Annuity Markets and Retirement Security

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Abstract

The growing importance of defined contribution pension arrangements has drawn increased attention to the means by which retired people draw down their assets. Current UK law requires annuitisation of at least a fraction of defined contribution plan accumulations. Annuity markets have recently attracted some criticism with respect to pricing and the available range of product options. This paper describes a key feature of voluntary annuity markets: the presence of ‘adverse selection’. This is the tendency of annuitants to live longer than non-annuitants, since individuals who know that they are likely to die soon do not purchase annuities. The paper presents information that quantifies the importance of adverse selection in the setting of private annuity prices and discusses the role of compulsory annuitisation requirements in reducing it. Requiring individuals to participate in the annuity market can reduce selection effects, at the cost of reducing individuals’ range of retirement income options.

JEL classification: G22, G23, H55.

I. INTRODUCTION

Annuities are insurance policies that pay their beneficiaries for as long as these beneficiaries are alive. They solve the problem of planning consumption in a world with uncertain lifetimes and indemnify individuals against the risk of outliving their resources. In return for an initial capital payment, a life annuitant is assured of receiving a constant income stream for the remainder of his life.

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The annuity provider (an insurance company) pools mortality risk across individuals and offers each annuitant a payout that, in theory, exceeds the income he or she could earn if his or her annuity premium were invested in a financial asset, such as a bond. The annuity’s additional return derives from the mortality risk facing the annuitant pool. The insurance company does not pay out the full amount of the annuity premium to annuitants who die earlier than the aggregate mortality experience would suggest. The principal that the insurance company does not pay out to those who die unexpectedly early permits a higher payout for those who remain alive.

Annuities are sometimes referred to as ‘reverse life insurance’. A life insurance policyholder pays the insurer each year until he or she dies. When the insured individual dies, the insurance company pays a lump sum to the beneficiaries of the life insurance policy. With annuities, the annuitant makes a lump-sum payment to the insurance company before the annuity payout begins. In return, the insurance company makes payments to the annuitant until the annuitant’s death.

Annuity markets have long attracted interest from economists. In simple life-cycle models, Yaari (1965) shows that an individual facing an uncertain lifetime, with no consumption risk such as unexpected healthcare needs and with no bequest motive, should annuitise all of his or her wealth at retirement. This prediction stands in stark contrast to actual experience with annuity markets. In most developed nations, these markets are small. In the UK, while there is an active ‘compulsory’ annuitant market in which individuals are required to annuitise part of their pension plan accumulation, the market for voluntary annuities is very limited. The voluntary annuity market in the USA is also tiny.

Economists have offered a variety of explanations for the limited size of the annuity market. ‘Adverse selection’ — the tendency for annuity buyers to live longer than randomly selected individuals in the population — is one of these explanations. This paper describes the role of adverse selection in annuity markets and discusses the potential role of compulsory annuitisation for retirement plan accruals as a method of reducing adverse selection.

While annuity markets have long been of interest to economic researchers, these markets have recently begun to attract substantial public policy attention, for two reasons. First, the structure of private pensions in both the UK and the USA has increasingly emphasised defined contribution rather than defined benefit pension plans. While defined benefit plans provide life annuities to their participants, those who are covered by defined contribution plans have discretion in spreading their retirement resources across the period after their retirement. Annuities offer one way to do this.

Second, as government-provided retirement pension systems, such as Social Security in the USA, have encountered long-term fiscal balance problems, there has been growing interest in ‘private account alternatives’ to these programmes. When individuals accumulate balances in such accounts, a key policy design
issue involves the way such balances should be drawn down. Understanding why individuals currently do not participate in voluntary annuity markets may provide very helpful insights for understanding the potential impact of annuitisation requirements in ‘individual accounts’ Social Security systems.

This paper investigates adverse selection in annuity markets, with a focus on the UK. This country has a more developed and active individual annuity market than the USA, largely because of requirements that individuals who accumulate assets in some types of defined contribution retirement plans purchase annuities with part of their accumulation. The remainder of this paper is divided into six sections. The first offers a brief historical perspective on the evolution of annuity markets, with particular reference to annuities and government finances in the UK. Section III outlines the structure of annuity products and the potential benefits that annuitants might expect to receive from buying annuities. Section IV explains how selection effects can affect the market for annuity products and motivates the notion of adverse selection by presenting simple comparisons between the mortality rates of annuitants and those of the population at large.

Section V summarises recent research on the pricing of annuity products and the degree to which adverse selection affects current prices. It describes the ‘money’s-worth’ conceptual framework, which has been used in such pricing exercises, and emphasises the potential differences between annuity prices from the standpoint of producers (insurance companies) and consumers (individual buyers) of annuities. Adverse selection drives a wedge between the effective price of an annuity from the standpoint of a randomly selected individual who faces the population mortality table and the effective price to the representative annuity buyer.

Section VI outlines a key policy choice with respect to annuitisation of retirement balances: whether or not to compel some annuitisation and, if so, whether to restrict the annuity options available to annuitants. It explores the trade-offs associated with voluntary versus compulsory annuitisation within retirement saving systems. Voluntary annuitisation offers potential annuitants greater flexibility in the policies that they choose and in the time path of retirement decumulation that they select than do compulsory systems. Voluntary systems are also, however, likely to give rise to greater adverse selection in annuity markets. There is a brief concluding section.

