Securing Lifelong Retirement Income: Global Annuity Markets and Policy

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Chapter 10

Compulsory and Voluntary Annuity Markets in the United Kingdom

Edmund Cannon and Ian Tonks

This chapter discusses the UK annuity market, which is the largest in the world. The reason for its size is mainly because anyone who has saved in a tax-privileged private pension in the United Kingdom must annuitize 75 percent of their pension wealth, which they do by buying a Compulsory Purchase Annuity. It is also possible to buy an annuity voluntarily, referred to as a Purchased Life Annuity. Mortality experiences are different in the two markets and the price of annuities is consequently different too. We report and discuss voluntary annuity rates over the period 1957–2009 and compulsory annuity rates for 1994–2009. Annuity rates have fallen in both markets since 1994 and we assess whether this decline is larger than could be justified by changes in longevity and bond yields. Our analysis centers on calculations of the money's worth ratio (MWR) which is the conventional measure to determine whether annuities are fairly priced. The money's worth measure suggests that falls in annuity rates can only be explained by lower interest rates and increased life expectancy up to about 2004.

In the remainder of the chapter, we start with a description of the institutional framework of the annuity market and the determinants of supply and demand. We then report time series of average annuity rates. We use these to calculate the money's worth and conclude by discussing possible reasons for the fall in the money's worth after 2004.

The structure of UK annuity markets

Pension provision and demand for annuities

Where annuities are purchased voluntarily, the annuity market tends to be small (Brown et al. 2001). Figure 10.1 illustrates that in this respect, the United Kingdom is similar to other countries: the voluntary annuity market is small, with total premiums in 2006 of only £40 million. There are a variety

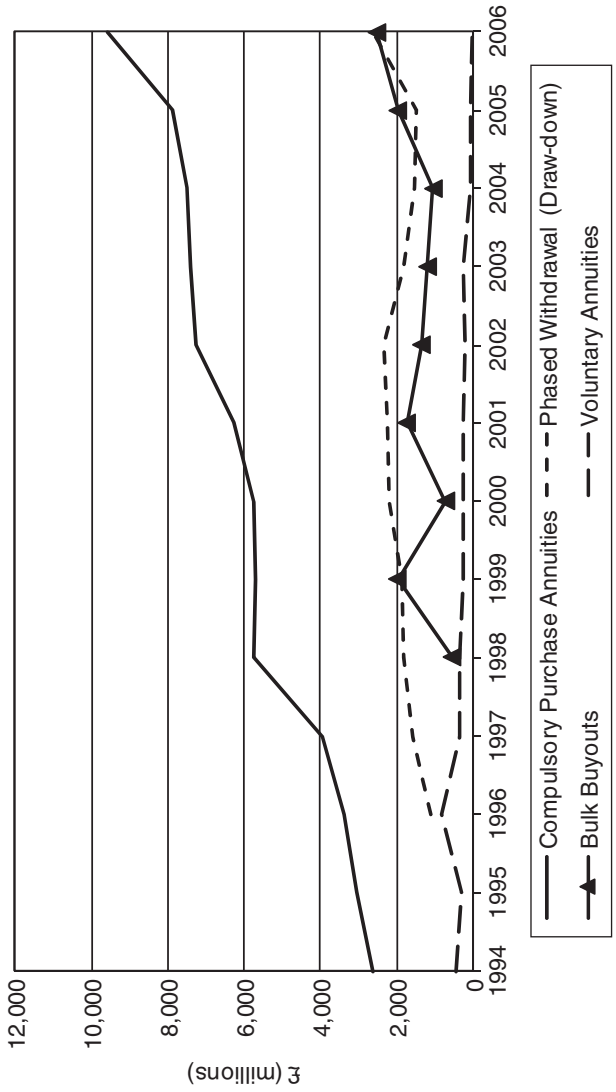

Figure 10.1 Growth in annuity sales 1994–2006. *Source:* Association of British Insurers (2010).

of reasons why annuity demand is low which we consider in detail in Cannon and Tonks (2008). But it is worth noting that most elderly people in the United Kingdom already have an annuity in the form of a state pension and this makes up a high proportion of their wealth (Pensions Commission 2004: 182).

What makes the UK annuity market so large is the compulsory market where total premiums amounted to £9.58 billion in 2006 (see Figure 10.1). Compulsory-purchase annuities are those purchased by individuals who have saved in a personal pension fund which has received tax privileges: contributions into the scheme are made before income tax is deducted from income and all investment returns are also tax free. Typically, the pension fund is managed by a life insurance company: the value of the fund at retirement is then used by the pensioner to buy an annuity, either from the life insurer with whom they accumulated the fund or from another life insurer (the 'open market option').

Pemberton (2006) documents the frequent changes to rules governing pensions since the original introduction of individual accounts in 1956 (when they were called 'retirement annuity contracts'). The result was a complicated set of regulations which even professional pension advisors found difficult to understand: it was quite possible for an individual to have a variety of pension funds all with different requirements on how they be annuitized at retirement. The 2004 Finance Act cut through this Gordian knot by allowing all pension wealth[1] to be amalgamated into one fund of which 75 percent had to be used to purchase an authorized annuity: the legislation became effective from 'A-day' on April 6, 2006. There is a cap on the total amount that can be paid into the fund (£1.5 million on A-day, rising annually thereafter) and also limits on how much can be paid into the fund in any given year. These constraints are sufficiently generous that they affect only a very small proportion of the population.

The compulsory purchase rule still leaves considerable flexibility to the annuitant, in three ways. First, the definition of an annuity includes products where some of the wealth is not in annuity form. A 'guaranteed' annuity is one where the first few years' payments are paid regardless of whether or not the annuitant is alive (if the annuitant dies, then the payments are made to the heirs). Annuities with guarantees of up to ten years are permitted, although five years is more common. A similar idea is the 'value-protected' annuity which pays a given sum to the estate on the death of the annuitant. Neither of these products is a pure annuity.

