Angst about Annuities: A Behavioral Exploration of Individuals' Attitudes towards Annuities

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ABSTRACT

There is a long lived (Yaari, 1965) and high quality literature (for example see Davidoff et al, 2005) in economics which has analysed the purchase of annuities. The general conclusion from this literature, which tends to use von Neumann-Morgenstern expected utility maximisers within Arrow-Debreu complete and incomplete market settings, is that it is somewhat of a puzzle why there is such a low level of voluntary annuitization of savings in practice. In fact, the puzzle seems to be beyond standard economic thinking/models and Davidoff et al (2005) concluded as follows:

> 'These results suggest that lack of annuity demand may arise from behavioral considerations, ……It also suggests the importance of behavioral modeling of annuity demand to understand the equilibrium offerings of annuity assets.' p. 1589.

Given the above puzzle, this paper explores how individuals evaluate the attractiveness of defined contribution annuity focused pension saving and the pattern of income from such schemes. Using behavioral/psychological models in regard to the attractiveness of the schemes we propose two types of evaluation are salient in this context; aggregate and disaggregate. Aggregate evaluation is an overall evaluation of whether the plan provides value for money, whilst disaggregate evaluation considers the adequacy of the payments produced by the plan with respect to individuals' needs.

Our findings indicate that annuities fail to satisfy individuals at either at an aggregate level or a disaggregate level. The results presented here suggest that individuals use a range of factors when evaluating annuities. Disaggregate evaluation seems to be related to economic variables (such as levels of income and spending), whereas aggregate evaluation seems to be based on a heuristic as simple as dividing the pension fund by the expected number of years in retirement. Finally, the shape of the preferred income stream in retirement seems to depend on a range of variables – for example, needs when very old and views about future values (time discount rates). Not surprisingly, given the importance and complexity of the subject, this behavioral exploration of attitudes to annuities reveals there are a range influences and variables which seem to be considered and perhaps this explains why the standard economic approach is left with the puzzle of the low voluntary take up of annuities.

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1 Introduction

Annuities have interested economists for quite some time (for example, see Yaari, 1965) but in spite of a number of innovations to the basic Arrow-Debreu models of complete and incomplete markets (for example, see Davidoff et al, 2005), there remains a puzzle as to why there is such a low voluntary take up of annuities. This puzzle is particularly concerning given the move from defined benefit to defined contribution pension schemes and the associated requirement to purchase annuities. More specifically, if individuals have concerns over the voluntary purchase of annuities, the move to defined contribution pensions is likely to decrease social welfare unless there is a better understanding of the factors which drive attitudes towards annuities.

In light of the puzzle and the move to defined contribution pensions, in this paper we use behavioral/psychological models to explore the attractiveness of annuities. More specifically, we propose two types of evaluation; aggregate and disaggregate. Aggregate evaluation is an overall evaluation of whether the plan provides value for money, whilst disaggregate evaluation considers the adequacy of the payments produced by the plan with respect to individuals' needs. Although disaggregate evaluation is salient in both defined benefit and defined contribution pension schemes, aggregate evaluation is more salient in a defined contribution environment because such schemes separate the savings and income stream purchase elements of the plan. The individual therefore is explicitly faced with the comparison of their accumulated savings with the income stream they can obtain.

The results suggest that the factors individuals consider in aggregate and disaggregate evaluation differ. While disaggregate evaluation seems to be related to economic variables (such as levels of income and spending), aggregate evaluation seems to be based on a heuristic as simple as dividing the pension pot by the expected number of years in retirement. Furthermore, the shape of the preferred income stream in retirement also seems to be related to a range of variables – for example, anticipated needs when very old and views about future values (time discount rates). In essence, this behavioral exploration of attitudes to annuities reveals there are a range of influences and variables which seem to be considered and further analysis will be needed if we are to more fully understand and model attitudes towards annuities. Given the current pension crises in many countries, the urgency of this work in terms of improving social welfare cannot be stressed too highly.

The structure of the paper is as follows. Section 2 discusses the issues which may influence the evaluation of annuities, Section 3 provides empirical evidence on issues raised and Section 4 concludes by discussing the findings and their implications.

