allocation profiles, these profiles gave us a total of 12 representative allocation strategies for the default funds plus the 100 percent bonds non-default option.[10]

The first risk factor in the PensionMetrics model relates to real (i.e., inflation-adjusted) asset returns. Some simulation models use historical realized returns to develop the distribution from which the simulated returns are drawn. In our main simulations, however, we used forward-looking investment return assumptions to account for the possibility that the historical realized equity risk premium is larger than can reasonably be expected in the future.[11] Some commentators argue that the historical equity risk premium is an upwardly biased estimate of the likely future risk premium. They claim that the high historical equity returns are, in part, the result of unexpectedly strong dividend growth and a fall in the level of the required risk premium, neither of which can be relied on to boost future equity returns. Dimson, Marsh, and Staunton (2001) concluded that the best estimate of a global equity risk premium is about 3.5 percent relative to U.S. T-bills, and Arnott and Bernstein (2002), who were writing near the peak of the equity markets, made the case for an even smaller premium.

We used the equity premium suggested by Dimson et al. (2001) to produce a set of forward-looking nominal return parameters, which we adjusted for expected inflation (2.5 percent). Although some of the funds were actively managed, we made no allowance for any (positive or negative) excess returns generated by active management. The returns received were reduced by the pension fund annual charge, which was assumed to be (in line with the typical charge level on stakeholder pension plans) 1.0 percent. We did, however, conduct a sensitivity analysis of the impact of fund charges, which we discuss later.

Although we did not use historical returns in our analysis, the volatility and correlation structure we used was taken from the historical data. We used data on key U.K. and international market indices for the period 1947 through 2003. The source of the data is the ABN AMRO/LBS dataset discussed in Dimson et al. (2001) and available commercially through Ibbotson Associates. U.S. equities were used as a proxy for non-U.K. equities. The forward-looking return parameters are shown in **Table 4**, together with the volatility and correlation parameters derived from the historical data.[12]

Exhibit 1. Stylized Default Life-Cycle Profiles

Profile	Switch Start Date	Final-Year Allocation
NL	None	Same as initial allocation
BC5	5 years prior to retirement	75% long (15+ years) bonds and 25% cash
BC10	10 years prior to retirement	75% long (15+ years) bonds and 25% cash
C5	5 years prior to retirement	100% cash

Note: NL = no life-cycle switch.

Table 4. Forward-Looking Real Returns and Historical (1947–2003) Volatilities and Correlations

A. Returns	U.K. T-Bills	U.K. Equities	U.K. Bonds	U.S. Equities	U.K. Real Earnings
Forward-looking nominal return assumption	4.0%	7.5%	4.5%	7.5%	na
Forward-looking real, after-charges return assumption	0.5	4.0	1.0	4.0	na
Historical arithmetic mean nominal return, before charges	1.2	9.2	1.8	8.7	2.1
Historical annual standard deviation	4.0	23.2	13.3	21.0	2.0
B. Correlation matrix					
U.K. T-bills	1.00				
U.K. equities	0.05	1.00			
U.K. bonds	0.47	0.51	1.00		
U.S. equities	0.14	0.58	0.25	1.00	
U.K. real earnings	0.05	–0.03	–0.35	0.05	1.00

na = not applicable.

Note: The cash return was derived by subtracting a 3.5 percent equity risk premium from the 7.5 percent expected equity return.

U.K. Financial Services Authority (FSA) rules require that customers buying financial products be provided with deterministic projections of the future value of their investment based on assumed investment growth rates of 5 percent, 7 percent, and 9 percent. A review of these projection rates by the consulting firm PricewaterhouseCoopers argued—partly on the basis of Dimson et al. (2001)—that a reasonable forecast for the mean annual return for U.K. equities is 7.5 percent (nominal, before charges) and for bonds, 4.5 percent, in an environment in which inflation is forecasted to average 2.5 percent (see FSA 2003). The inflation rate of 2.5 percent is in line with the Retail Price Index inflation target set for the Bank of England by the U.K. government. Our adjusted return parameters are, therefore, broadly consistent with the FSA analysis.