Second, it is not necessary to annuitize until age 75: up to that age, one can access pension wealth through phased withdrawal (referred to as 'drawdown' or 'unsecured' income).[2] The maximum amount of pension wealth that can be taken as income through drawdown is 120 percent of the best single-life annuity payment for the relevant age and sex. Figure

10.1 shows that drawdown is large relative to annuity purchase. Even at age 75, it is possible to avoid annuitization through a process known as 'alternatively secured income', originally designed to meet the objections of a small Christian sect to pooling mortality risk. It quickly became clear that some rich individuals were using this as a means to avoid paying tax and the regulations were changed in 2007, so that it became compulsory to take an income of between 65 and 90 percent of the best annuity rate aged 75, and any remaining assets in the pension fund are taxed at a penal rate on the death of the annuitant.[3] Finally, there is a bulk annuity market where an annuity provider acquires a package of individual pension liabilities, typically from the closure of a defined-benefit occupational scheme.

The main determinant of purchases of annuities in the compulsory market is the number of individuals reaching retirement age and their pension wealth. Given the information available on individual personal pensions, the Pensions Commission (2005) made predictions about demand for annuities up to 2012, illustrated in Table 10.1. The demand for bulk annuities is very difficult to predict since it will be determined almost entirely by the ongoing choices of firms to close their defined-benefit schemes. The collapse of the stock market in 2007 has almost certainly made it harder to predict the bulk market: firms would probably be even keener to shed their pension liabilities but, since their pension obligations are in deficit, the transfer to the bulk market is a costly option.

Following the recommendations of the Pensions Commission (2006), the 2008 Pensions Act introduced a new workplace pension scheme to become effective in 2012. This makes it compulsory for all employers to offer a defined-contribution pension scheme with a minimum pension saving for most workers of 8 percent of income, of which a minimum of 3 percent must come from the employer (the rest from the employee and tax relief). The Pensions Commission (2005) suggested that, were such a

Table 10.1 Scenarios for the size of the annuity market (estimated annual flows, £ billion)

Annuity type	2002	2012 (projected)		
		Low	Medium	High
Individual annuities	7.2	16.6	18.1	19.7
Drawdown	2.3	5.3	5.8	6.3
Bulk buyout	1.4	1.5	35.4	128.1

Source: Pension Commission (2005).

scheme to target successfully the population without provision, then there would be an increase in the annual demand for annuities of £13 billion by the year 2040 at current earnings levels (this demand would represent an additional increase on the numbers in Table 10.1). However, the saving rate of 8 percent is relatively low by existing standards: if this saving rate were to become a focal point for all pension saving, then the result could be lower saving by existing savers.

Supply of annuities and regulation

Annuities in the United Kingdom are typically sold by life insurance companies. Some of these companies are also involved in other forms of insurance and some are owned by other financial institutions such as banks. A series of scandals in the nineteenth century resulted in life insurers being regulated from 1870 onward: the current regulatory body is the Financial Services Authority (the FSA). Every year, life insurers are required to produce 'FSA Returns' which summarize their balance sheet. Standard and Poor's compiles these returns for commercial use in the *SynThesys* database, and most companies make their own returns available for free on the Internet.

The total number of life insurance companies has fallen since the Second World War due to mergers and acquisitions (Cannon and Tonks 2004*b*), and many of these companies no longer actively market these products. Important sources of annuity rates enabling comparison of different companies' prices are the FSA website and the private provider *Money Facts*. These sources suggest that only about ten companies are actively marketing annuity products in the compulsory market. Further confirmation that the industry is heavily concentrated is provided by Figure 10.2.

Typically, annuity prices depend on age and gender, but from 2007 some life insurers also started to price annuities based on the annuitant's address (postcode) since this is a good predictor of life expectancy, and the variations by location are large (up to ten years). Four of the largest companies now price annuities on this basis.

It is also possible to buy 'enhanced' annuities or annuities on 'impaired lives'. These offer better rates to smokers or to individuals with health problems such as diabetes. Since the annuity rate offered depends upon the circumstances of the individual, these are often sold through specialist brokers. These annuities form an increasingly large part of the market. A consequence of this is that the remaining annuities sold are increasingly only sold to relatively healthy individuals.

From Form 49 of the FSA returns, we are able to see how annuity providers manage their annuity liabilities, illustrated in Figure 10.3. The

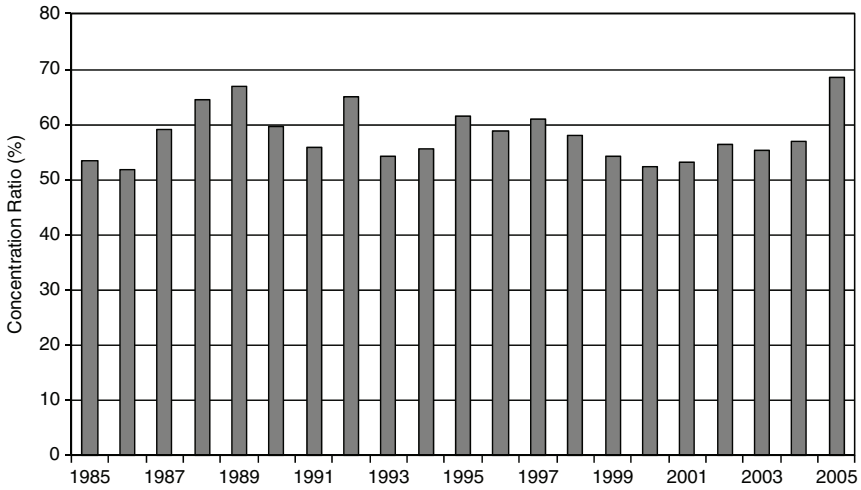

Figure 10.2 Six-firm concentration ratio in the compulsory purchase market. *Source*: Authors' calculations based on data provided by Standard and Poor's (2005).

most important asset class is long-dated government bonds. This makes sense since it is a good hedge; when the yield curve slopes up (as it usually does), then providers can take advantage of the higher yields on longer dated debt. Other important asset classes are commercial bonds and commercial mortgages. When valuing these assets, companies are required to make explicit risk adjustments in the FSA returns, and it is clear that the UK regulator effectively prevents life insurers from investing in risky assets. Figure 10.3 shows that the mixture of government and corporate bonds has shifted over time. In 1985, life insurance companies held five times as many government bonds as corporate bonds; by 2005, this ratio was almost 1, though over most of the sample, 1989–2004, the percentage of debt instruments that were government bonds was between 60 and 70 percent.