II. HISTORICAL PERSPECTIVE ON THE EVOLUTION OF ANNUITY MARKETS

Financial contracts similar to annuities have a long history. James (1947) reports that ancient Roman contracts, known as annua, promised an individual a stream of payments for a fixed term, or possibly for life, in return for an upfront payment. Speculators who dealt in marine and other lines of insurance offered such contracts. Beginning in 40 BC, at least one quarter of a decedent’s property
needed to pass to his legal heirs. Determining whether this condition was satisfied required some way of valuing the interest that heirs might have in annuity contracts. Wadsworth, Findlater and Boardman (2001) report that, by roughly AD 200, the Roman jurist Ulpianus had compiled the first recorded life table for the purpose of computing the estate value of annuities. His data suggest that life expectancy for a male at age 65 was 5.3 years. Today, in the UK, the comparable life expectancy is 15.4 years.

Single-premium life annuities were available in the Middle Ages, and detailed records exist of special annuity pools, known as *tontines*, that operated in France during the seventeenth century. In return for an initial lump-sum payment, purchasers of tontines received life annuities. The amount of the annuity was increased each year for the survivors, as they claimed the payouts that would otherwise have gone to those who died. When the second-to-last participant in a tontine pool died, the sole survivor received the entire remaining principal. The tontine thus combined insurance with an element of lottery-style gambling.

During the 1700s, governments in several nations, including England and Holland, sold annuities in lieu of government bonds. Holland sold annuities as early as 1554 to finance a war with France. In 1746, Britain employed an ‘annuity lottery’ to raise funds. Just over 60 years later, in 1808, Chancellor of the Exchequer Spencer Percival inaugurated the British government’s modern annuity finance programme. The government received capital in return for a promise of lifetime payouts to the annuitants.

Murphy (1939) provides a detailed account of the sale of public annuities in England in the eighteenth and early nineteenth centuries. He reports the interesting experience of England in 1746, when annuities initially were sold to all individuals at a fixed price, regardless of their age or sex. A Dutch syndicate subscribed a substantial share of the annuities but purchased annuities on behalf of individuals (such as newborn girls) whose remaining life expectancy was substantially greater than that for randomly selected individuals in the population. As it became clear over time that mortality rates for annuitants were lower than those for the population at large, a more refined pricing structure was introduced in the sale of government annuities.

The modern annuity market, in which private insurance companies sell insurance contracts to individuals who wish to avoid the risk of outliving their resources, emerged in the eighteenth century. Governments and private insurance companies both sold annuities during the eighteenth and nineteenth centuries. Wadsworth, Findlater and Boardman (2001) provide an outline of major historical events in the growth and evolution of the UK annuity market during the last three centuries. The most important recent milestones involve the explicit connection between the private pension market and the annuity market. The 1986 Social Security Act allowed individuals in the UK to opt out of the State Earnings-Related Pension Scheme (SERPS) if they participated in a
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defined contribution pension plan that satisfied a set of minimal requirements. This extended legislation, passed in 1978, that permitted individuals to opt out of SERPS by participating in a defined benefit pension plan. The 1986 Act also required a fraction of the balances built up in defined contribution plans to be annuitised, which raised the demand for individual annuity products.

III. THE STRUCTURE OF ANNUITY PRODUCTS AND THE POTENTIAL BENEFITS OF ANNUITISATION

The private market currently offers a range of different annuity products to individuals. These products are designed to insure against different risks, although virtually all annuities serve the core function of insuring against the risk of outliving one’s resources. This section provides a brief introduction to the various types of annuity products, which differ in their provisions for asset accumulation and in the terms under which the accumulated principal is dispersed during the liquidation phase.

The prototypical annuity contract can be divided into two parts: an accumulation phase and a liquidation phase. During the accumulation phase, capital builds up; this capital is dispersed during the liquidation phase. Annuities that have an accumulation phase are known as deferred annuities. Historically, one of the arguments for individuals purchasing deferred annuities was that they offered an opportunity to invest in assets that individuals would not otherwise be able to purchase. In recent years, with the growth of retail unit trusts and related investment vehicles that have ‘democratised’ the investment process, this argument is not as compelling as it was in prior decades. This paper does not analyse deferred annuities, but rather focuses on annuities that begin liquidation as soon as they are purchased. These are known as single-premium immediate annuities.

Single-premium immediate annuities are the products that most participants in the compulsory annuity market purchase. They do not have an accumulation phase. Annuitants make lump-sum payments to the annuity provider of the accumulated capital that they wish to draw down. During the liquidation phase, the annuitants receive payouts contingent upon their survival or in accord with other terms specified in the annuity contract. In some annuity contracts, payouts are specified as a guaranteed minimum, with the opportunity for a dividend if mortality experience or rates of return on insurance company investments prove better than expected.

The annuity payout rate varies with both the annuitant’s prospective mortality risk and the rate of return that the annuity provider can earn on invested assets. Younger individuals, because they are expected to receive payments for a longer time period, receive lower annuity payouts than older annuitants for a given amount of capital invested. Higher rates of return generate greater income per pound of capital for the insurance company and therefore permit higher payout
rates to annuitants. Variation in rates of return on bonds and other investment vehicles appears to contribute to substantial variation in annuity payout rates over time.

There are several common payout methods associated with individual annuity contracts. The simplest individual annuity contract is a single-premium immediate annuity. In return for a single premium payment, the annuitant receives a guaranteed stream of future payments that begin immediately. These payments end when the annuitant dies (a simple life annuity) or at the death of both the annuitant and a co-annuitant, such as a spouse (a joint life survivorship annuity). It is also possible to structure the annuity so that the payments end at the later of a fixed number of years or the date of death of the annuitant. This type of contract is known as a life annuity with stipulated payments certain.