The second risk factor relates to interest rates. We needed to model the evolution of interest rates over time in order to forecast the annuity factor at retirement (i.e., the expected present value of a pension of £1 a year from retirement until death). When the plan member reaches the retirement age of 65, the accumulated fund is converted into a single life annuity that provides a level income to him until he dies. The annuity rate is based on a long-term interest rate consistent both with the investment returns earned by the fund prior to retirement and with the PMA92 survival probabilities at age 65 taken from the mortality tables published by the Institute and Faculty of Actuaries; these tables reflect the mortality experience of men buying pension annuities from U.K. life insurance companies. The pension at retirement is found by taking the ratio of the pension fund and the annuity factor. The interest rate model that we used is based on the Vasicek (1977) model, which links bond returns and bond yields in a consistent manner.

The third risk factor is employee earnings. To model earnings, we used the lifetime earnings profiles for various occupations. These profiles show how salary varies with age in the same occupation at a given point in time. We assumed that an individual's salary over time follows the lifetime earnings profile of his or her profession but also is subject to annual uprating (rises) in line with the real growth in national average earnings, which has averaged 2.1 percent in the post–World War II period.[13] The plan member's wage growth experience in this case was assumed to match that of a typical male employee in the United Kingdom, and to simplify the analysis, we assumed that there was no risk to the accrual of pension benefits from unemployment or disability.[14]

Having specified all of the risk and control factors, we used the model to perform thousands of simulations of the stochastic variables, such as the asset returns and interest rates, and then generated an empirical distribution of pension outcomes for the plan member's selected retirement date. We report the simulation results in terms of the *replacement ratio*—that is, the ratio of initial pension to the member's salary immediately prior to retirement. A replacement ratio of 1.0 implies that the particular DC pension plan has generated a pension income equal to the member's pre-retirement salary. Most final-salary DB pension plans in the United Kingdom have targeted replacement ratios

of two-thirds or one-half for a full contribution period of 40 years (i.e., they are based on either a 60th or 80th annual accrual rate). In DC plans, however, the generated distribution of possible replacement ratios will typically be quite wide. To make a suitable comparison, we needed to specify one or more percentiles from the distribution. The *i*th percentile of this distribution is also known as the value at risk (VAR) at the (100 – *i*) confidence level. In this article, we report the median and mean replacement ratios and use the 5 percent pension-VAR as our measure of downside risk.

The next section presents the results of our simulations for the various default fund strategies.

Simulation Results

Table 5 presents simulation results based on our forward-looking return projections. Shown are the median and mean replacement ratios for each of the 13 investment strategies, together with the 5 percent VAR level as a measure of downside risk. All results are based on 5,000 simulations carried out by using the PensionMetrics model.

Consistent with prior studies (Booth and Yakoubov 2000; Blake et al. 2001; Hibbert and Mowbray 2002), the key conclusions from Table 5 are (1) that the anticipated replacement ratio varies in an economically significant manner among asset allocation strategies and (2) that any given strategy has a wide range of possible pension outcomes. The median replacement ratios for the initial default asset allocation strategies (i.e., the NL combinations in Panel A) range from 0.39 for the U.K. Equity strategy to 0.43 for the Global Equity strategy. In other words, we found that the UK strategy has a 50 percent chance of producing a pension of at least 39 percent of the pre-retirement salary whereas the GE strategy has a 50 percent chance of producing a pension at least 43 percent of the pre-retirement salary.

