Updating Miles and Sefton results on the current position of the USS and ways forward from it.

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This short note presents some additional results to those in two recent papers we have written on the state of the Universities pension scheme (the USS), and on a potential way forward. In those two papers[1] we analysed the scale of risks the USS is taking and then suggested a way forward which reduced substantially the risk of the scheme running out of money while not harming (in fact improving) the outcomes for scheme members. Here we do two things. First, in section I, we update the calculations on risk to take account of more recent asset values. Second, we present a different way of thinking about the potential gains for those who might transfer some proportion of their existing USS defined benefit (DB) pension rights to a defined contribution (DC) fund.

I. A June 2021 update of the risk simulations undertaken

In our earlier paper we took the USS asset values as used in the 2021 USS Valuation. These are values as of the end of March 2020.

The USS had delayed the valuation until the last allowable date by The Pension Regulator (TPR). However, March 2020 coincided with a trough in equity markets shortly after the onset of the COVID-19 pandemic. We have now updated the simulations from our September 2021 paper using asset values as of June 2021.

Since March 2020, equity markets have rallied across the globe; the S&P500 price index was up 72% by June 2021, and the FTSE 100 by 24%. Over the same period, USS assets rose 28% from £66.5bn to £85.3bn. This rise in the value of the assets is positive for the sustainability of the fund. However, not all the investment news has been good. Over the same period, real interest rates (as measured by the yield on index linked gilts) continued to fall, with the 10 year real rate falling from -2.6% to -3.2%. In Figure 1, we have plotted the 5 and 10 year maturity real interest rate since 1985. This fall in the real interest rate is a continuation of a trend that has being going on since at least 1985[2]. Given real rates fell between March 2020 and June 2021, the value of the USS accrued pension liabilities increased offsetting some of the gain in the asset position. We have estimated the impact of these changes on the long run sustainability of the USS.

[1] "How Much Risk is the USS Taking", National Institute Policy Paper, number 29, September 2021 and "The University Pension Scheme – a Way Forward", National Institute Policy Paper, number 31, November 2021.

[2] Summers, L. H., & Rachel, L. (2019, March). "On falling neutral real rates, fiscal policy and the risk of secular stagnation". In Brookings Papers on Economic Activity, BPEA Conference Drafts.

Figure 1: Real Interest Rates on UK Index Linked Gilts of 5- and 10-year maturity since 1985

Figure 2 shows how the present value of remaining pension liabilities that existed in 2021 evolves over time; these fall as the accrued pension promises are paid off[3]. The first plot uses the real forward rates as June 2021; this measure of the pension liabilities is often referred to as the buyout value. Comparing these numbers to those in our working paper, the estimated buyout value of these pension liabilities rose from £139bn in March 2020 to £149bn in June 2021. This £10bn increase will partially offset the increase of £19bn in the asset position noted earlier. We also plot on the same graph the estimated size of these liabilities should the real interest rate rise to approximately 0%[4]. These measures of liabilities are relevant if the scheme runs out of assets - they show the cost to the Universities of passing on the remaining pension promises to another financial institution if the USS were to run out of assets and could no longer pay any further pension obligations.

There has been considerable discussion recently of the size of the shortfall that the Universities could manage in the event that the USS funds are exhausted. This discussion is phrased in terms of the strength (or risk capacity) of the Universities' 'covenant'; it is effectively an estimate of Universities' ability to make additional contributions to cover any possible future shortfall. We shall use a figure of £22bn as a measure of this additional risk capacity; it is 10% of academic payroll over a period of 20 years (the 'covenant horizon')[5].

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[3] We did not have available an updated estimate of the future real pension cash payments as of the end of June 2021. We therefore assumed that in the period March 2020 to June 2021, the new accrued promises were roughly equal to those paid in the same period, leaving the required future pension payments unchanged. This is an approximation but one that will have negligible effect upon the end results.

[4] To facilitate comparability with our previous paper, we have assumed real interest rates rise by the same amount as we assumed in our working paper. As real interest rates fell roughly by 0.5% between March 2020 and June 2021, we therefore assume interest rates rise to -0.5%, and not 0% as before. We label this plot as 'approximately zero real interest rates'.