Life insurers predict life expectancy using mortality tables produced by the Central Mortality Investigation Bureau (CMI). This collects data from life insurers, anonymizes it, and then produces periodical reports as well as other research papers, published either on the website of the Institute of Actuaries or the *British Actuarial Journal*. Each individual life insurer makes adjustments to the CMI projections to take account of the different consumers of each company and they report the details in the FSA Returns. Aggregate mortality risk is borne predominantly by the life insurers themselves, although a small amount is reinsured.

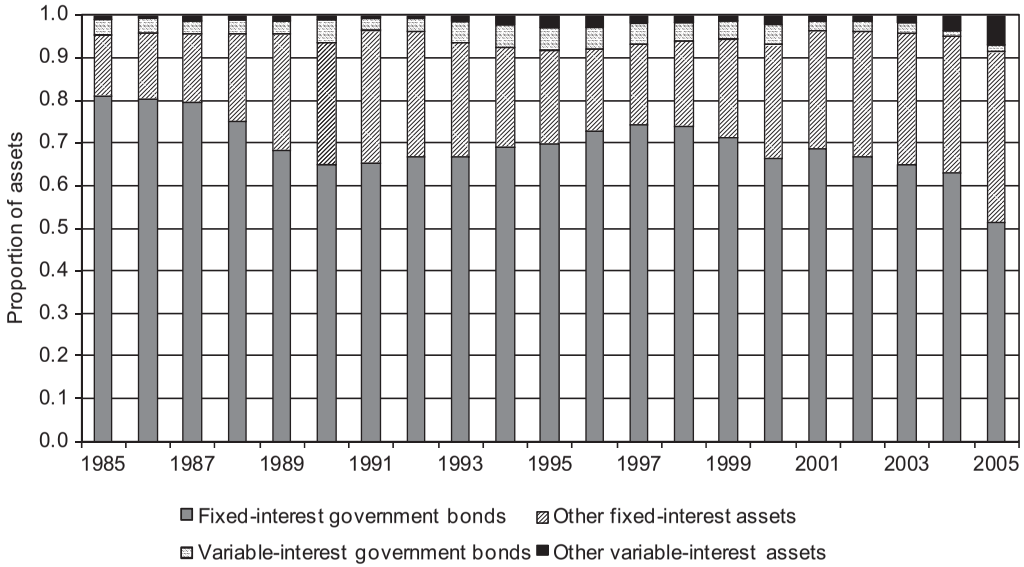

Figure 10.3 Composition of life insurers' assets. *Source*: Authors' calculations based on data provided by Standard and Poor's (2005).

Data on UK annuity rates

Compulsory purchase life annuities

Although legislation for individual pension accounts was passed in 1956, the market for compulsory annuities was small for a long time because it took time for pension funds to accumulate sufficiently to create much demand. The earliest data we can find on annuity rates in this market are those provided by *Money Facts* from 1994 onward. Between twenty and twenty-five companies were quoting at the beginning of the period: by the end, this had reduced to nine. The FSA's price comparison website in January 2010 reported annuity rates for only six companies (with a seventh company providing annuities only for construction workers) with an additional three companies refraining from providing any indicative annuity rate since they price annuities entirely on the postcode of the annuitant. Figure 10.4 illustrates the evolution of the simple average annuity rate for nominal and real annuities.

From the FSA Returns, we know that sixty-two companies were selling compulsory annuities in 2005. But the five-firm concentration ratio is 72 percent and the largest firm, the Prudential, supplies over 23 percent of new business. The annuity rates in the *Money Facts* database represent all of the major providers.

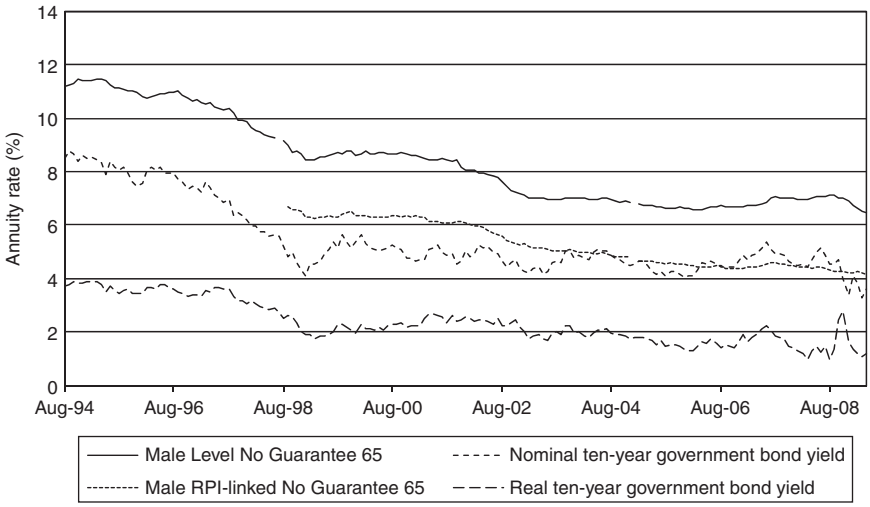

Figure 10.4 Annuity rates in the compulsory market (65-year-old male). *Source*: Authors' calculations based on annuity data from Moneyfacts Group (2010) and interest rates from Bank of England (2010); see text.