Each strategy also generated a wide range of possible outcomes. The downside risk involved can be appreciated from the 5 percent pension-VAR data in Table 5—ranging from 0.12 for UK-NL to 0.17 for BM-NL. An example of how to interpret the pension-VAR data is that in the case of the UK strategy, we found a 1-in-20 chance of the pension turning out to be 12 percent of pre-retirement income or less.[15]

All of the default strategies we investigated have initial high equity content—typically, 70–100 percent—so investors who are very risk averse ought to opt out of the default and make an active choice of a more conservative fund, although inertia may prevent them from doing so. Table 5 shows the simulation results for such a fund—100 percent long-term U.K. government bonds—which can be considered the low-risk benchmark. The median replacement ratio for that strategy is,

Table 5. Simulation Results: Return Parameters Based on Forward-Looking Estimates

Strategy	Median Replacement Ratio	Mean Replacement Ratio	5% Pension-VAR
A. No life-cycle switch			
Strategy 1: BM-NL	0.41	0.50	0.17
Strategy 2: GE-NL	0.43	0.56	0.15
Strategy 3: UK-NL	0.39	0.56	0.12
B. Balanced Managed with life-cycle switches			
Strategy 4: BM-BC5	0.40	0.47	0.18
Strategy 5: BM-BC10	0.39	0.44	0.19
Strategy 6: BM-C5	0.40	0.47	0.18
C. Global Equity with life-cycle switches			
Strategy 7: GE-BC5	0.41	0.52	0.17
Strategy 8: GE-BC10	0.40	0.49	0.18
Strategy 9: GE-C5	0.42	0.52	0.17
D. U.K. Equity with life-cycle switches			
Strategy 10: UK-BC5	0.38	0.52	0.14
Strategy 11: UK-BC10	0.37	0.49	0.16
Strategy 12: UK-C5	0.38	0.52	0.14
E. Strategy 13: 100% Bonds	0.29	0.31	0.18

Note: Results are based on 5,000 simulations.

not surprisingly, much lower than the equity-based alternatives. Also, as would be expected, the variability around the median is lower for the all-bond fund; the 5 percent pension-VAR is closer to the median replacement ratio than it is for the equity-dominated strategies.

Note also, however, that although the 5 percent pension-VAR level for the cautious strategy is not much higher than the VAR for the equity-based default strategies, the reduction in return is substantial. In fact, several of the equity-based strategies with life-cycle features (Panels B–D) provide higher median replacement ratios *and* equal or higher 5 percent VAR levels than the conservative 100 percent bonds strategy. Although equities are volatile, the high expected return limits the extent of the downside risk in the longer term. The cautious strategy, therefore, appears appropriate only for investors who cannot tolerate short-term volatility in their pension assets and are prepared to sacrifice long-term return to avoid it. For other investors, fixed-income investment for the full pension plan tenure may be considered "reckless conservatism."

The life-cycle profiles used in several of the default arrangements are designed to reduce the risk that falling equity markets in the years immediately prior to retirement cause losses in the pension fund from which there is too little time to recover. Table 5 shows that the life-cycle profiles (Strategies 4–12) raise the 5 percent VAR levels by only a marginal amount. Part of the reason is that the life-cycle switch involves forgoing the higher expected return from equities for a number of years.

The risk reduction effects of switching are largest, not surprisingly, for strategies that have high initial equity contents (e.g., Strategy 2 versus Strategies 7–9) and lower for strategies that already had higher fixed-income content (Strategy 1 versus Strategies 4–6). The reduction in risk and in median replacement ratio is greater when the life-cycle switch begins 10 years from retirement than when it begins 5 years before retirement. Note also that for the five-year life-cycle profiles, little difference is observable between profiles with a final-year asset allocation of 75 percent bonds (Strategies 4, 7, and 10) and those that end with 100 percent cash (Strategies 6, 9, and 12). Although a switch to long bonds is usually recommended as a hedge for annuity rates, our simulations suggest that long bonds are, on average, of little greater benefit than cash in protecting the purchasing power of the pension fund.

For the replacement ratios shown in Table 5, we assumed an annual contribution rate of 10 percent of salary for 40 years of pension plan membership. On the basis of the low estimates for the equity risk premium used in the simulations, the 10 percent contribution rate does not produce replacement ratios that many people would find attractive. This aspect is important because 10 percent of salary is a common contribution rate in practice (Pensions Commission 2004).