These different annuities address different insurance needs. A simple life annuity is primarily designed to insure annuitants against outliving their resources; a joint life survivorship annuity addresses this risk and also provides retirement income for dependants. The payout-certain annuity is designed to address the fear, on the part of the potential annuitant, that he or she will turn over a capital sum to an annuity provider and then die shortly thereafter without receiving many annuity payments. It overcomes this inhibition by ensuring that payments will be made to the annuitant’s beneficiaries for at least a fixed period. The level of the annuity payout associated with a fixed-payments-certain contract is lower than that for a simple life annuity. Payment-certain contracts may satisfy the annuitant’s desire to purchase insurance against outliving his or her resources, while at the same time delivering some potential benefits to children or others to whom the annuitant might wish to leave a bequest.

Each of the annuity products described above is available in each of the two distinct annuity markets in the UK. These are the voluntary annuity market, in which individuals with accumulated non-pension savings may use these accumulated assets to purchase an annuity, and the compulsory annuity market, in which individuals who have accumulated savings in defined contribution pension plans are required to annuitise a portion of their accumulated balance. Annuitants in the compulsory annuity market buy annuities to draw down their accumulation both in occupational defined contribution plans, which are offered by employers, and in personal pension plans, which are established by the individual. Both types of defined contribution plans can be used to opt out of SERPS.

The compulsory annuity market is currently much larger than the voluntary market. The Association of British Insurers (1999) reports that, in 1998, annuity payments totalled £6.2 billion, with nearly 90 per cent (£5.4 billion) coming from compulsory annuitants. Of the £6 billion spent on new annuity purchases in 1998, 94 per cent was spent on compulsory annuities. These statistics on the value of annuity purchases can be compared with household-level data on the nature of annuity buyers. Banks and Emmerson (1999) use data from the 1996–
Family Resources Surveys to explore the source of funds for annuity purchases. They find that 27 per cent of annuity buyers bought their annuity using occupational pension funds and 17 per cent used personal pension funds, while 56 per cent used other funds. Given the projected growth of defined contribution pension assets in both occupational pension plans and personal pension plans, the compulsory annuity market is likely to grow substantially in coming decades.

Many different annuity products are offered in both the voluntary and the compulsory annuity markets. Both markets offer level-payment nominal annuities that promise annuitants a fixed stream of nominal payouts for the duration of their lives, or possibly their lives as well as a guarantee period. Insurance companies also offer ‘graded-payment’ annuities that promise rising nominal benefit streams over the life of the annuity product. The most common example of such a policy promises a 5 per cent nominal increase in benefits during each year of the annuity. Finkelstein and Poterba (2000) note that this rate of payout growth is greater than the estimate of the long-term inflation rate implied by the term structure of nominal and real interest rates.

In addition to these two nominal annuities, insurers offer inflation-protected annuities in both the voluntary and the compulsory markets. These annuities provide buyers with insurance against outliving their resources and they also provide insurance against the risk that inflation erodes the value of nominal assets. The market for inflation-indexed annuities is much smaller than that for nominal annuities. This raises the question of why annuitants do not demand insurance against price-level movements.

IV. ADVERSE SELECTION IN ANNUITY MARKETS

The limited size of private annuity markets has puzzled research economists, since calculations using standard economic models suggest that individuals facing uncertain lifetimes should be prepared to pay a significant amount to purchase insurance against outliving their resources. Historically, the puzzle was posed with respect to the size of the voluntary annuity markets in the UK and the USA. It also appears, however, that individuals in retirement plans who have the option to annuitise their resources, but who are not required to do so, are reluctant to annuitise. Mitchell (2001) reports that, in Chile, where individuals can choose an annuity or a set of graduated payments to draw down the balance accumulated in their mandatory defined contribution individual accounts system, only 40 per cent of the beneficiaries have elected for a life annuity. The majority of beneficiaries have chosen a payout option that exposes them to some risk of exhausting their resources before death.

Four broad classes of explanations have been suggested to explain the apparently limited consumer interest in annuity products. The first is that households have bequest motives and that buying annuities is not consistent with
providing a bequest to one’s heirs. While annuities that promise payouts for a fixed number of years do offer the prospect of combining insurance against longevity risk with some potential benefits to children or other heirs, these products nevertheless reduce the amount that a potential annuitant could expect to leave to his or her beneficiaries.

A second potential explanation for limited annuity demand holds that there is a demand, for precautionary or other reasons, for a stock of wealth that can be deployed as the holder wishes. The potential need to pay for nursing-home expenses or medical care provides one rationale for this. There are likely to be substantial differences across countries in the importance of resource needs late in life. Using wealth to control the behaviour of potential beneficiaries provides another explanation of why potential annuitants may prefer to retain their wealth rather than transfer their resources to an annuitised format.

A third explanation for the limited demand for annuities is that annuities are complicated financial products that many individuals do not understand. While it is true that some annuities are complex, others are relatively straightforward. There are also examples of complex products, such as life insurance products with an investment component, that individuals purchase in substantial numbers. This makes it difficult to evaluate the ‘complexity results in non-participation’ explanation for the small annuity market.