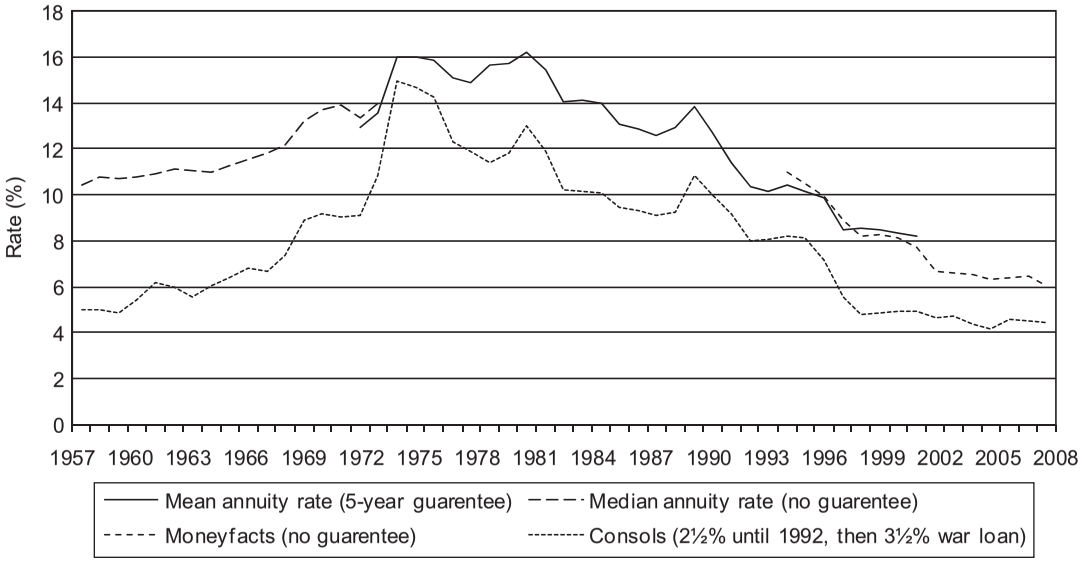

Figure 10.5 Annuity rates in the voluntary market (65-year-old male). *Source*: Cannon and Tonks (2004*b*) and authors' calculations based on annuity data from Moneyfacts Group (2010) and interest rates from Bank of England (2010); see text.

Figure 10.4 also provides a comparison of annuity rates in the compulsory market with long-term interest rates. It compares the nominal annuity rate for 65-year-old males with the UK government ten-year bond yield. It can be seen that the two series clearly move very closely together, although the annuity rate is slightly smoother. The figure also plots the inflation-adjusted annuity rate in the real annuity market and the corresponding real government bond yield.

Voluntary annuities

Although the voluntary (purchase life) market is small, it is interesting because it has existed in the United Kingdom for a long time, allowing us to see the long-run effect of mortality improvement on annuity rates. For Cannon and Tonks (2004*b*), we collected data for 1957–2002 from a variety of sources: here we update the series to 2009 using data purchased from *Money Facts*. During the 1950s and 1960s, it was common for about seventy companies to be quoting in the voluntary market, but in 2009 this had reduced to four, since many of the remaining life insurers do not appear to quote in the voluntary market. In Figure 10.5, we plot the time series for the simple average of all annuity rates of 65-year-old males together with the interest rate payable on consols (government perpetuities). It can be seen that long-term interest rates are very similar at the end of the period to the beginning, but annuity rates are much lower: this narrowing of the gap is due to increased life expectancy.

Measuring annuities using the money's worth ratio

Definition of the money's worth ratio

A conventional measure of the value of an annuity is the money's worth, which is the ratio of the expected present value of the flow of payments made by an annuity to the premium paid for it.[4] More formally, define the annuity rate A_t as the annuity payment received by an individual made per year per £1 purchase price in year t. For a level annuity with no guarantee period, this can be calculated using:

$$\text{Money's worth} \equiv A_t \sum_{i=1}^{i=T} \pi_{t,t+i}(1 + R_{t,i})^{-i} \tag{1}$$

where $\pi_{t,t+i}$ is the probability of someone living i more periods, believed in period t. Notice that the survival probabilities depend upon the age, gender, and type (compulsory or voluntary) of annuitant. T is chosen so

that $\pi_{t,t+T} \approx 0$ and $R_{t,i}$ is the appropriate discount rate in period t for payments received in period $t + i$, expressed at an annual rate: typically, this is the rate on government bonds.[5]

To calculate the money's worth in year t, it is necessary to know the yield curve for that year (sometimes this must be estimated) and the most up-to-date actuarial table for the relevant annuitant type that was available in that year. Using such data, the money's worth also is based on the information available when the annuity was sold and is not affected by the benefit of hindsight. All of our calculations use the best historical data that we can find and are thus true *ex ante* estimates of the value of an annuity.

The mortality tables used by actuaries are projections of future survival (or death) probabilities. It has not proved practicable to produce projections based on causal models of death, and most projections consist of extrapolations in trends in existing data.[6]

The last ten years have seen large theoretical advances in projection methods based on time series econometrics and finance theory (for a survey, see Pitacco et al. 2009). In our analysis, however, we use the projections in the actuarial tables published by the UK Institute of Actuaries. Our justification for this is that there is still considerable debate about the newer methods and they are unlikely to have been taken up by practitioners immediately after publication in academic journals. In addition, the notes to the FSA returns say explicitly that liabilities were valued using the official actuarial tables.