[5] In "Methodology and Risk Appetite for the 2020 Valuation" discussion document issued by the Trustees in March 2020 (available at https://www.uss.co.uk/about-us/valuation-and-funding/2020-valuation), the risk capacity is argued to be 10% of the academic payroll - £11bn in 2019/20 – over an horizon of 20 years for 'tending-to-strong' covenant. The undiscounted value of such a flow of payments over 20 years is £22 billion.

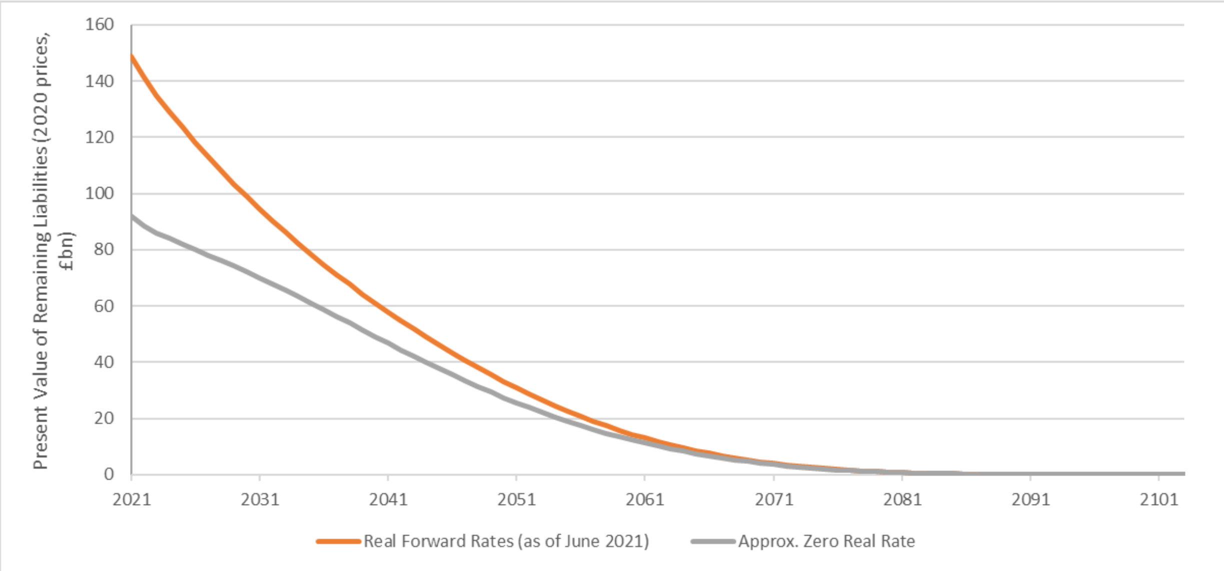

Figure 2: Present Value of Remaining Accrued Pension Liabilities under alternative real interest rate assumptions.

Figure 2 would then suggest that if the USS managed to pay all pensions which are currently promised (not including new pension liabilities incurred and not adding in future contributions made in exchange for those extra pension rights) out to 2054, the remaining liabilities would be less than the estimated Universities' risk capacity of £22bn.

Simulation Updates

We give all details of the simulation assumptions in our original working paper. We briefly summarise these here. We assume there are two types of assets: a risk-free asset whose return in all future periods is given by the real forward yield curve as of June 2021; and a risk asset, which we think of as equities, whose returns in any year is independently and lognormally distributed with an expected real return of 4.5% per year and standard deviation of 17.5%.

Baseline Simulations

In our first simulation, the USS invests 75% in the risky asset, 25% in the risk-free asset and pays the pension obligations that come due at the end of each of year. We simulate forward until 2101 (when all accrued pension promises have been paid) to estimate the likely distribution of fund assets at points up to that date. Figure 3 below is the update of Figure 2 in our September paper using June 2021 asset values and gilt yields. The forecasts look more favourable than before; the probability of the funds being exhausted by 2051 is now 8% (previously it was 20%); and of being exhausted by 2081 is 20% (previously it was 40%). We also make a distinction between the USS funds being exhausted leaving a liability greater than the risk capacity of Universities of £22bn, and being exhausted with a liability less than £22bn. We estimate a risk of 11% that the USS funds will be insufficient to cover the accrued pensions promises and leave a liability of more than £22bn.