A fourth explanation for the limited demand for annuities is that these products may be ‘expensive’ when viewed from the perspective of the typical individual. The cost of an annuity depends on the relationship between the present discounted value of payouts and the initial premium payment. Annuities could be expensive from the standpoint of potential buyers, either because the insurance companies that offer them are charging substantial amounts for administration or for other costs, or because the typical buyers of annuities are longer-lived than the population at large. The latter would follow from the presence of adverse selection in the annuity market. Friedman and Warshawsky (1990) make the important point that adverse selection exists in many insurance markets but that many other markets are larger than the annuity market. The plausibility of adverse selection as a contributory factor to the small size of the annuity market therefore depends on its magnitude.

Economic research on insurance markets has long recognised that insurance buyers may know more about their risk of loss than the insurance companies that sell insurance. Rothschild and Stiglitz (1976) provide a classic analysis of insurance market equilibrium in the presence of such asymmetric information. When insurers cannot tailor the policies that they offer to specific individual risk attributes, those who purchase insurance may represent a higher-risk group than those who choose not to purchase insurance. This is because insurance is worth more for those with higher risk of loss. The resulting pool of insurance buyers will be ‘adversely selected’, from the standpoint of the insurance company, relative to the population. In the annuity market context, adverse selection
implies that those who purchase annuities will have a higher-than-average risk of living for a long time. Thus adverse selection would be reflected in lower mortality rates among annuitants than among those in the general population.

There is a substantial literature on the presence of adverse selection in a range of insurance markets. Cutler (2001) provides a summary of the experience in health insurance markets, and Chiappori and Salanie (2000) describe evidence on adverse selection in other insurance markets. With respect to health insurance, when individuals have choices across a range of insurance plans, there is a tendency for the least healthy individuals to opt for the most generous insurance coverage. This can lead to insurance company losses on generous policies when these policies are priced assuming that the buyers will face expenditure risks similar to those in the population at large. In some cases, a dynamic adverse selection effect can lead to the disappearance of some insurance markets.

Both the voluntary and the compulsory annuity markets in the UK display adverse selection of annuitants relative to the population at large. This can be illustrated by comparing the mortality rates of annuitants with the population mortality rates in the UK. Table 1 shows the projected future mortality rates for UK men who were 65 years of age in 1998. The table shows three sets of mortality rates. The first assumes that the 65-year-old faces the average mortality rates for the population as a whole. The second shows mortality rates corresponding to individuals who purchase voluntary annuities, while the third shows a proxy for the mortality rates of those who buy annuities in the compulsory market. Finkelstein and Poterba (2001) provide a detailed description of the construction of these mortality tables, which are based on data from the Institute of Actuaries and the Faculty of Actuaries, Continuous Mortality Investigation Committee (1999a and 1999b).

The entries in Table 1 show that mortality rates are higher for those in the population at large than for those who buy annuities in the compulsory market. The mortality rates for ‘compulsory annuitants’ are, in turn, higher than the mortality rates for voluntary annuitants. The differences in the mortality rates are striking. A randomly chosen 65-year-old man in the UK population has a 2.12 per cent probability of dying during the year when he is 65. A randomly chosen compulsory annuitant has a 1.53 per cent chance of dying, which is less than three-quarters of the probability for someone in the population at large. A randomly chosen voluntary annuitant has only a 0.89 per cent probability of dying, less than half of that for someone in the population at large.

The differences between the mortality rates for the two groups of annuitants and the population at large are evident at all ages. They become somewhat smaller, in proportionate terms, at older ages, as the level of the mortality rate rises for all groups. There is even a crossover of mortality rates for voluntary and compulsory annuitants at ages greater than 95, but the samples used to estimate
TABLE 1
Projected Mortality Rates, Using Population and Annuitant Mortality Tables, for a Man who is 65 Years Old in 1998

<table>
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<tr>
<th>Age</th>
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Note: Each entry shows the probability of dying within a year.
Source: Government Actuary’s Department and Institute of Actuaries Continuous Mortality Improvement Bureau. See text for further description.
mortality rates at these ages are very small. Discussions with actuaries also suggest that the degree of adverse selection is most pronounced in the first few years after annuitants purchase their annuities. The mortality difference between annuitants who purchased annuities 10 years ago and individuals in the population is less pronounced than that between annuitants who purchased annuities one year ago and those in the population.

An unresolved issue with respect to adverse selection in markets such as that for annuities is the degree to which this selection is the result of private information about risk factors on the part of individuals. While private information could lead to the mortality patterns that we observe in Table 1, these patterns could also arise if there were a correlation between the attributes of annuity buyers and underlying mortality risk, even if the annuitants were unaware of this correlation. Finkelstein and Poterba (2000) discuss this ‘active’ versus ‘passive’ selection distinction in further detail. Annuitants tend to have higher net worth and to have higher incomes than randomly selected individuals in the population. Since individuals with these attributes live longer than other individuals, as Attanasio and Hoynes (2000) and Attanasio and Emmerson (2001) suggest, passive selection may be operating in the annuity market.

V. EMPIRICAL EVIDENCE ON THE ‘MONEY’S-WORTH’ OF ANNUITY PRODUCTS

Evaluating the importance of adverse selection in annuity markets requires more than a simple demonstration that mortality rates are lower for annuitants than for non-annuitants. It requires a quantitative measure of how adverse selection affects the price of annuity contracts. Fortunately, a substantial recent literature has developed just such a measure of annuity pricing: the ‘money’s-worth ratio’. This is defined as the ratio of the expected present discounted value of the (uncertain) future payment stream associated with an annuity product to the product’s purchase price. Several studies that compute money’s-worth ratios for various annuity products can be found in Brown et al. (2001). It is also possible to evaluate adverse selection by computing the rate of return that annuitants earn on their annuity investments and comparing that with the rate of return available elsewhere. Murthi, Orszag and Orszag (2000) adopt this approach to analysing the compulsory annuity market in the UK.