2 Theoretical Issues

A rational approach to the aggregate evaluation of an annuity is to compare the actuarially fair price for the annuity with the annuity premium required by the annuity provider. The actuarially fair price can be considered to be the expected present discounted value (EPDV) of annuity payments (see Finkelstein and Poterba, 2002). The actuarially fair price of a nominal guaranteed annuity can be computed as[1]

$$\sum^{T}_{i=1}[(A \times S_t)/\prod^{i}_{j=1}(1 + i_j)], \qquad (1)$$

where:
A denotes the payment per period from the nominal guaranteed annuity,
S_t denotes the probability that the annuitant survives until payment period t,
and i_j denotes the expected nominal short-term interest rate at time-period j.

Evaluating this expression requires estimates of future interest rates, inflation (if the income stream is defined in nominal terms) and the future mortality of the recipient. Although individuals may have some internal estimate of their mortality (perhaps based on the lifespan of relatives) or indeed be convinced by statistical information on expected lifespan for those sharing their age and sex, the other elements are estimates, and individuals will generally have little experience of estimating these values. The expression in (1) is itself also complex.

Given the above, it should not be surprising that the voluntary annuity market is small but economists (see Finkelstein and Poterba, 2004) find it a puzzle and they have searched for explanations within their expected utility/Arrow-Debreu market settings: for example, bequest motives, the prevalence of public-sector social security programs and private deferred benefit and pension schemes, the need for buffer stock savings to pay for medical and long-term care needs, and poor value for money either due to charges or individuals having worse mortality than assumed in the annuity rates.

In contrast to searching for explanations which have to be consistent with the 'existing economic framework', we consider how individuals might evaluate annuities from a behavioural perspective. More specifically, when considering any plan which aims to provide income in retirement there are two potential ways it could be evaluated, which we will refer to as aggregate and disaggregate. Aggregate evaluation is an overall evaluation of whether the plan provides value for money, considering it as a whole. Disaggregate evaluation focuses on looking at the regular (usually monthly) payments produced by the plan from the viewpoint of what an individual can do with them i.e. determining their adequacy in meeting the individual's needs.

Our use of aggregate and disaggregate evaluation draws on prior literature which has shown that individuals may not invoke all potential levels of aggregation when making decisions (even if it might have been in their interests to do so) and that individuals may not evaluate the relevant level of aggregation from a payment viewpoint (e.g. Read et al, 1999; Gourville, 1998; Ranyard and Craig, 1995). In making decisions on credit agreements, for example, individuals may focus on the

[1] This formula can easily be adapted to cope with rpi linked or escalating annuities as shown in the paper by Finkelstein and Poterba.

monthly payments rather than the total amount to be repaid. The "pennies a day" approach used by marketers (see Gourville, 1998) is based on a similar concept; trying to manipulate the level at which an offer is evaluated by focusing on the small daily cost of a product such as insurance cover rather than the larger annual cost (even though charges are not paid daily). As well as invoking a smaller (albeit perhaps repeated) cost this approach also changes the set of items with which the item under consideration is compared, making the item perhaps more comparable with petty cash items such as newspapers or a cup of coffee.

From both finance and behavioural perspectives, annuities are particularly interesting because they involve the purchase (for a large sum) of a set of smaller future payments spread over what may be a considerable number of years. From a finance perspective, therefore, the "value for money" evaluation should be affected by an individual's discount rate (see Frederick, Loewenstein and O'Donoghue (2003) for a review of the time discounting and time preference literature). From a behavioural perspective, the potential exists for a particular annuity product to produce an unfavorable disaggregate evaluation while having a good aggregate evaluation (or indeed vice versa). An individual's exact response to such conflicting evaluations is unclear, but may depend on their circumstances; e.g. obtaining a good deal at the aggregate level alongside a poor disaggregate evaluation might be acceptable if there were reasons not to expect the deal to be able to pass the adequacy test (for example, if the individual's saving for retirement started very late in life), but could be distressing if someone had saved diligently from an early age. If an individual's aggregate evaluation is unfavorable whilst their disaggregate evaluation is favourable, then they may well adopt such rationalizations as "at least it gives me enough to do what I want", thus invoking notions of satisficing behaviour rather than notions of economic optimization.