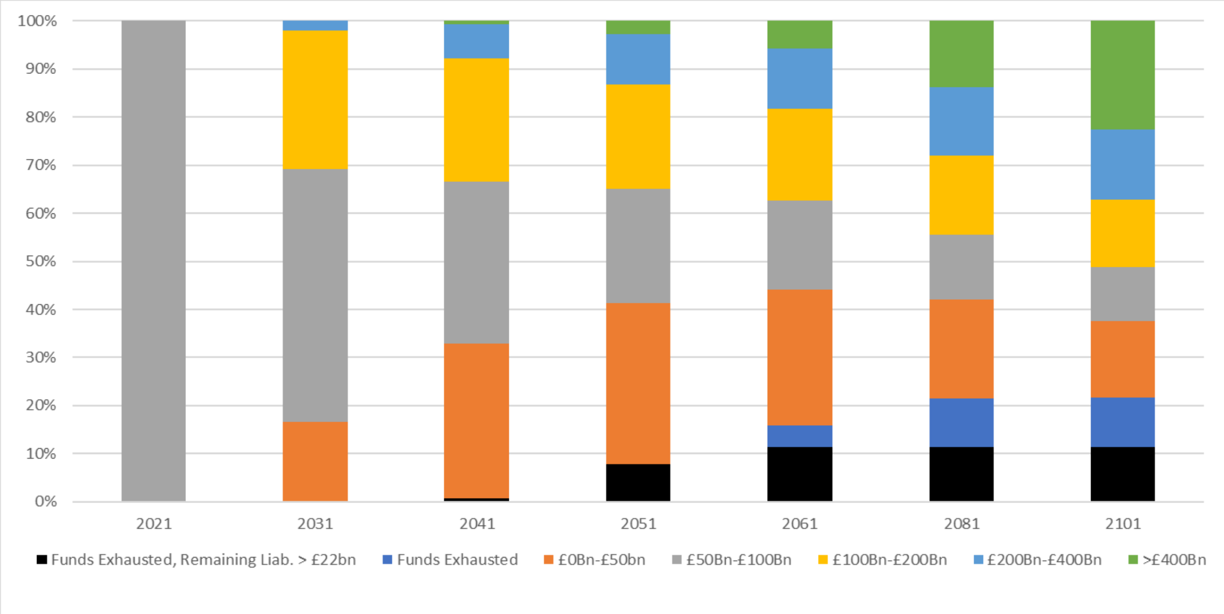

Figure 3: Projected Distribution of USS Fund Assets assuming 75% allocation to equities, no mean reversion in equity returns and real rates as of June 2021.

Figure 4 plots the distribution of outcomes, under the assumption that the USS only invests 25% in the risky asset. Under this investment strategy, there is a 27.5% probability that the funds are exhausted leaving a deficit greater than the risk capacity of £22bn. The small advantage of this strategy relative to the 75% invested in equity is that there is now a negligible probability that the funds become totally exhausted before 2047; and there is a slightly lower probability they become exhausted before 2051, but at the cost of a higher probability afterwards.