Even using the official actuarial tables leaves two important problems to be confronted. First, it is necessary to choose the correct mortality data for projection. For the voluntary market, this is not problematic because there is only one table available. For the compulsory purchase market, there are several potential mortality tables, which we discuss. Second, although life expectancy has steadily increased with each birth cohort, there is some evidence of a structural break in the trend of life expectancy (Willets 1999). This 'cohort effect' occurs for cohorts born in around 1930, suggesting that simple extrapolation of life expectancy would be unreliable for individuals retiring aged 65 from about 1995 onward. For most of the period we are analyzing, data did not (and could not) exist for the mortality experience of individuals born after 1930 when they were older than 65: the cohort effect had been observed in the mortality of individuals aged less than 65 who had purchased life insurance. This meant that there was considerable uncertainty about how to model the cohort effect. In our calculations, we use the 'long cohort' projection, which is the least optimistic about increases in life expectancy and thus gives the highest money's worth figures.

With 'actuarially fair' pricing, the money's worth would be exactly equal to unity. However, this ignores the fact that annuity providers have addi-

tional costs: administrative and marketing costs; costs of managing the assets; the need to reserve against investment; and mortality risk. Quantifying these costs is difficult since the information needed is commercially sensitive.

Money's worth ratios for compulsory annuities

We now turn to MWRs of pension annuities in the larger compulsory purchase market. The biggest problem in this analysis is the absence of a long time series of mortality data for personal pensioners. The Institute of Actuaries' data on personal pensioners is small until about 1995, because most personal pensions were in accrual up until that point. This is because personal pensions in a form similar to what we have today were only introduced in 1987, when the term 'personal pension' was originally coined. Before 1987, pensions for individuals, originally called 'retirement annuity contracts', were primarily designed for the self-employed (who would not have had access to an occupational pension) and employees would either have an occupational pension or be members of the State Earnings-Related Pension scheme (currently called the State Second Pension or S2P).

This means that we have to choose between three mortality tables when calculating the money's worth of compulsory purchase annuities:

1. Data on personal pensioners, from tables PPM and PPF for males and females, respectively. But the dataset is too small for reliable projection, since there were as few as 50,000 male annuitants of all ages as recently as 1991–4 (CMI 2004).
2. Data from individuals who had retirement annuity contracts and have now retired, tables RMV and RFV. The dataset is large enough for reliable projection (more than 600,000 male annuitants in payment), but these individuals appear to have different life expectancies from other personal pensioners buying in the compulsory market.
3. Data for members of pensions which are administered by life insurance companies, called the 'life office pensioners', tables PML and PFL. Where a firm wants to have an occupational pension but is too small to administer this itself it runs the scheme through a life insurance company. Although members of such occupational pension schemes may top up their pensions with defined contribution 'additional voluntary contributions' and form a small part of the compulsory annuity market as a result, these members of defined benefit schemes are likely to have different characteristics to those people who are buying a pension annuity (Cocco and Lopes 2004; Brander and Finucane 2007).

Given the problems with interpreting RAC and PP life expectancy, Finkelstein and Poterba (2002) use the Life Office Pensioners, of whom there were over 1 million in 1999–2002 and for whom data are available for a longer period of time. Using these data has the advantage that life expectancy information is available on both a lives and an amounts basis (tables PML and PMA, etc.). The former shows the life expectancy of each life (possibly more accurately of each policy – if a pensioner has more than one policy, then he or she may be counted twice). The latter basis reweighs the life expectancy by the size of the pension so that richer pensioners have a higher weight – unsurprisingly, life expectancy of amounts is longer than life expectancy of lives since richer people tend to live longer. From the point of view of a life insurer, the amounts measure is more relevant, since that determines the profitability of the company; from the point of view of a typical pensioner, the lives basis may be more relevant since the amounts measure is affected by a small number of rich individuals. Furthermore, the most recent life office pensioner data allow us to exclude individuals who retired early and concentrate on those who retired at a 'normal' age (tables PNML and PNFL).

In addition to the choice of actuarial table, we need to estimate the projection methods that were used to forecast future mortality. The '80' and '92' tables (published in CMI (1990) and CMI (1999), respectively) contained projections of future mortality. Within a few years, it became clear that mortality was improving faster than projected in the '92' tables, and CMI (2002) provided 'interim adjustments' which came in three versions: short, medium, and long cohort projections. The long cohort projection has the highest forecast increase in life expectancy and hence using it gives the highest money's worth. The most recent set of tables was the '00' series published in CMI (2006), but this did not attempt to make any projections. Where we have used this series to calculate the MWRs, we spliced the interim projection improvements in mortality on to the '00' mortality levels.

To give some idea of the magnitude of the changes due to revisions to projected mortality, the remaining life expectancy of a 65-year-old man was forecast to be just over fifteen years in 1994 using the PML80 Table; by 1999 using the PML92 Table, a 65-year old's life expectancy was seventeen years and two months; by 2002, it was nineteen years using the short cohort adjustment and twenty-one years using the long cohort adjustment. In addition, the data from the personal pensioner table (PPM00) suggests that these annuitants had an additional two years of life expectancy compared to the life office pensioners.

To account for the problems in deciding which actuarial table to use, we report MWRs based on a variety of actuarial tables: where there is uncertainty about the precise point at which a given table was used, we

allow overlap years. In all cases, the annuity rates are taken from the *Money Facts* data described earlier and interest rates are taken from the Bank of England's contemporary estimates of the yield curve (available from the Bank's website). Our results are summarized in Table 10.2; Figure 10.6 graphs the money's worth based on 'lives' for 65-year-old males using the life office pensioner mortalities.

The money's worth for the base case of a 65-year-old man has averaged 0.90 over the period, which represents a fair value after allowing for load factors (see Table 10.2). The results for women are similar, with the money's worth for 65-year-old females averaging 0.91. But it is apparent that regardless of mortality table used, the MWRs appear to be falling in the period 2000–4. And when a new mortality table is introduced, the MWR jumps up. This is consistent with information on increased life expectancy gradually becoming apparent to life insurers, resulting in annuity prices gradually falling: because we only update our mortality improvements discretely, there are discrete jumps up in the MWRs that we calculate. The only exception to this is when we switch to using the '00' tables: these followed on very quickly from the 'interim adjustments' and were almost exactly in line with their projections.