We calculate that the required contribution rates for a two-thirds replacement ratio (with 50 percent probability) after 40 years of membership range from 15.7 percent for a GE strategy with no life-cycle feature to 18.0 percent for a U.K. equity fund that begins switching to bonds and cash 10 years prior to retirement. It is interesting—but not surprising—that these rates are consistent with total contribution rates paid into occupational DB pension plans (see, e.g., NAPF 2003). At these contribution rates, the 5 percent pension-VAR levels range from 0.20 for the UK strategy to 0.34 for the BM strategy with a 10-year life-cycle switch. So, even with relatively high contribution rates, the default funds remain risky for pension plan members.

One way to reduce the risk would be to opt out of the default fund and invest in a more conservative fund. That move, however, comes at a cost: An investor following the conservative 100 percent bond strategy would have to contribute 23.2 percent of salary throughout his or her 40-year career to have a 50 percent probability of a replacement ratio of two-thirds or better. This contribution percentage is well above that required by the equity-based strategies.

Disturbing as these results might be, note that the analysis we have performed is relatively *generous* to the stakeholder plans in comparison with traditional DB plans. We assumed that the stakeholder pension fund is used to buy an annuity with a level stream of payments, payable only to the plan member until that member's death, and we ignored any further benefits that could be provided by the annuity. Most DB pensions, however, at least as currently structured in the United Kingdom, allow for indexation of the pension in line with retail prices up to some specified maximum, such as 2.5 percent a year, and allow for a 50 percent pension payable to the spouse after the death of the member. Replicating these benefits from the DC plan would raise the annuity cost by 40–65 percent—either reducing the replacement ratio or requiring a corresponding increase in contributions.[16]

Finally, this analysis ignores attitudes toward risk of individual plan members. If a member is risk averse, with a concave utility function, the dispersion of replacement ratios could have large welfare implications. The life-cycle feature may reduce the expected replacement ratio from a particular strategy, but to the extent that it also reduces the dispersion of outcomes significantly, it might well be an optimal strategy from the individual's point of view (see, e.g., Cairns, Blake, and Dowd 2006).

Fund Charges

Our simulation analysis used an assumed 1.0 percent annual management charge. Further analysis of fund charges is required, however, because charges can have an important impact on the performance of a DC pension scheme. For example, Carhart (1997) showed that mutual fund charges have a nearly one-for-one impact in reducing mutual fund performance. Charges are particularly important in the context of default funds because passive members may pay little attention to the charges they are paying or may be unaware of the impact of charges on performance. A particular concern is that a provider could exploit this inertia by nominating a high-charge fund as the default.

The importance of charges is recognized in the regulations governing stakeholder pension plans, in that the regulations set a price cap. When stakeholder pensions were introduced in 2001, total charges could not exceed 1.0 percent a year. In 2005, this cap was changed as a result of industry lobbying, and the new cap is 1.5 percent a year for the first 10 years of each customer account, falling to 1.0 percent thereafter. The higher cap in the initial years was designed to allow providers to recover the up-front marketing and setup costs.

Based on the mutual fund market and the institutional pension market, one would expect charges to vary in accord with the nature of the investments in the fund. Equity management typically costs more than fixed-income management, and active management typically costs more than passive management. In the stakeholder market, however, individual members pay bundled fees that cover marketing costs, sales commissions, and record-keeping costs as well as the costs of fund management. Industry contacts have suggested to us that the proportion of the charge covering pure asset management is small. That fact may explain the results in **Table 6**, which show that despite some variation in the level of fees among default funds, most providers charge at the 1.0 percent level that was set out in the initial stakeholder regulations.