In making evaluations individuals may also vary with respect to the form of the income stream they prefer. Economic theory would suggest that people should try to maximise their utility by spreading the consumption that can be financed by their lifetime income over their lifetime (Modigliani & Brumberg, 1954). Findings for individuals preferences for sequences of money, however, do not support the concept of equally spread consumption being ideal. A number of studies (e.g. Loewenstein & Sicherman, 1991; Chapman, 1996, plus many more) have shown that individuals prefer rising sequences of income, although the source of income can influence this. Frank and Hutchens, 1993 and Matsumoto et al (2000) show that the preference for rising sequences is present in relation to wages. The question, however, is what do people prefer when wages end and pension takes over?

Read and Powell (2002) suggest that individuals do not clearly distinguish income and consumption, and therefore look for sequences that are "appropriate" to their expected or desired consumption pattern (with self control, for example, being a reason for such a preference). Their results show that people prefer constant or rising sequences of income over falling ones (they included a sequence with rising income while working and a slightly lower constant income while retired in this category). They also show that individuals see patterns of health which decline in the retirement years as appropriate and do not find rising sequences of health over the lifetime as attractive. Read and Powell also indicate that people will vary in their choice

motivations, with some using concepts such as maximisation, while others might emphasise self control or closeness to "ideal" outcomes.

In a retirement context we might expect to find that people would focus on the impact of issues such as changing health status so that they might find rising sequences of income less attractive (Read and Powell had respondents who thought of this even in a whole life context, for example, "[the rising sequence] seems unnatural and the wrong way round to be having most income at your disposal when you're oldest and less likely to actually need that increase" (p453)). Of course, some elements of these choices may be constrained by disaggregate evaluation. Thus an individual may prefer an income stream which is steady in real terms (adjusted by rpi), but the reduction in the initial amount received may mean that they feel they cannot afford to take this route. Individuals may also vary in their preference for rising versus steady versus falling income streams in real terms. Finkelstein and Poterba (2002), for example, suggest that longer-lived individuals should prefer annuities that are back-weighted relative to the annuities chosen by short-lived individuals, though they find mixed evidence for this supposition. They link this to the finding that individuals in higher socio-economic groups have lower mortality and thus suggest that they should choose more back-weighted annuities**.** They also suggest that risk averse individuals may be willing to pay a higher risk premium for a real product than a nominal product to protect themselves against inflation risk.

In the remainder of this paper we empirically investigate the issues surrounding individual's annuity evaluations raised above, by analyzing the views of members of the UK general public. Respondents to the Financial Well-being Survey developed by the International Institute of Banking & Financial Services (IIBFS) provide a unique panel database for this study. Members of this panel are recruited from random mailings to the UK public, providing a sample with wide ranging ages and levels of wealth.

3 Investigations

Particular issues raised in the prior section are investigated are in the following sub-sections.

3.1 Expectations of annuity outcomes – are outcomes perceived as fair and adequate?

Individuals were presented with a scenario involving having a fund of money with which to purchase an annuity:

Imagine that you are saving for your pension in a money purchase scheme. This builds up a pot of money that can be used to provide you with a pension in retirement. If you continue saving until you retire at age 65, you will have a pot of £100,000 to provide you with a pension. (If you are already retired, imagine that you were in this position when you retired). One way you can get a pension using the money you have accumulated is to buy an annuity. This could provide you with an income, which is the same for every year until you die.[2]

Individuals were then asked to say, if an annuity was purchased using the £100,000 at age 65, how much annual pension they thought they *would* receive and how much they thought they *should* receive to get a fair return for their £100,000. Individuals were also asked how much pension they thought they would *need* to receive to be able to live comfortably in retirement.

A summary of results is shown in Table 1. A GLM within-subjects analysis of responses to all three questions showed that responses on the amount people *would* receive/ *should* receive and *need* are all significantly different ($p<0.01$)[3]. Interestingly, womens' responses to the *would* and *should* questions were higher than mens' (although the differences are not statistically significant) which is surprising given that, due to greater life expectancy, women generally receive lower incomes. Women gave significantly lower *need* values than men ($p<0.01$). The retired and non-retired respondents do not differ in their responses significantly and so are not separated in the analysis.

Table 1: GLM within-subjects analysis of per annum income responses to "would", "should" and "need" questions.