If the long cohort adjustment is appropriate, then, except for the hiatus when new data on life expectancy arrived in 2000–4, the MWRs remain roughly constant in the range 0.86–0.92 for the whole period. If the short cohort adjustment is more appropriate, then the MWRs appear to have fallen to the range 0.80–0.85. The fall became apparent in about 2006 and was a major concern to the government, since some commentators using out-of-date mortality data, incorrectly suggested that the money's worth had fallen dramatically.

The finding that the MWRs did not fall over the period relies upon using not just the long cohort adjustment but also concentrating on male annuitants buying level annuities. We summarize the money's worth calculations in Columns 1–6 of Table 10.2 in the tenth column, which just splices the different series together. In Columns 11–13, we report the analogous spliced series for males based on amounts data, for women and for men buying real annuities.[7] In all of the spliced series, we use the long cohort adjustment which gives the highest MWRs for 2002 onward. Despite this, the money's worth measures fall in all three cases. Based on 'amounts', the money's worth appears to fall from the range 0.91–0.99 to 0.88–0.91 and for women it falls from 0.89–0.92 to 0.85–0.89. The most remarkable fall, however, is in real annuities, whose MWRs fall from 0.89 in 1999 to 0.76 in 2009 (real annuity rate data are not available before 1999).

The difference between nominal annuities and real annuities is partly in the level of the money's worth, always lower for real annuities: compare the MWR of 0.94 for a nominal and 0.90 for an RPI-linked annuity for a 65-year-

Table 10.2 Money's worth ratios (MWRs) in the UK compulsory market for 65-year olds

Year	PML80	PML92	PML92 short cohort	PML92 long cohort	PNML00 short cohort	PNML00 long cohort	RMV92	RMV92 long cohort	PPM00 long cohort	MWRs for 'lives' – spliced series based on Columns (1)–(6)	MWRs calculated using 'amounts'	MWRs for women calculated using 'lives'	MWRs for men, real annuities
1994	0.875									0.88	0.914	0.891	
1995	0.910									0.91	0.951	0.931	
1996	0.884									0.88	0.922	0.897	
1997	0.899									0.90	0.941	0.924	
1998	0.886									0.89	0.931	0.918	
1999	0.863	0.931					1.001			0.86	0.989	0.92	0.891
2000	0.876	0.951					1.026			0.95	1.011	0.954	0.876
2001		0.912					0.978			0.91	0.966	0.921	0.831
2002		0.860	0.920	0.975			0.922	1.031		0.86	0.991	0.947	0.902
2003		0.822	0.880	0.936			0.883	0.992		0.94	0.95	0.911	0.856
2004			0.824	0.876				0.926		0.88	0.888	0.868	0.813
2005			0.836	0.891	0.832	0.888		0.943	0.946	0.89	0.892	0.86	0.779
2006			0.827	0.883	0.824	0.880		0.935	0.94	0.88	0.884	0.851	0.768
2007			0.800	0.851	0.797	0.848		0.898	0.904	0.85	0.852	0.825	0.754
2008			0.831	0.884	0.828	0.882		0.933	0.941	0.88	0.885	0.862	0.816
2009			0.857	0.908	0.854	0.905		0.955	0.964	0.91	0.91	0.887	0.759

Source: Authors' calculations; see text.

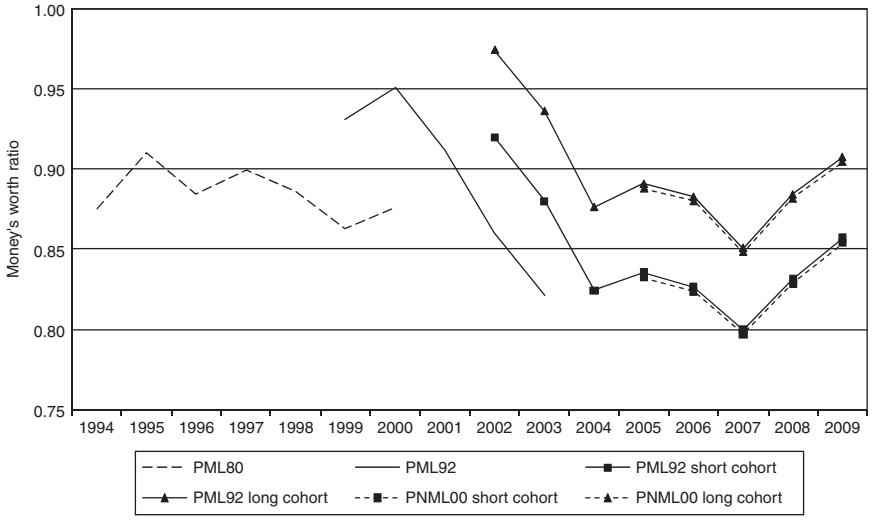

Figure 10.6 Money's worth for compulsory annuities for a 65-year-old male. *Note*: The figures are the same as in Columns 1–6 of Table 10.2. *Source*: Authors' calculations; see text.

old man in 1999. Finkelstein and Poterba (2002) suggest this is due to selection effects, as longer lived people would be more likely to choose real than nominal annuities. But, the discrepancy has more than doubled since 1999 and it is implausible to suggest that this is entirely due to selection effects. This raises the question of whether other issues, such as the higher costs of inflation-proofing annuities, are the major cause of the difference in the MWRs.

Until this point, we have continued to follow Finkelstein and Poterba (2002) in using Life Office Pensioner mortality to calculate the MWRs. In Columns 7–9 of Table 10.2, we consider the effect of using the mortality of people with retirement annuitant contracts, and for the few years that they are available, the data based on personal pensioners. With these mortality tables, the MWRs are much higher and suggest that annuities would have been very good value for the typical annuitant.