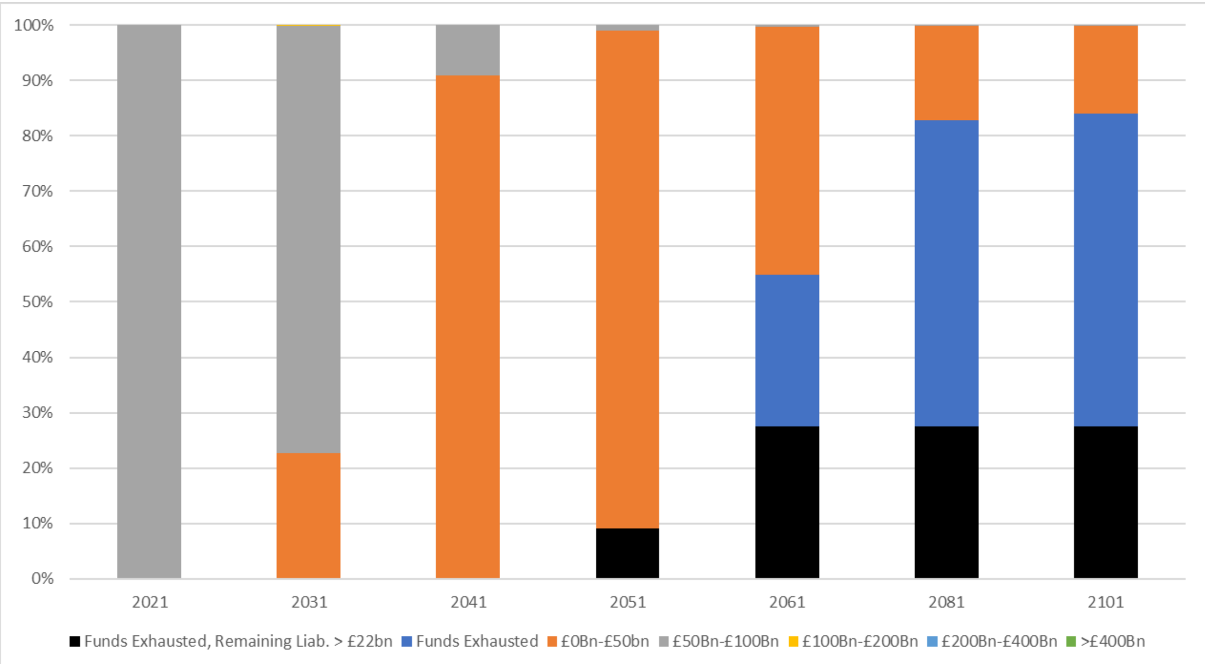

Figure 4: Projected Distribution of USS Fund Assets assuming 25% allocation to equities, no mean reversion in equity returns and real rates as of June 2021.

Scenarios based on more optimistic assumptions

As in the original working paper, we now present the results for simulations under a more optimistic set of assumptions on asset returns. We assume now that real interest rates rise to close to 0% as of tomorrow. This is a significant reversal of the trend illustrated in Figure 1 and therefore it could be argued as unlikely. But there is still no consensus on why real interest rates have fallen so precipitously over the past 40 years and the chances of a sudden reversal are hard to estimate. Further, we assume this very large interest rate rise does not cause a revaluation of the equity market. Expected equity returns remain at 4.5%, but now we allow for some mean reversion in equity returns[6]. This is similar (though not identical) to assuming a lower volatility for equity returns. This combination of events – a sharp rise in the safe real interest rate, no induced sell off in equities and mean reversion that reduces substantially the risk of holding equities over long horizons – represents a dramatically more favourable environment for the USS. It does not represent a central forecast.

Figure 5 plots the distribution of outcomes under these much more optimistic assumptions, assuming a 75% allocation to equity. Under these assumptions, the risk of USS funds being exhausted falls significantly to 6%. Further the risk of leaving a deficit of over £22bn is now only around 1.3%.