	Would	*Should*	*Need*	
Mean values (£'s)	7311.83	9911.60	20202.40	
Median values (£'s)	6000.00	10000.00	19000.00	
Type III Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*[a]
9830942247.371	1.071	9177458138.522	119.452	0.000
Mean values (£'s)				
Males	7057.07	9166.97	22699.96	
Females	7525.00	10582.77	18291.39	

a. Mauchly's test indicates sphericity can not be assumed, thus all significance levels are computed employing the Greenhouse-Geisser correction

The values individuals thought they *would* and *should* receive were compared with those available in the annuities marketplace. The best rates for males were £7,104 pa, with those for females being £6,684 pa. Single sample t-tests on men and women

[2] In the question the term "pot" was used, rather than "fund", as this is a term commonly used in popular discussions of the topic. There was also concern that "fund" might be seen as relating to a product rather than the individuals' personal savings.

[3] Comparisons made using the Bonferroni adjustment for multiple comparisons.

separately show that the *would* values are not significantly different from the real values but the *should* values are ($p<0.01$). This suggests that, although people have fairly realistic expectations of annuity outcomes, there is dissatisfaction with the annuity incomes on offer. Given that the *need* values significantly exceed the *should* values, this suggests that the returns from an annuity purchased with £100,000 at 65 would not be seen as adequate to meet individuals' needs. This is a cause for concern given that individuals' typical pension funds at the point of annuity purchase are usually substantially smaller than this £100,000 value. The Association of British Insurers statistics for 2004 show that the average pension fund used to buy an annuity was just £21,500 (RIRC, 2005, p42). Taken together these results suggest that annuity returns are producing undesirable results both at the disaggregate and aggregate evaluation levels.

3.2 Factors linked to aggregate and or disaggregate evaluation

Some of the variables used in Section 3.1 above (*should* receive and *need*) can be used to provide some measure of the individuals' evaluations. The difference between what an individual thinks they *should* receive as income from a particular annuity purchase and what they actually would receive provides a measure of their aggregate evaluation of the offer (with larger values indicating more dissatisfaction). Similarly the difference between what they *need* to live comfortably and what they would actually receive from the purchase provides a measure of their disaggregate evaluation. These measures were calculated for the respondents, using the actual annuity rates given in Section 3.1.

We would expect the factors influencing aggregate and disaggregate evaluation to differ because one focuses on evaluating the overall deal the annuity offers over the remaining lifespan of the individual, while the other focuses on the income in each period versus the individual's needs. For aggregate evaluation we suggest the following will be influences:

- The amount the respondent receives each period (ideally this should be evaluated in real terms; it seems unlikely that individuals can do this easily if the amount is not in real terms).

- The amount in the pension fund purchasing the annuity.

- How long the respondent expects to live ("expected number of payments"). The probability of unexpected death might also need to be incorporated; someone might expect to live for 20 years, but recognize a probability of death before this time. However, initially we consider life expectancy only. A question was included in the survey to check that individuals recognised that the same amount of money would generate different incomes for the remaining life of the individual if that remaining life differed in length. Individuals were given a scenario of a competition prize which comprised either £250,000 immediately or an annual income for life. Individuals were asked to give the annual income for which they were equally happy with both options. They were then asked to answer the same question in relation to someone significantly younger and someone significantly older than themselves. GLM within-subjects comparisons revealed that all three

values were significantly different ($p<0.01$),[4] and that respondents felt that people who are younger should get less annual income and those who are older should get more.

- The discount rate of the respondent. Individuals with a high discount rate will put less value on income received at a particular point in the future than those with lower discount rates, and the individual's discount rate will therefore impact their aggregate evaluation.

- Current interest rates. These would indicate how much money the individual could make annually by investing the pension fund and just taking income while retaining the capital.

However, for disaggregate evaluation we suggest the following will be influences:

- The amount the respondent receives or will receive initially

- The level of individual expenditure, which is not mortgage related expenditure (as mortgages typically are completed by retirement), as this directly relates to individual need

- The individual's income at the time of the evaluation, as this provides a point of comparison for feelings about relative wealth before and after retirement

To test the influences on aggregate evaluation empirically we ran regressions on the aggregate and disaggregate variables calculated above against variables representing the influences. In the scenario in question some of these influences are fixed, to facilitate comparison between individuals. For aggregate evaluation, for example, the amount of the pension fund had been fixed in the question and the amount the person would receive each year was included in the calculation of the dependent variable. Respondents all answered at the same time and thus current interest rates are fixed also. We are therefore looking at the influence of life expectancy and discount rate on aggregate evaluation. Similarly for disaggregate evaluation, the amount received is included in the dependent variable and so we are looking at the influence of income and expenditure on disaggregate evaluation.