The money's worth for voluntary annuities

Murthi et al. (1999), Finkelstein and Poterba (2002), and Cannon and Tonks (2004*a*) all report that UK voluntary annuities are approximately fairly priced, calculating the money's worth measures for 65-year-old men as 0.99, 0.93, and 0.98, respectively. However, the choice of survival prob-

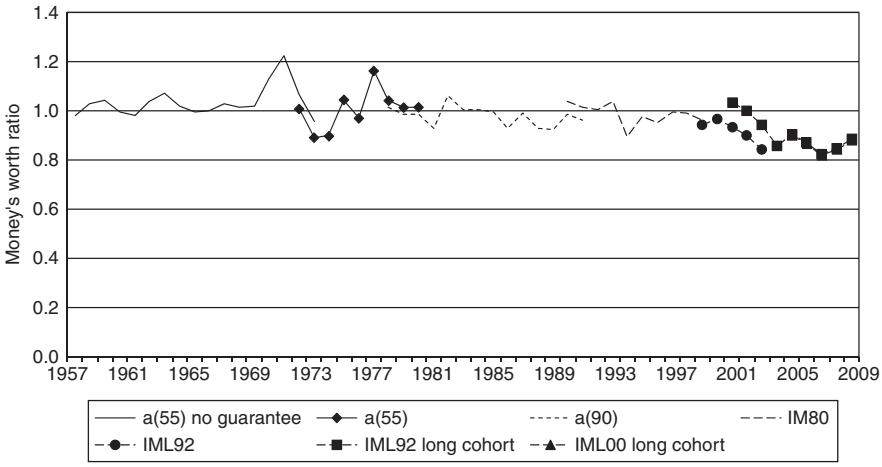

Figure 10.7 Money's worth for voluntary annuities for a 65-year-old male. *Source*: Cannon and Tonks (2004*a*) and authors' calculations; see text.

abilities is crucial: our result of 0.98 for 1990 was based upon the MWR calculated using the actuaries' a(90) table; yet using the IM80 table (which was only published in that year), the figure would have been 1.03. Over the entire period 1957–2002, we calculated an average money's worth of 0.97.

Figure 10.7 updates the analysis to 2009. Annuity rates for 1957–73 are for an annuity without a guarantee: thereafter they are guaranteed for five years. Where there is uncertainty over the date of introduction of a new actuarial table, we calculate the MWR using both sets of survival probabilities for comparison. To obtain a single statistic on the money's worth over the sample 1957–2009, we splice together the guaranteed and non-guaranteed annuity series to obtain an overall average of 0.98, which is not significantly different from unity (statistically or economically). Since these MWRs are based upon the average annuity rate in each year, it would have been possible to obtain even better value for money by buying an annuity from the life insurer with the highest rate. However, just as in the compulsory market, there is a decline in the MWR toward the end of the period.

Evaluating and explaining the money's worth

Our calculations in the previous section suggest that the money's worth for nominal annuities has been about 0.90 for the compulsory market and around unity for the voluntary market. Even after a decline at the end of

the period, the money's worth was 0.80 or higher. But we need to know whether this is a satisfactory level for the money's worth. Given the presence of unavoidable transaction costs, we should certainly expect a money's worth less than one, but it is difficult to know how much less than one as the magnitude of transaction costs is commercially sensitive information and not revealed by life insurers. Real annuities have a lower money's worth, although this may be because insuring against inflation is more costly for the life insurers.

Is the money's worth good value?

One possible benchmark for the MWR for annuities is the analogous figure for other forms of insurance, namely the ratio of the value of claims paid by insurance companies to the value of premiums received. Using information provided by the Association of British Insurers for the period 1994–2006, we calculate average figures of 0.79 for motor insurance, 0.60 for domestic property insurance, and 0.57 for commercial property insurance. These figures are much lower than for the money's worth of nominal annuities and comparable to that for real annuities: except for motor insurance in 1997 and 1998, the insurance products we consider were always less good value than nominal annuities.

An alternative benchmark would be other long-term investment products. James (2000) examines the cost of investing in a variety of retail investment products in the United Kingdom, and she finds that to get the market rate of return on £1, a consumer would have to invest £1.50 in a managed fund, and between £1.10 and £1.25 in an index tracker. These figures imply a money's worth of 0.66 for a managed fund and less than 0.91 for a tracker. Again these figures are comparable or lower than the money's worth on annuities. They also suggest that it is during the accumulation phase that charges from the insurance companies have a significant reduction on the effective rate of return and not in the decumulation phase.

Why did the money's worth fall after 2004?

Despite the money's worth appearing good compared with other insurance or investment products, recent experience seems less satisfactory. In particular, the period from 2004 onward has seen a fall in the MWRs for all sorts of annuity products, reaching a minimum of about 0.80 in both voluntary and compulsory nominal annuities in 2007. Although there has been a small recovery since then, the fall in the money's worth value is clearly a cause for concern to policymakers: in particular, we need to have some idea why these measures fell so dramatically. In the compulsory

market, the fall in the money's worth based upon life office pensioner mortality may be because life insurers were moving to using the personal pensioner mortality tables. But this still would not explain the contemporaneous fall in the MWRs in the voluntary market.

Because we do not know exactly when different actuarial assumptions were made, it is impossible to gauge the precise point at which the money's worth measures fell. This is one reason why we calculate the values annually rather than monthly: timing actuarial changes to the nearest month is impossible. A consequence of this is that we cannot use the timing of changes in the money's worth to identify causes. Nevertheless, we can still evaluate several possible drivers of the money's worth and see whether they have changed at some point over this period.