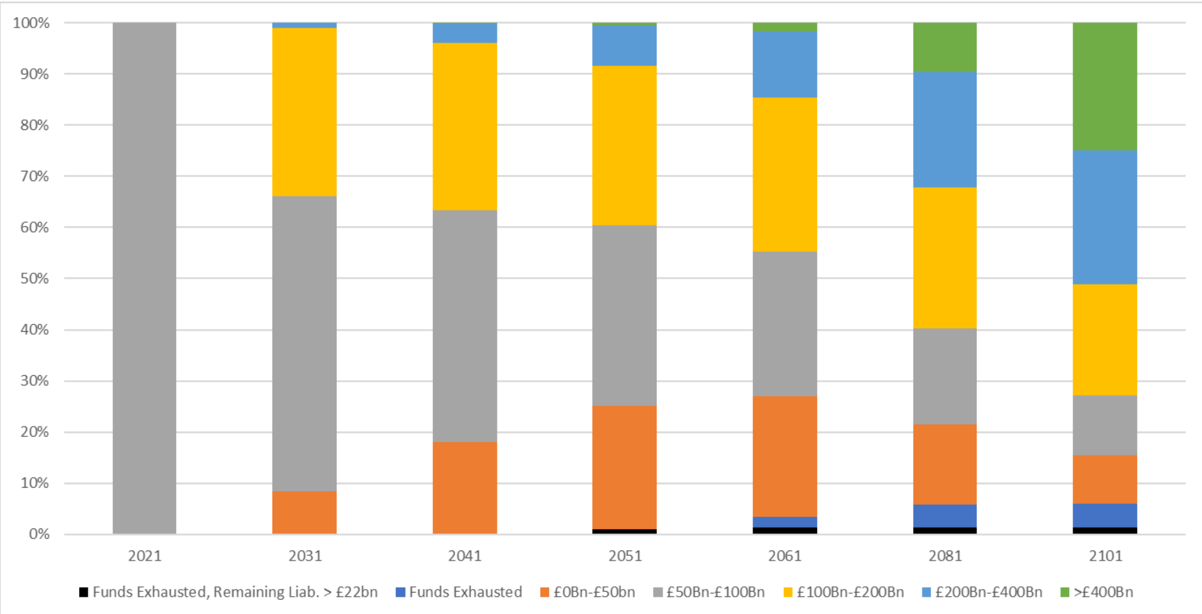

Figure 5: Projected Distribution of USS Fund Assets assuming 75% allocation to equities, mean reversion in equity returns and approximately zero real rates.

Figure 6 is the distribution of outcomes under these more hopeful assumptions but assuming only a 25% allocation to equity. Under this investment strategy, the probability of leaving a deficit greater than £22bn is negligible (<0.1%), and of the funds being exhausted before 2101 only 6%. However the upside relative to the 75% allocation to equity is also significantly reduced.

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[6] The data generating process is described in the original working paper, and is calibrated to recent empirical studies.

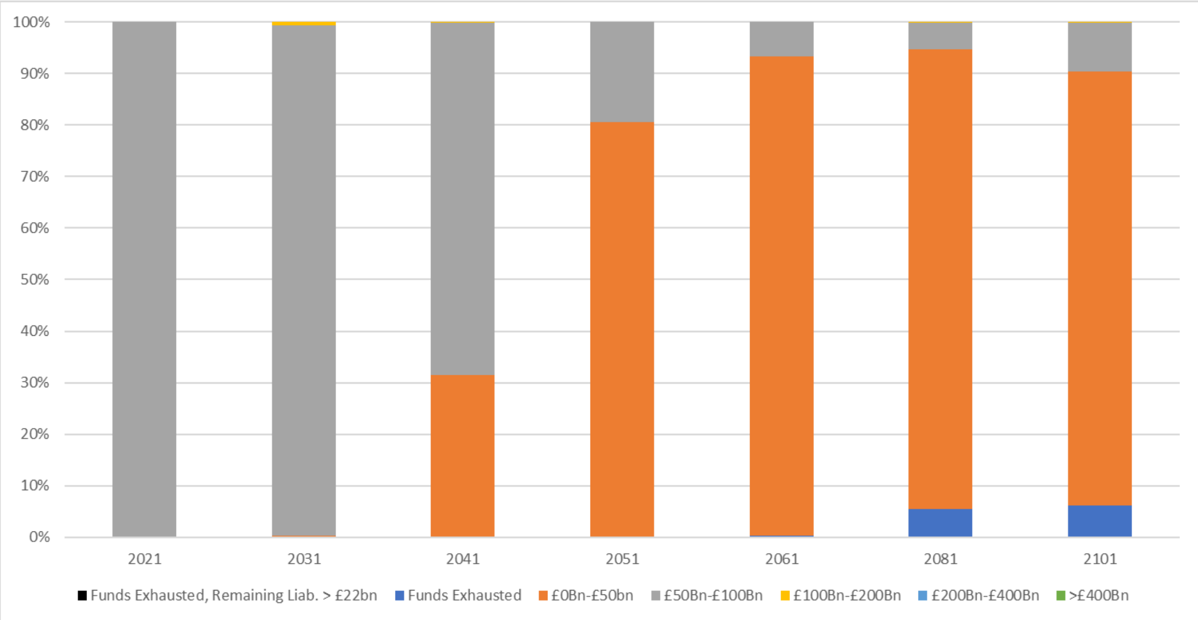

Figure 6: Projected Distribution of USS Fund Assets assuming 25% allocation to equities, mean reversion in equity returns and approximately zero real rates.