The regression on the aggregate evaluation variable showed no significant relationships between this variable and either the individuals' estimates of their own life expectancy or their mean discount rate. The lack of significance for either variable in the model for aggregate evaluation may seem strange but, as discussed in Section 2, the calculation of the value of an annuity is complex. When faced with such situations humans often fall back on simple to follow "rules of thumb" known as heuristics (see Gilovich et. al., 2002 for a compilation of research on this issue). One potential heuristic in the aggregate evaluation situation might be to divide the amount in the pension fund by the expected remaining lifespan of the individual at 65. This heuristic was calculated for our respondents, and compared (using a paired sample t-test) with the amount they felt they *should* receive from the annuity. No significant

[4] Again multiple comparisons are Bonferroni adjusted.

difference was found, which is supportive of the idea that individuals are using a heuristic such as this in aggregate evaluation.

Models of the dissagregate evaluation showed, as expected, a significant relationship with both income and spending ($p<0.05$ for both coefficients), with higher levels of income and spending leading to increased dissatisfaction with the annuity.

3.3 Preference for patterns of income stream

As discussed above individuals may vary in their preference for rising, steady or falling future income streams from an annuity. Finkelstein and Poterba (2002), for example, suggested that longer lived individuals should prefer back-weighted annuities, and such a preference may also be related to income and education via their impact on life expectancy. It could, however, be that individuals also consider what they can do with the money at different ages; thus people may prefer to have more money at a younger age while they are healthier and have more options for hedonic returns on its use. Practical needs may dictate a different decision; if individuals are concerned over, for example, provision of long term care then rising income streams can be attractive as they provide more money for this as the individual ages. Risk aversion could also play a part in this decision; risk averse individuals might prefer to avoid falling income streams because, if they live long enough, they may find themselves with insufficient income. Conversely they might have concerns over "getting their money's worth" in a rising income stream, being more aware of the potential loss from dying in the early years of the annuity.

Respondents were shown three graphs portraying a rising, steady and falling pattern of income received in retirement. Values were in real terms[5] and the three graphs corresponded to income streams with the same actuarial value. Respondents were told that the values were in real terms or "today's money", and that all three income streams would cost the same to purchase. They were then asked to rate how attractive each option was to them using a 0 to 10 scale where 0 meant "not at all attractive" and 10 meant "very attractive". Results are summarized in Table 2

[5] This avoids responses to the income itself being confounded by differing estimates of inflation.

Table 2: GLM within-subjects analysis of attractiveness ratings for rising, steady and falling future income streams.

	Rising	*Steady*	*Falling*	
Mean attractiveness	6.14	5.41	3.02	
Type III Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*[a]
1075.574	1.611	667.551	45.567	0.000

a. Mauchly's test indicates sphericity can not be assumed, thus all significance levels are computed employing the Greenhouse-Geisser correction

A GLM within subjects analysis of responses shows that the attractiveness ratings differ significantly across the three income stream types. However, Bonferroni adjusted pairwise comparisons revealed that *rising* and *steady* income streams are not rated significantly differently from each other, but both are rated as significantly more attractive than *falling* income streams. Nonetheless, *rising* income is the first choice for 51% of respondents, with 23% preferring *steady* and only 17% preferring *falling*.

The respondents were also asked to state the reasons for their ratings of patterns of income. 162 out of the 281 stated a comprehensible reason for their choice. A textual analysis of these responses was undertaken to group the various reasons given and these are shown in Table 3.

Table 3: Broad reasons for ratings of patterns of retirement income.

Reason	**Number stating this reason (percentage of valid respondents)**	
Enjoy money more when younger (or less when older)	25	(15.4)
Own life expectancy (low/high)	12	(7.4)
Higher needs/expenses when very old	34	(21.0)
Not able to live on initial amount	4	(2.5)
Just prefer a rise	18	(11.1)
Lower needs/expenses when very old	13	(8.0)
Can earn more money when younger	1	(0.6)
References to risk	2	(1.2)
Easier to budget/plan	10	(6.2)
Inflation	43	(26.5)

As can be seen, some of these reasons are related to the expected pattern of future economic needs and some are based on subjective value attitudes (utility in a broad sense). Generally the implications of the reasons given are clear in respect of the pattern of income that would be most appropriate and these have been set out in Table 4.