INSURANCE REGULATION

Life insurers in the United Kingdom are regulated by the FSA, which incorporates the European Union Life Directives for the insurance industry. The EU's proposed changes to regulation are described by 'Solvency II', which will take a more risk-sensitive approach than hitherto. In anticipation of these changes, the FSA has proceeded with its own risk-based solvency requirements (FSA 2003, 2005). This new regime may have increased the regulatory cost associated with providing annuities, by imposing higher levels of regulatory capital on annuity providers.

INCREASED LACK OF COMPETITION IN THE INSURANCE INDUSTRY

Although there are relatively few large providers, there is a significant number of potential entrants, as there are so many firms who still sell small numbers of annuities and could presumably expand their operations fairly quickly if they thought it profitable to do so. The FSA comparative tables provide information on annuity rates in the compulsory market, which enables consumers to find the best prices. So, although the small number of annuity providers is a potential cause for concern, there is no evidence that it is a cause of the low money's worth. In any case, it is difficult to see how the fall in the money's worth could be due to changes in the degree of competition, since there has been no discernable change in measures of competition such as the six-firm concentration ratio (illustrated in Figure 10.2).

THE INSURANCE CYCLE

After periods when negative shocks have resulted in *ex post* losses, insurers tend to increase their premia, a phenomenon called the 'insurance cycle' (Harrington 2004). Since life insurers may have been making *ex post* losses on annuities over some of this period, due to unanticipated reductions in

mortality (i.e., when the money's worth was close to or above unity), the observed reductions in annuity rates may be an example of the insurance cycle.

In a perfectly competitive market with perfect information, insurers would be unable to recoup their losses in this fashion. Absent perfect information, however, there are two reasons why prices would rise: first, the negative shock would result in rational updating of probabilities which might cause life insurers to reduce their projections of mortality by more than suggested in the CMI reports; and second, the negative shock would have resulted in a reduction in life insurers' capital on annuities in payment which could not be replaced in the short term, or which could only be replaced at relatively high cost.

PRICING OF MORTALITY UNCERTAINTY

The money's worth methodology assumes that life insurers price annuities in an actuarially fair fashion. In practice, both prudence and regulation mean that they must build in prudential capital for downside risk. Alternatively, they could reinsure their risks, but this would also be costly and we know that reinsurance markets for mortality risk are small.

During the period we consider, it is probable that life insurers have been paying more explicit attention to cohort mortality risk. Cannon (2009) shows that increased uncertainty in mortality projections need not reduce the money's worth if life insurers aim to price on the expected value of the annuity. But if life insurers increase their prudential reserves when risk appears to rise, then this would result in the money's worth falling.

An additional incentive came directly from the regulator. In April 2007, the FSA sent a 'Dear CEO' letter to chief executives of annuity providers, reflecting on the debate over future annuitant longevity improvements. The letter recognized that companies would usually make assumptions based on their own mortality experiences; however, if this was not possible, firms might consider the different industry views in this area and err on the side of caution (FSA 2007). In other words, annuity providers, according to the regulator, should price annuities conservatively to reflect the risk of mortality improvements.

IMPAIRED LIVES

According to Quinton (2003), there was an increase in the impaired life market of 23 percent between 2001 and 2002. In 2005, the *Synthesis* database reports that of £8.5 billion sales of CPA annuities, only £386 million (4.5 percent) were impaired life. This growth in the impaired life market would have resulted in the remaining annuitants in the conven-

tional market having higher average life expectancy, which would mean that life insurers would have to lower annuity rates to remain profitable. Our estimates of MWRs make no allowance for any growth in the impaired life market, since the life tables that we use are unable to distinguish between impaired and non-impaired lives. This means that our money's worth calculations would be based on annuitants systematically different from those buying in the non-impaired market, biasing our results downward.

Conclusion

In this chapter, we have examined a time series of UK voluntary annuity rates for 1957–2009 and compulsory annuity rates for 1994–2009. In the larger compulsory pension annuity market over a shorter sample period, we estimate that the UK MWRs for 65-year-old males and females have been approximately 0.90. In the smaller voluntary market, the money's worth is close to one for much of the period. Taking into account transactions costs, and compared to other financial and insurance products, this implies that annuities are fairly priced.

Toward the end of the period, the compulsory market is difficult to evaluate because the money's worth calculations are sensitive to the assumptions made about life expectancy and there is some uncertainty over which actuarial table we should use. Despite this, however, the MWRs have fallen in both markets since 2004, reaching a nadir in 2007.

We have discussed a number of factors that could have contributed to this result. Changes in industrial concentration do not look to have been important but more promising explanations include changes in insurance regulation; life expectancy shocks and the insurance cycle; pricing of mortality uncertainty; and the growth in the impaired lives market.

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Notes

[1] This includes wealth in defined-benefit occupational pension schemes, although the terms on which an individual can access this wealth are partly determined by the scheme.

[2] The stated aim of simplifying the pension system has been attenuated by the authorities' frequent changes of terminology.

[3] The precise details are complicated. The maximum income is to reduce the possibility that the pension fund is exhausted before death. The minimum income is to ensure that an income is taken and the authorities can collect the resulting income tax. A penal tax rate of 70 percent on the fund at death is to discourage *inter vivos* transfers.

[4] For a general discussion of the calculation of the money's worth, see the introduction to the collection of papers in Brown et al. (2001).

[5] Finkelstein and Poterba (2004) use the return on UK corporate bonds instead of government bonds. From the data in Figure 10.4, the difference between yields on UK commercial banks' bonds and ten-year government bonds has averaged 0.44 percentage points over the period 1994–2009.

[6] The Board of Actuarial Standards (2008) emphasizes that there is no consensus on the best type of model to use for projecting future changes in mortality.

[7] The interest rates used for real annuities are taken from the yield curve based on government bonds whose payments are RPI-linked. Note that although the current official inflation rate in the United Kingdom is based on the CPI, both government bonds and annuities are indexed to the older RPI measure.

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