The expected present discounted value of a nominal annuity with an annual payout \( A_n \), purchased by an individual of age \( b \) years, assuming that the individual will not live past age 115, is

\[
V_b(A_n) = \sum_{j=1}^{115-b} \frac{A_j P_j}{\prod_{k=1}^{j}(1+i_k)}
\]
where $P_j$ denotes the probability that an individual of age $b$ years at the time of the annuity purchase survives for at least $j$ years after buying the annuity, while $i_k$ denotes the one-year nominal interest rate $k$ years after the annuity purchase. This expression focuses on the pre-tax value of annuity payouts and applies a pre-tax interest rate for discounting, which follows much of the prior literature on this subject. For an escalating annuity, $A_n$ in equation (1) is not a constant but rather corresponds to a rising stream of nominal annuity payouts. The parallel expression for the value of a real annuity — an annuity with an inflation-indexed payout stream — is

$$V_h(A_r) = \sum_{j=1}^{15-b} \frac{A_r P_j}{\prod_{k=1}^j (1 + r_k)},$$

where $A_r$ denotes the real annual payout and $r_k$ denotes the annual real interest rate $k$ years after the annuity purchase.

The money’s-worth ratio is computed by dividing the value that results from evaluating equation (1) or equation (2) by the purchase price of an annuity, say £100,000. This ratio offers a scale-free metric for comparing annuities over time or across countries. Computing the money’s-worth ratio requires information on mortality rates, such as that shown in Table 1, as well as on the payouts offered by annuity contracts and on the discount rates that potential annuity buyers might apply to those payouts. The money’s-worth ratio can be computed using either the population or annuitant mortality table, and the ratio will often differ substantially in the two cases. The money’s-worth ratio will be higher if the mortality rates used to evaluate it are lower, and vice versa.

Table 2 presents information on the money’s-worth ratios for fixed nominal annuities that were available to 65-year-old men and women in the UK at the end of May 2000.

<table>
<thead>
<tr>
<th>Mortality table</th>
<th>Population</th>
<th>Voluntary annuitants</th>
<th>Compulsory annuitants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong> Voluntary market</td>
<td>0.844</td>
<td>0.974</td>
<td>0.910</td>
</tr>
<tr>
<td>Compulsory market</td>
<td>0.908</td>
<td>1.040</td>
<td>0.971</td>
</tr>
<tr>
<td><strong>Women</strong> Voluntary market</td>
<td>0.857</td>
<td>0.949</td>
<td>0.901</td>
</tr>
<tr>
<td>Compulsory market</td>
<td>0.929</td>
<td>1.028</td>
<td>0.975</td>
</tr>
</tbody>
</table>

Note: Annuities are nominal level-payment annuities.

Source: Author’s calculations using data provided by Moneyfacts, a UK annuity broker. Mortality rates are from the Government Actuary’s Department and the Institute of Actuaries and Faculty of Actuaries, Continuous Mortality Investigation Committee (1999a and 1999b).
of May 2000. Finkelstein and Poterba (2001) present similar tabulations for an
earlier time period. Moneyfacts, a leading UK annuity broker, provided the
annuity prices for the voluntary and compulsory markets. Thirteen insurance
companies in the Moneyfacts database offered annuities that were broadly
available, i.e. were not restricted to particular types of workers or those with a
specified minimum investment. For an initial premium of £10,000, the average
annual payout on a level-payment annuity in the compulsory market was £875.
The analogous average for the voluntary annuity market was £820. Average
payouts for escalating annuities (£541 and £503) and inflation-protected
annuities (£630 and £628) were substantially lower than those for fixed nominal
annuities.

Table 2 shows money’s-worth ratios evaluated using the population,
voluntary annuitant and compulsory annuitant mortality tables. It presents
information on both the voluntary and the compulsory annuity markets. The
money’s-worth ratios are evaluated using data on the term structure of nominal
interest rates drawn from the UK gilt market. The results highlight the important
difference between the valuation of an annuity from the perspective of a
potential buyer and the valuation from the standpoint of an insurance company
that sells the annuity product. Consider a randomly selected 65-year-old woman
in the population who is contemplating the purchase of an annuity in the
voluntary market. (Conclusions similar to the ones we draw for the voluntary
market would emerge if we focused on the compulsory market instead.) From
this woman’s perspective, the natural way to compute the money’s-worth ratio is
to use the population mortality table, so it appears that the expected present
discounted value of annuity payouts is 85.7 per cent of the annuity’s premium
cost.

From the standpoint of an insurance company offering the voluntary annuity,
however, the expected present discounted value of payouts is much greater than
the money’s-worth from this woman’s perspective. That is because the woman is
not representative of the individuals who purchase annuities in the voluntary
market. On average, these buyers have mortality rates that are described by the
voluntary annuitant mortality table. From the insurer’s perspective, therefore, the
expected present discounted value of payouts is 94.9 per cent of the premium
cost. This is also the expected value of payouts, as a fraction of the premium, for
the typical buyer of a voluntary annuity.

This dichotomy between the ‘producer’s perspective’ and the ‘consumer’s
perspective’ is potentially important for evaluating how the private annuity
market might respond to substantial changes in the nature of retirement saving
arrangements. If the ‘producer’s perspective’ describes the relationship between
expected payouts and premium costs that insurers need in order to cover their
costs, then it may offer useful insight on the relationship between expected
payouts and premiums that might emerge in an expanded private annuity market.
Such a market might arise with a universal, or expanded, system of individual retirement saving accounts.