Table 6 shows that passively managed funds do, on average, charge less than actively managed funds. In the full sample, the difference in the mean charge between active and passive is 20 bps. The modal charge for both groups is 1.0 percent, however, and some passive funds charged more than active funds. The government's initial 1.0 percent cap on charges seems to act as something of an anchor for providers—an officially endorsed charge level—that may be, in a sense, counterproductive. Substantial variation in charges is evident in the full sample from the minimum to the maximum, although for any fund charging more than 1.0 percent, the regulations require the charge to drop to 1.0 percent or below after 10 years.

Table 6. Default Fund Charges by Fund Type

	All Funds		Balanced Funds	
Measure	Active	Passive	Active	Passive
No. of funds	15	15	9	4
Mean	1.08%	0.88%	1.12%	0.78%
Mode	1.00	1.00	1.00	No mode
Minimum	0.75	0.60	0.80	0.60
Maximum	1.50	1.45	1.50	1.00
	Global Equity Funds		U.K. Equity Funds	
	Active	Passive	Active	Passive
No. of funds	5	7	1	4
Mean	1.03%	0.88%	1.00%	0.98%
Mode	0.95	0.75	1.00	1.00
Minimum	0.75	0.65	1.00	0.90
Maximum	1.50	1.45	1.00	1.00

Notes: In each case, the charge is a bundled fee that covers asset management, administration, record keeping, and sales and marketing costs (including adviser commission if applicable). One plan with a passive global equity default fund did not disclose its charges.

Some of the variation reflects product type; for example, the balanced funds typically charged more than the equity funds. Even after allowing for this difference, however, we found further variation. Some variation may be explained by what is included in the bundled charge (e.g., the level of decision support given to members). Furthermore, the higher-fee plans tend to have a retail focus; the lower fees are available for large employers. In some cases, plan providers say they may discount fees for large schemes/plans or those with more highly paid employees, although few providers publicly disclose the level of discount they offer.

Overall, the analysis shows that DC plan members who passively accept their plan's default fund may face fees that are quite different from those paid by members of similar schemes offered by other providers. There is no evidence of providers charging higher rates for their default funds, however, than they do for comparable funds in their stakeholder pension offerings.

Given the variation in fund charges, we decided to conduct a sensitivity analysis of the impact of fees on the replacement ratio simulations. **Table 7** shows the results. In the base case, we used the 1.0 percent fee level set out as the maximum under the original stakeholder regulations. We then varied the fee to 0.75 percent a year and to 1.25 percent a year. (Although the 1.25 percent fee is higher than allowed by stakeholder regulations, it could be

Table 7. Sensitivity Analysis of Replacement Ratios at Varying Fund Charge Levels

	0.75% Charge		1.0% Charge		1.25% Charge	
Strategy	Median Replacement Ratio	5% Pension-VAR	Median Replacement Ratio	5% Pension-VAR	Median Replacement Ratio	5% Pension-VAR
Strategy 1: BM-NL	0.43	0.17	0.41	0.17	0.39	0.16
Strategy 2: GE-NL	0.45	0.16	0.43	0.15	0.41	0.14
Strategy 3: UK-NL	0.41	0.12	0.39	0.12	0.37	0.11
Strategy 13: All bonds	0.30	0.18	0.29	0.18	0.28	0.17

Note: Results are based on 5,000 simulations.

charged by providers in nonstakeholder contracts.) We assumed that all funds earned the market return gross of fees; that is, higher costs (e.g., for active management) did not produce superior performance. For space reasons, we show only the basic default fund strategies in Table 7 without the variants in life-cycle profiles. To the extent that active managers earned higher gross returns, that performance could offset some of the drag of higher fees.

Table 7 shows that, overall, a plan with a 0.75 percent annual charge would generate a median replacement ratio about 10 percent (or 4 percentage points of final salary) higher than a plan with an annual charge of 1.25 percent.

Conclusion

A wide variety of strategic asset allocation and life-cycle profiles is offered as the default fund in stakeholder DC pension plans in the United Kingdom. Our simulations showed that the choice of profile can have a significant effect on the range of retirement incomes likely to be experienced by plan members. If plan members passively accept the default arrangements offered to them, as behavioral economics research predicts the majority will do, then the provider's choice of default fund will be a crucial determinant of members' subsequent retirement income.