II. An alternative way of gauging the likely desire to switch some proportion of DB to DC

In our earlier paper we presented estimates of the proportion of DB pensions that scheme members might switch to a DC fund if flexible transfer options were available. Such voluntary switches would reduce risk to the USS while also improving outcomes for members. We based estimates of the demand for such transfers on assumptions about members' degrees of risk aversion. That demand was always significant and highly sensitive to assumed coefficients of risk aversion. The coefficient of risk aversion that is used in these calculations reflects the property of a utility (or preference) function but as such is not a number with an easy or intuitive interpretation.

Here we present an alternative way to assess how much of a DB pension people might wish to transfer which is more readily interpreted in terms of an implied appetite to take risk.

We consider people with DB pensions of different values. We also assume people expect to receive a state pension. We then estimate what proportion of DB pensions they would switch to DC such that the chances of having a total pension (occupational DB pension, DC pension plus state pension) below some minimum acceptable level is small.

We set the state pension at the level that a single person with a full employment history would get under current (December 2021) rules. This is £9339. (Many members of the USS scheme will have partners and so combined state pension income will be above this level, while single people with less than a full employment history will get less).

We use the same central parameters for the return on the DC scheme as in our earlier papers where we picked figures that are plausible for equity investments. The mean (real) return is set at 4.5% per annum, the volatility of returns (annual standard deviation) is 17.5% and returns are assumed to be independent across time periods.

In the first table below we set the minimum acceptable pension at 85% of what would be earned if none were switched to a DC fund. This is 85% of the sum of the state pension and the full DB pension accrued. We then calculate the level of alpha (the proportion of the DB pension switched to the DC fund) which creates only a 5% chance of being below this minimum acceptable pension.

The table shows the value of alpha for three levels of accrued DB pension (£10,000 a year; £20,000 a year and £40,000 a year) and for someone 15 or 10 years from retirement. In all cases we assume that the assets that are accumulated in a DC fund are used to buy an annuity at retirement available at the same rate as that implied by the DB scheme.

For each alpha we calculate the average outcome for total pension income that it implies and by how much this exceeds the pension if none is switched to a DC fund.

The table shows that those for whom the state pension is larger relative to their DB pension would wish to switch relatively more of their DB pension to DC. But those for whom the DB pension is going to be a much higher part of total retirement pension income will switch less. But note that the pension switched to DC (that is alpha x DB pension) as a proportion of *total* safe pension income (DB pension plus state pension) is the same however high the DB pension is. (This is because we set the minimum acceptable pension income as a fixed proportion of the sum of DB and state pension no matter what the level of the DB pension is).

For those with high DB pensions alpha is just under 40%; for those with DB pensions worth £20,000 a year the proportion switched is near to 45% while for those with more modest DB pension (£10,000) around 60% is switched. In all cases the proportion switched is slightly higher for those 10 years from retirement than for those 15 years from retirement.

With these values of alpha the average outcome from the switch makes total pensions around 28% higher for those with 15 years to retirement and around 18% higher for those with 10 years to retirement. If not all DC assets were annuitized at retirement these average percentage gains of partial transfer from DB to DC would be greater.

DB pension	40000		20000		10000	
Time to retirement	15	10	15	10	15	10
DB pension plus state pension	49,339	49,339	29,339	29,339	19,339	19,339
Retirement income at 5% level	41,938	41,938	24,938	24,938	16,438	16,438
Alpha	0.37	0.40	0.44	0.47	0.59	0.63
Average income with partial DC transfer	63,307	58,163	37,645	34,586	24,814	22,798
Gain (%) if receive average income	28.3%	17.9%	28.3%	17.9%	28.3%	17.9%

Table 1: Demand for Partial Transfer from DB to DC.