Table 4: Implications of reasons for pattern of retirement income.

Reason	Implied pattern of Real Retirement Income
Enjoy money more when younger (or less when older)	Falling
Own life expectancy (low/high)	Falling if Low Rising if High
Higher needs/expenses when very old	Rising
Not able to live on initial amount	Falling
Just prefer a rise	Rising
Lower needs/expenses when very old	Falling
Can earn more money when younger	Rising
References to risk	Not clear
Easier to budget/plan	Constant
Inflation	Rising (or constant)

When the reasons stated by individuals are cross tabulated with the pattern of income which they most preferred there is a high level of agreement between the implied pattern and the patterns selected by individuals (see Table 5). In addition, statistical analysis shows that there is a strong relationship between the reasons put forward and the actual choices made (χ^2, $p>0.01$). Thus we can be confident that in some sense there is congruence between the choices of individuals and their explanations of those choices.

Table 5: Crosstabulation of stated reasons for ratings and most preferred pattern of income stream.

		Income stream			
Stated reason		Rising	Steady	Falling	Total
	Enjoy money more when younger (or less when older)	1	7	16	24
	Own life expectancy (low/high)	1	4	4	9
	Higher needs/expenses when very old	27	2	2	31
	Not able to live on initial amount	1	2	1	4
	Just prefer a rise	15	3	0	18
	Lower needs/expenses when very old	0	2	11	13
	Earn more when younger	1	0	0	1
	References to risk	0	2	0	2
	Easier to budget/plan	2	8	0	10
	Inflation	35	7	1	43
Total		83	37	35	155

NB: The number of observations (n=155) is less than that reported in Table 3 (n=162) due to tied preferences, which are omitted.

Reasons for preference reported by individuals were also considered in the light of previous research on annuities, and the rationales suggested there. As discussed above, Finkelstein and Poterba (2002) suggest that longer-lived individuals should prefer annuities that are back-weighted relative to the annuities chosen by short-lived individuals. In addition, Hamermesh (1985) and Hurd and McGarry (2002) suggest that individuals have informed and plausible views about their life expectancy beyond the information that can be gleaned from their observable characteristics. We find

evidence that about 7% of our sample have made their choice on the basis of their personal views of their own life expectancy. For some of the sample we have individuals' estimates of their own life expectancy. Regression analyses showed no significant relationship between life expectancy and ratings for the three patterns of income, and there was no significant difference in life expectancy between groups of individuals who had different first choice preferences for income stream. Tests were also made for relationships between income stream preference and education, individual income and household income (because of their potential relationship to actual life expectancy). Only one significant relationship was found, but this indicated that those with higher levels of education gave *lower* ratings to rising income streams, which would be counter to Finkelstein and Poterba's prediction.

Finkelstein and Poterba (2002) also state that risk averse individuals may be willing to pay a higher risk premium for a real product than a nominal product to protect themselves against inflation risk. We find a strong tendency amongst the respondents to cite inflation as the factor for their choice of income stream. Generally this reason was not explicitly linked by respondents to the concept of risk so there is a possibility that these concepts are differentiated in the attitudes of individuals. The data file included a variable which measured the individuals' risk preference, but tests of the citing of inflation against this variable indicate no significant connection between risk aversion and this reason. Indeed no significant relationships were found between risk preference and income stream preference.

Many of the respondents cited their expected future pattern of needs as reasons for their choice. In particular 21% cited higher needs and expenses when very old as reasons for choosing an increasing annuity. This is broadly in accord with the possible need for buffer stock savings to pay for medical and long-term care needs which was put forward by Finkelstein and Poterba (2004) as a possible reason for the small size of the voluntary annuity market in the UK. It should be noted, however, that there is a lack of homogeneity in views of the likely pattern of future needs with 8% of the respondents expecting lower needs/expenses when very old**.** It would be an interesting avenue for future work to investigate this lack of homogeneity. Some individuals may have reasons (whether fully rational or not) for expecting a particular pattern of future needs based on factors such as their family medical history and their own social and medical circumstances.