Our analysis of the default funds in stakeholder plans found that they are typically risky, with high equity content. But we also found substantial differences among funds in terms of their asset allocations and the nature of the life-cycle profiles that automatically switch a member's pension fund assets to fixed-income investments and/or cash as the planned retirement date approaches. We also found that fees vary substantially among the various fund offerings, although many plans do charge at the 1.0 percent original fee cap.

Our findings raise questions about how providers select their default funds. The plans we examined are generic arrangements that can be adopted by any employer and, in many cases, purchased by individuals. This factor suggests that providers should tailor their products for the requirements of the "average" customer in the marketplace. Our data suggest either that they do not do this or that they take quite different views on the characteristics of the average customer.

Differences between default funds may be related to the characteristics of plan providers. In particular, if the marginal costs of production of particular types of fund differ between providers, then providers might be inclined to nominate their lowest-cost fund as the default. If so, then as far as the typical plan member is concerned, the default fund has no obvious match with his or her characteristics.

We have focused on default funds on the basis of evidence that most plan members use them. However, members usually have the option to choose funds other than the default, which raises the question of whether providers and sponsors give an appropriate range of choice. Elton, Gruber, and Blake (2006) provided some evidence of this problem in the context of the U.S. 401(k) DC market. They found that in almost half of the 400 cases they investigated, the choice offered by the plan sponsor was inadequate to allow members to form portfolios on the efficient frontier and that the inferior fund range could have a significant impact on members' terminal wealth. They interpreted their findings as suggesting that most sponsors carry out poor due diligence in selecting fund ranges. This situation is somewhat surprising because employers would seem to be better placed to devote resources to fund selection than are their individual employees. Langford, Faff, and Marisetty (2006) provided evidence from the Australian superannuation market that employers are in the better position to make fund selections. They found that retail offerings chosen by individuals tend to have higher fees and lower returns than the wholesale funds used in an occupational context, which are typically selected by an employer on behalf of its employees.

Overall, our results suggest that employers need to take great care in selecting a plan's default fund, which is likely to be the fund used by the majority of plan members. Otherwise, these members end up taking part in a lottery in which they have only a low chance of being matched to a fund that reflects their characteristics. Financial analysts and planners have a key role to play in assisting plan sponsors with this important task.

Choosing better default funds would require employers to have an in-depth understanding of the characteristics of their particular employees and require providers to have access to that information. Employers and pension product providers could jointly assess the profile of employees before deciding on a default fund.[17] Employers also need to be more proactive in asking for default funds tailored for their employees.

The problem of default funds would diminish if the percentage of members relying on the default fund could be reduced. The inertia that leads to default fund use is deep-seated, but intelligent scheme design might be able to mitigate it to an extent. Few members are likely to be able or keen to build their own risk-tailored multi-asset strategy—as many DC scheme fund menus imply they will want to do—but they may be able to choose among a limited number of risk-graded multi-asset strategies that have been prepackaged for them and labeled clearly—for example, "cautious," "balanced," and "adventurous." Targeted communication may also be effective in engaging members in investment choice. For example, a letter advising the member that the account balance has just passed £50,000 or US$50,000 and noting that the member has yet to choose an investment strategy for this sizable pot of money might provoke a response. In the United Kingdom, these approaches are just beginning to be tried, so the results are as yet unknown.

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This article qualifies for 1 PD credit.