Notes: Alpha is calculated so that chance of retirement income below 85% of status quo is 5%; average return on risky assets is 4.5% a year; standard deviation of stock returns is 17.5%; return on safe assets used to calculate transfer value = 0%.

The two tables below show the impact of changes in the minimum acceptable pension to 80% or to 90% of the full DB and state pension, holding constant the acceptable probability of falling short of this level at 5%. As in table 1 the values of alpha are significant, ranging from a low of 25% to a high of 83%.

DB pension	40000		20000		10000	
Time to retirement	15	10	15	10	15	10
DB pension plus state pension	49,339	49,339	29,339	29,339	19,339	19,339
Retirement income at 5% level	39471	39471	23471	23471	15471	15471
Alpha	0.50	0.53	0.59	0.63	0.78	0.83
Average income with partial DC transfer	67,963	61,104	40,414	36,335	26,639	23,951
Gain (%) if receive average income	37.7%	23.8%	37.7%	23.8%	37.7%	23.8%

Table 2: Demand for Partial Transfer from DB to DC.
Notes: Alpha is calculated so that chance of retirement income below 80% of status quo is 5%; average return on risky assets is 4.5% a year; standard deviation of stock returns is 17.5%; return on safe assets used to calculate transfer value = 0%.

DB pension	40000		20000		10000	
Time to retirement	15	10	15	10	15	10
DB pension plus state pension	49,339	49,339	29,339	29,339	19,339	19,339
Retirement income at 5% level	44405	44405	26405	26405	17405	17405
Alpha	0.25	0.27	0.30	0.32	0.39	0.42
Average income with partial DC transfer	58,651	55,222	34,876	32,837	22,989	21,645
Gain (%) if receive average income	18.9%	11.9%	18.9%	11.9%	18.9%	11.9%

Table 3: Demand for Partial Transfer from DB to DC.
Notes: Alpha is calculated so that chance of retirement income below 90% of status quo is 5%; average return on risky assets is 4.5% a year; standard deviation of stock returns is 17.5%; return on safe assets used to calculate transfer value = 0%.

The final two tables keep the minimum acceptable pension at 85% of the combined full DB and state pension, but set the acceptable probability of falling short of this level at either 2.5% or at 10%. Once again there is wide range of values of alpha – the lowest is 31% and the highest is 84%.

DB pension	40000		20000		10000	
Time to retirement	15	10	15	10	15	10
DB pension plus state pension	49,339	49,339	29,339	29,339	19,339	19,339
Retirement income at 5% level	41938	41938	24938	24938	16438	16438
Alpha	0.31	0.34	0.37	0.40	0.49	0.53
Average income with partial DC transfer	61,020	56,785	36,285	33,767	23,918	22,258
Gain (%) if receive average income	23.7%	15.1%	23.7%	15.1%	23.7%	15.1%

Table 4: Demand for Partial Transfer from DB to DC.

Notes: Alpha is calculated so that chance of retirement income below 85% of status quo is 2.5%; average return on risky assets is 4.5% a year; standard deviation of stock returns is 17.5%; return on safe assets used to calculate transfer value = 0%.

DB pension	40000		20000		10000	
Time to retirement	15	10	15	10	15	10
DB pension plus state pension	49,339	49,339	29,339	29,339	19,339	19,339
Retirement income at 5% level	41938	41938	24938	24938	16438	16438
Alpha	0.52	0.54	0.62	0.64	0.82	0.84
Average income with partial DC transfer	68,854	61,223	40,943	36,406	26,988	23,997
Gain (%) if receive average income	39.6%	24.1%	39.6%	24.1%	39.6%	24.1%

Table 5: Demand for Partial Transfer from DB to DC.

Notes: Alpha is calculated so that chance of retirement income below 85% of status quo is 10%; average return on risky assets is 4.5% a year; standard deviation of stock returns is 17.5%; return on safe assets used to calculate transfer value = 0%.