The money’s-worth values in Table 2 can be used to estimate the component of the deviation between observed money’s-worth and an ‘actuarially fair’ money’s-worth ratio of unity that is attributable to adverse selection in the set of individuals who purchase annuity policies. Consider the money’s-worth ratios for a 65-year-old man buying an annuity in the voluntary market. Using the population mortality table, the money’s-worth ratio for a fixed nominal annuity is 0.844. Valuing the same annuity using the voluntary annuitant mortality table yields a money’s-worth ratio of 0.974. The difference between the money’s-worth value for an actuarially fair annuity (1) and the value using the population mortality table is 0.156. Of this difference, however, 0.130 is due to the difference between the voluntary annuitant and the population mortality tables. This suggests that 83 per cent of the disparity between the annuity valuation using the population mortality table and the idealised ‘actuarially fair annuity’ is due to adverse selection.

It is not clear that the idealised annuity with a money’s-worth ratio of unity is a useful benchmark for these comparisons. Insurers need to cover their costs and provide for a profit margin in pricing their annuities. These factors would tend to reduce annuity payouts relative to the actuarially fair benchmark. The extent of this reduction may be a function of the size of the annuity market, the regulatory environment and a host of other factors.

The entries in Table 2 make it possible to compare the voluntary and the compulsory annuity markets with respect to money’s-worth values. The money’s-worth values computed using a given mortality table are systematically higher in the compulsory market than in the voluntary market. For example, using the population mortality table, the money’s-worth ratio of a voluntary annuity for a man is 0.844, while that of a compulsory annuity is 0.908. Similar patterns emerge with respect to annuities available to women. These results suggest that the degree of adverse selection is greater in the voluntary annuity market than in the compulsory annuity market. The difference between the valuation of a compulsory annuity using the population mortality table and that using a plausible proxy for the compulsory annuitant mortality table is smaller than the difference between the valuation of voluntary annuities using the population and the voluntary annuitant tables.

Table 3 presents information on the money’s-worth ratios associated with different types of annuity products. The first column focuses on level-payment nominal annuities, the same annuity products that were considered in Table 2. The next column focuses on index-linked annuities, which provide inflation insurance to their purchasers. The final column considers annuities that offer payouts that rise at 5 per cent each year. The table shows that there are differences in the money’s-worth values for these different annuity products and
that the patterns are similar in the annuity markets for men and for women. The money’s-worth ratio is highest on the nominal level-payout annuities. The money’s-worth ratios for the real and escalating annuities are roughly 4 percentage points lower in the voluntary annuity markets for both men and women. In the compulsory annuity market (the much larger market), the money’s-worth value for the index-linked annuity is approximately 9 percentage points lower than that for the nominal annuity. The escalating annuity is between the nominal and inflation-indexed annuity in this case.

One explanation of the differences in the money’s-worth values for different annuity products is adverse selection across product types. Finkelstein and Poterba (2000) argue that, because the payouts on an inflation-indexed annuity or an escalating annuity are backloaded relative to the payouts on a fixed nominal annuity, annuitants who expect to be long-lived should be attracted to these products rather than to fixed nominal annuities. This results in selection across annuity products based on the perceived mortality risk of potential annuitants.

The money’s-worth calculations in Tables 2 and 3 focus on the current UK annuity market. To provide some perspective on these results, it is useful to compare them with findings on annuity money’s-worths for other time periods in the UK. It is also useful to make comparisons with other nations.

There is no continuous time series on money’s-worth values for the UK, but Murthi, Orszag and Orszag (1999a and 1999b) present evidence on the money’s-worth ratio for nominal annuities in the compulsory annuity market for several years in the 1990s. While their algorithm for computing money’s-worth values is not exactly the same as that used in Tables 2 and 3, it is very similar. In 1990, they estimate that the money’s-worth value for the average annuity in the compulsory market was 0.996. By 1994, they report that this value had declined to 0.921, and they report a value of 0.905 in 1999. This evidence, along with related evidence spanning a longer time period in the US annuity market...
reported in Warshawsky (1988) and Brown, Mitchell and Poterba (2000), suggests that there are non-trivial changes over time in the money’s-worth ratio.

The decade-long decline in the money’s-worth of compulsory annuities in the UK has coincided with a decline in the ratio of the typical monthly payout, as a fraction of the premium, on new annuities. This decline is at least partly a result of declining nominal interest rates over the same period. The decline in nominal payouts has nonetheless led to concern about the operation of annuity markets and fuelled some calls for changing the current requirements for annuitisation of defined contribution balances. Orszag (2000) notes that the falling ratio of payouts to premiums has led to a perception that annuities are poor value for money and that this is an important driver of proposals to reform the current compulsory annuitisation structure.

While most studies of the pricing of annuities have relied on data from either the USA or the UK, there is also a small literature that provides insights on the annuity market in other nations. Table 4 summarises some calculations from the James and Vittas (1999) study of annuity markets around the world. These international comparisons should be viewed with some caution. The institutional structure of annuity markets may differ across nations, and these differences may affect the estimated money’s-worth values. There is also very little evidence on mortality rates for countries other than the USA and the UK, so it is sometimes necessary to use the mortality data from one or the other of these nations to evaluate the money’s-worth of annuity products in other nations. Bearing these cautions in mind, Table 4 offers some guidance on the differences across markets in annuity money’s-worth. It shows money’s-worth values for voluntary annuities of at least 0.950 in all of the countries under consideration.