There is a body of academic work on annuities, see for example Mitchell et al (1999) and Kingston and Thorp (2005), that discusses the benefits of purchasing annuities (or types of annuities) in terms of the lifetime expected utility that may be expected from the purchase. Not surprisingly, none of the respondents have explicitly mentioned utility in their responses. However, the advantages of being able to benefit from a constant level of consumption which loom quite largely in the academic literature were, perhaps surprisingly, also not mentioned. Other issues relating to utility were quite prominent amongst the responses. About 15% of the respondents indicated that they would enjoy the money more (get more utility out of the same amount of money) at a younger age. This seems to indicate a feeling that utility does vary with age which is not a concept that has featured in the finance/ economics literature to date.

We might also expect that an individuals' preference for a particular pattern of income would be influenced by the rate at which they discount future income. To investigate

this issue we also asked the same respondents of the IIBFS FWS to state equivalent present/future value amounts for various lump sum values at different points of time. Thus we were able to obtain mean estimates of their discount rates. The results from a multivariate ANOVA of the attractiveness ratings for the three income stream patterns with discount rate is presented in Table 6. The sign on the discount rate coefficients for the rising and falling income streams are as expected. The significant and positive discount rate coefficient for falling income streams indicates that individuals with higher discount rates give falling income streams higher attractiveness ratings. This is to be expected as they discount the future more and place greater emphasis on the present, thus they would place more value on early higher amounts. Whilst the negative discount rate coefficient for rising income is insignificant, it is correctly signed and indicates that individuals with higher discount rates would give rising income streams lower attractiveness ratings.

Table 6: Multivariate ANOVA of the attractiveness of income stream patterns with discount rate.

Dependent Variable	Discount rate coeff.	Type III Sum of Squares	df	Mean Square	F	Sig.
Rising	-0.057	8.355	1	8.355	0.747	0.389
Steady	0.047	5.578	1	5.578	0.734	0.393
Falling	0.128	41.529	1	41.529	4.373	0.038

Overall there does appear to be another annuity related puzzle arising from the results, in that the large majority of the respondents prefer an annuity that either increases or is static in real terms whereas in the UK annuity market, most annuitants purchase a non-increasing annuity. There are two possible explanations for this. Firstly, an individual's choice of annuity will be affected by the other assets and income rights that they hold. Some of these assets and rights (which will include the right to state benefits) may provide a sufficient level of protection against inflation. A second possible explanation is the small size of the funds that most individuals have available for annuity purchase. The alternative income streams proposed in the survey provide an income that is not unreasonable to be able to live on whereas the funds available to many individuals in reality would only be sufficient to purchase a very modest income. This might force people down the route of taking the highest possible initial income (based on a non-increasing annuity) in order to at least be able to live on the initial amount. This explanation is often suggested anecdotally by advisors in the annuity industry.

Discussion

Our findings here support those in Summers et. al. (2005) in indicating that annuities fail to satisfy individuals either at an aggregate level (in terms of providing a good return for their pension fund) or at a disaggregate level (in terms of meeting their retirement income needs). Although people have fairly realistic ideas about how much they would receive from an annuity they do not feel it is as much as they should receive.

While theoretically expected variables were found to be related to individuals disaggregate evaluations of an annuity scenario, this was not the case for aggregate evaluations. We suggest that individuals may be using a heuristic approach to such evaluations and find evidence that a simple heuristic, such as dividing the amount in the pension fund by the remaining life expectancy at time of purchase, is not inconsistent with individuals' responses.

In terms of the income stream provided by the annuity, individuals generally rated falling income streams (in real terms) less highly than those which were steady or rising, and over half the respondents gave their highest rating to a rising income stream. Ratings of income streams were influenced by the individual's discount rate, with falling income streams being given significantly higher ratings by those with higher discount rates as might be expected. In reality, because of the use of nominal income streams, most individuals do purchase a falling income stream. This puzzle is worthy of further investigation. It may arise because of the other assets held by individuals or because the average pension fund in the UK does not generate an adequate income initially on other income stream patterns. Thus what individuals buy is cost constrained to a pattern which most would see as non optimal.

Variations in preferred income stream can be related to reasons given for the choice with some, for example, choosing a rising income stream to cope with care expenses in later life. A percentage of responses, however, indicated that individuals expected the utility of income to vary with their age, with money received at younger ages having more utility. This is a concept which is not currently considered in the finance/ economics literature, and is worthy of further investigation.

Overall these findings suggest that individuals will not find the pension provided by defined contribution annuity based pension arrangements attractive, even if they were able to save substantially larger pension funds than is normal today.

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