Notes

1. Stakeholder plans must have a low level of minimum contribution (£20), no penalties for ceasing or reducing contributions, and no penalties for transferring to another arrangement; total charges were initially capped at 1.0 percent a year. Since April 2005, providers have been allowed to charge a fee of up to 1.5 percent for each of the first 10 years the pension product is held by a customer. After 10 years, the fee cap reduces to 1.0 percent (www.hm-treasury.gov.uk/consultations_and_legislation/stakeholder/consult_stakeholders_index.cfm).
2. See Statutory Instrument 2000 No. 1403, *The Stakeholder Pension Schemes Regulations 2000,* at www.opsi.gov.uk/SI/si2000/20001403.htm.
3. See www.hmrc.gov.uk/stats/pensions/menu-by-year.htm.
4. Although our analysis is based on stakeholder pension plans in the United Kingdom, it can be generalized to other DC pension arrangements with similar default options.
5. Life-cycle asset allocation profiles are used to attempt to reduce the risk that a fall in equity prices close to the planned retirement date will reduce the member's retirement income. Bodie, Merton, and Samuelson (1992) argued that if an individual's human capital (i.e., future labor income) is less risky than equity, then at younger ages, this capital constitutes a relatively high proportion of total wealth and can be balanced by investing a greater proportion of the individual's financial wealth in risky assets. As time moves on, the share of wealth accounted for by human capital declines and reducing the risk attached to financial wealth makes sense. Furthermore, younger individuals have more scope to increase their work effort to make up for any shortfall generated by losses in financial assets.
6. In the retail setting, default funds should be less important than in the employer context because an individual joining a pension plan is under the guidance of a financial adviser. The adviser will guide the individual to a fund choice that is consistent with his or her financial circumstances and degree of risk tolerance. In addition, individuals who approach a pension provider directly (i.e., doing business on an execution-only basis) are likely to be financially knowledgeable and prepared to make their own fund choice. Nonetheless, relatively uninformed consumers could deal directly with plan providers and be inclined to accept whatever default fund is proposed.
7. A previous version of this study found that in 2004, prior to the regulation change, approximately 50 percent of stakeholder plans had default funds that used a life-cycle profile and a further 20 percent had a life-cycle fund as a feature that members could choose.
8. Technically, a retiree may defer buying an annuity until age 75 by drawing an income directly from the pension fund, but in practice, only those with substantial assets would be in a position to do this. Such people are typically not the target membership for stakeholder pension plans.
9. Retirement annuities are priced on the basis of prevailing long-term interest rates and assumptions about the likely longevity of the person buying the annuity. Other things being equal, a given level of annuity will become more expensive to purchase as long-term interest rates fall. This risk can be hedged by holding a portfolio of bonds that will increase in value as long-term interest rates fall.

10. Not all of these strategies are followed in practice, but for completeness, we decided to present all possible combinations of the observed default fund types and default lifecycle profiles.
11. Analysis and results based on parameters derived from historical returns are available as supplemental material in the *FAJ* area of www.cfapubs.org.
12. We used standard deviation and correlation figures based on annual returns. We did not take into account the possibility that the structure of risk and correlation over longer holding periods differs from that of a one-year holding period, as argued by Campbell and Viceira (2005). In the context of financial planning, ignoring any mean reversion in investment returns can be considered a "prudent" basis for analysis.
13. Earnings data are from the Office for National Statistics.
14. The impact of different career salary profiles, by gender and by type of occupation, on the retirement income from DC pensions is discussed in detail in Blake et al. (forthcoming 2007). For simplicity, in this study, we considered only the career wage growth profile of a *typical* male employee in the United Kingdom.
15. The pension plan member would also be eligible for the basic state pension and, if total income was low, certain means-tested state benefits.
16. For example, as of June 2006, a fund of £100,000 would buy a man age 65 a level annuity of £6,840 on a single-life basis, an annuity of £4,656 on a single-life basis linked to the retail price index (RPI), or an RPI-linked annuity paying a 50 percent pension to the surviving wife (also age 65) of £4,068 (from the Standard Life figures in the FSA comparative tables at www.fsa.gov.uk/tables/).
17. Employers and providers could consult the literature linking risk tolerance to various demographic characteristics (e.g., Hallahan, Faff, and McKenzie 2004).

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