The results in Table 4 confirm the findings in Tables 2 and 3 and in other studies of the US and UK annuity markets. They suggest that the money’s-worth ratio from the standpoint of insurance companies — i.e. valuing the present discounted value of annuity payouts using the mortality rates of typical annuity buyers — is relatively close to one. This suggests that the reason we sometimes observe low money’s-worth values when annuities are valued using the population mortality table is adverse selection, rather than high profits or administrative charges on the part of insurance companies.

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>0.986</td>
<td>0.970</td>
</tr>
<tr>
<td>Canada</td>
<td>1.014</td>
<td>1.015</td>
</tr>
<tr>
<td>UK</td>
<td>0.966</td>
<td>0.957</td>
</tr>
<tr>
<td>USA</td>
<td>0.970</td>
<td>0.950</td>
</tr>
</tbody>
</table>

Source: James and Vittas, 1999.
This conclusion is important for discussions of how annuity markets might operate if a larger fraction of the population participated in defined contribution retirement plans, either in the private sector or through an individual accounts Social Security system. Expanding the pool of individuals who purchase annuities would probably reduce the disparity between the mortality rates of annuitants and those of the broad population, thereby reducing the observed degree of adverse selection. This, in turn, would presumably increase the money’s-worth ratio when annuities are evaluated using the population mortality table.

One factor that is likely to bear on the pricing of individual annuities is the risk of changes in aggregate mortality rates. If insurers perceive that there is substantial risk of a sharp drop in future mortality rates, they are likely to charge higher prices (offer lower payouts) on annuity contracts. Wadsworth, Findlater and Boardman (2001) offer a strategy for reducing or eliminating this component of annuity costs by allowing all of the annuitants in a given cohort to bear their cohort mortality risk, while insuring their individual differences from the cohort pattern.

VI. TRADE-OFFS IN VOLUNTARY VS. COMPULSORY ANNUITISATION

The presence of adverse selection in the voluntary individual annuity market, and to a smaller degree in the compulsory market, highlights the key trade-off between individual choice and adverse selection in insurance markets. When individuals can decide whether to annuitise, how much to annuitise and what type of annuity to purchase, as they currently can in the UK voluntary annuity market, there is substantial opportunity for adverse selection. From the standpoint of a random individual in the population, the resulting money’s-worth ratio will be lower than that when participation in the annuity market is compulsory.

Compulsory annuitisation could take a variety of forms. As in the present UK market, it could entail a requirement that individuals annuitise part or all of their accumulated retirement balance, with relatively little restriction on the type of annuity purchased. It could also involve more sweeping constraints, specifying the particular annuity product that individuals need to purchase. Blake (1999) discusses a range of options that involve regulation of annuity providers or restrictions on the available set of policies that annuitants can buy. The Retirement Income Working Party (2000) suggests an innovative policy change that would require individuals to purchase annuities that promised to provide a minimum acceptable level of retirement income but that did not restrict decumulation or investment decisions for the remaining funds in defined contribution accounts.
Whenever individuals have some discretion over the amount that they annuitise or the form in which they receive annuity payments, it is possible that the annuity market will be characterised by adverse selection. This is illustrated by the current patterns of annuity choice within the compulsory annuity market in the UK, where longer-lived individuals appear to choose annuity products that offer backloaded payout streams. Individuals with defined contribution plans can also choose how much of their accumulated defined contribution balance to annuitise and at what age to annuitise. A potential annuitant may delay the purchase of his or her annuity after retirement until age 75, provided that he or she draws an income from the pension fund that is between 35 and 100 per cent of the amount that would be obtained from a single life, nominal annuity. Potential annuitants who believe that they face higher-than-average mortality rates may choose to defer their annuitisation date for their pension balances. This implies that the set of persons who do purchase annuities at younger ages may be selected toward the longer-lived segment of the population.

Compelling all retired people to purchase the same annuity product, at the same age, would reduce the degree of adverse selection. It would also, however, entail costs. When individual preferences differ, a ‘one size fits all’ annuitisation requirement may inefficiently restrict consumer preferences and force some buyers to accept policies that they would not choose to purchase, even in the absence of adverse selection. For example, when consumers differ in their discount rates as well as their mortality prospects, some consumers may prefer annuity products that offer frontloaded rather than backloaded payout streams. If all retired people are required to purchase an annuity with a pre-specified payout structure, priced using the single mortality table, the resulting time profile of annuity payouts may be substantially different from the ideal policy from the standpoint of some potential annuitants.

Whether individuals can undo the effects of an annuity payout profile that differs from their preferred profile is an open issue. If the annuity payments are frontloaded and the potential annuitant would prefer a backloaded profile, then it should be possible to save a portion of the early payouts and to use them to finance consumption (if alive) at a later date. It may be very difficult to borrow against future annuity payouts if the potential annuitant would like a frontloaded payout stream and the required annuity offers only backloaded payments.

Restrictions on the time profile of annuity payouts are not the only potential difficulty associated with restrictions on annuity options. Orszag (2000) argues that individuals are also likely to differ in their risk tolerance and that some individuals are likely to demand annuities that offer returns that are at least partially linked to the performance of risky assets, such as corporate equities. While the present annuitisation requirements in the UK do not prohibit the purchase of ‘with profit’ annuities that allow some participation in the equity market, these annuities have historically accounted for a very small share of the market. Wadsworth, Findlater and Boardman (2001) suggest that the number of
Annuity Markets and Retirement Security

‘non-standard’ annuities is likely to grow, but they also imply that the potential demand for these products is greater than the current level of activity in this market.

Those who argue in favour of compulsory annuitisation sometimes point to adverse selection as a basis for this policy prescription, but there are also two other potential justifications for such a policy. One concerns the need for some type of annuitisation, while the other concerns the need to restrict the set of options available to potential annuitants. The argument for requiring some degree of annuitisation holds that, without such a requirement, at least some households would either spend their accumulated retirement wealth or invest their wealth in assets that have some chance of losing their value, and become impoverished in their old age. The likelihood of such behaviour is difficult to judge based on historical experience. McCarthy (2000) suggests that a recent policy change in Ireland, which removed the mandatory annuitisation requirement in that nation, may offer some leads.

The argument for limiting the set of annuity choices available to consumers concerns the difficulty of selecting an annuity product from the wealth of options available in the private market. McDonald (1999) raises this issue and points to the ‘bewildering’ array of annuity options that currently confront retired people in the UK. Annuities can be complicated financial products and, for some households, it may be difficult to evaluate the alternative annuity options. For example, it may be difficult for households to compare the relative merits of real and nominal annuities, since this requires some judgement about the degree of inflation risk over a long horizon.

Whether the fact that some consumers may lack the financial acumen to evaluate alternative annuity options provides a warrant for compulsory annuitisation, or for restricting the set of annuity products available to retired people, is unclear at best. Other household decisions with respect to asset accumulation, such as the choice of investment vehicle in employer-sponsored retirement saving plans, involve similarly complex choices. In the USA, a number of financial service providers have developed products that help consumers evaluate their investment options. In part out of concern about potential liability that may flow from uninformed choices by workers, firms have begun to offer various types of financial education to assist their employees in making decisions about retirement saving options. On average, the mix between corporate stocks and bonds in self-directed retirement plans in the USA appears to be similar to that in defined benefit pension plans that are managed by professional investors. As more households reach retirement with substantial defined contribution balances in self-directed retirement accounts, similar services may arise with respect to annuity options.

This discussion of trade-offs between compulsory annuitisation and alternative schemes under which individuals would decide how to draw down their retirement income does not offer a definitive answer to the question of how
to proceed. Such an evaluation requires measures of the degree of adverse selection in annuity markets with different degrees of compulsion, and of the likelihood that individuals would make poor judgements, with respect to either their wealth decumulation profile or their investment choices, in an unconstrained system. Research on these issues is just beginning. Doyle and Piggott (1999), for example, attempt to compare various annuity products in which annuitants bear different degrees of aggregate mortality risk and aggregate investment risk. Calculations of this type are needed to assess better the trade-offs outlined here.

VII. CONCLUSION

This paper describes the role of adverse selection in annuity markets and sketches some of the public policy implications of the existence of such selection effects. It shows that a substantial fraction of the difference between the expected value of the payouts on both voluntary and compulsory annuity products in the UK and the premium cost of those products is attributable to adverse selection. This is simply the fact that the individuals who currently choose to purchase annuities are, on average, longer-lived than randomly selected individuals in the UK population. Adverse selection is most pronounced in the voluntary annuity market, but there is also some evidence of selection in the compulsory market, where individuals can choose which type of annuity to purchase and how much of their defined contribution balance to annuitise.

Requiring all persons to annuitise their retirement account balances at a specified age is one way to reduce the degree of adverse selection in the annuity market substantially. More generally, however, any policy that encourages a large fraction of the population to participate in the annuity market is likely to have a similar effect. Doyle, Mitchell and Piggott (2001) compare the annuity markets in Australia and Singapore, and they find a greater degree of adverse selection in the former than in the latter. They attribute this difference to the relatively generous government old-age safety net in Australia, which reduces the fraction of households that find it attractive to purchase private annuities.

Whether government policy should compel participants in defined contribution retirement saving programmes to annuitise all or part of their accumulated balance, and whether there should be restrictions on the set of annuity policies that individuals can purchase, are important and controversial policy issues. There are key trade-offs associated with any policy choice. Compelling annuity purchase reduces the chance that some elderly households will outlive their resources and reduces the degree of adverse selection in the annuity market. Compulsion may also limit the choices available to retired people and force some of them to purchase annuity products that are substantially different from the products they would choose in an unconstrained market. Developing models that can evaluate the welfare costs of adverse
selection and of limiting consumer choice in a world with heterogeneous consumer preferences should be a central goal for future work.

Part of this research agenda will involve improved estimates of the factors that underpin consumer demand for annuities. Choices within the annuity market, as well as the choice of whether or not to annuitise when the annuitisation decision is voluntary, require attention. The overwhelming majority of annuity buyers in the UK purchase simple nominal annuities, rather than annuity products that offer some degree of inflation protection. Inflation-protected annuities appear to be priced less favourably than nominal annuities, which may explain this pattern. In the USA, even though inflation-indexed bonds have existed for several years and at least one insurance company offers an inflation-indexed annuity, Brown, Mitchell and Poterba (2000) report that there has been virtually no consumer interest in this product. Why consumers evidence little interest in annuity products that could protect them from longevity risk as well as inflation risk is not clear.

Another element of the research agenda should involve analysis of the time-series variation in annuity prices. One objection that is sometimes levelled at compulsory annuitisation systems is that they require potential annuitants to annuitise their wealth at a single point in time, even though there is substantial variation over time in annuity prices. Understanding the source of this price variation would be extremely helpful for evaluating the potential costs that annuitants bear when they lose the option to diversify their annuitisation decisions over time.

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