

**Issues in the Issuance of Enhanced Annuities**  
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**Abstract**

Two forces are about to create a growing market for individual annuities in the United States and Canada. First, the postwar Baby Boom (born 1946–64) is inexorably moving into retirement. Second, there is a strong move away from employer-sponsored defined benefit pension plans to defined contribution pension plans. This trend could even extend (in the United States) into the provision of Social Security benefits.

Under these arrangements, participants must find a way to mitigate their “longevity” risk (and the investment risk, although this is not the topic of this paper). The most obvious answer is to buy a life annuity. However, at this time in the United States and Canada persons who voluntarily apply to buy a life annuity are generally assumed to be in extremely good health, and annuity rates are determined using very low mortality assumptions (high life expectancy assumptions). While there is a growing market in “enhanced/impaired annuities,” especially in the United Kingdom where annuitization has been mandatory, the present pricing structure for annuities in the United States and Canada means that a large proportion of the population cannot get a “fair value” annuity given their less-than-preferred health profile.

This paper looks at the present annuity marketplace in the United States and Canada. It also reviews the underwriting and marketing of life annuities in the United Kingdom where “enhanced” life annuities are available for a broader cross section of the marketplace. It also reviews the use of P&C risk classification techniques and how they might apply to the annuity marketplace as well as potential legal constraints on broader risk classification for life annuities.

The paper concludes that the U.S. and Canadian annuity marketplace could be doing more to provide “fair value” annuities to substandard risks. Without an appropriate private-sector reaction, consumers may respond by inviting government intervention.

**1. Introduction**

Two important forces are about to impact the individual annuity marketplace. First, the postwar Baby Boom is reaching its retirement years. If you accept that the Baby Boom was born in the years 1946–64, then the first wave of the Baby Boom will turn 61 in 2007. Thus, over the next 20 years, one of the largest well-defined demographic groups will be entering retirement.

Second, and at the same time, many pension plan sponsors are moving away from defined benefit (DB) pension plans and replacing these systems with defined contribution (DC) pension plans. Statistics tell us that in 1960 traditional DB pension plans covered about half of all private-sector workers in the United States. By 2005 only 21% of private-sector workers participated in a traditional DB pension plan even though about half of all American private-sector workers were still covered by a retirement plan. DC

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plans now overwhelmingly dominate employer-sponsored retirement programs in the United States (EBRI 2006).

We also see continued pressure to move the U.S. Social Security system (OASDI) from a DB system to a DC system using individual accounts. One implication of the move to DC retirement savings plans is that the “longevity” risk (or the life expectancy risk) has to be borne by the individual worker/participant. There is also an investment risk to be transferred or managed, but this is not the topic covered by this paper. The easiest way to mitigate the longevity risk is for the worker to buy a life annuity from an insurance company at some appropriate moment in retirement (for more on the optimal time to annuitize, see Milevsky 2001).

Annuity prices have also increased markedly over the past decade as interest rates have dropped and life expectancy has improved, thus making life annuities a relatively “expensive” product to the consumer. However, the average cost of annuities is tangential to the focus of this paper.

In the life annuity market, there is a growing offering of what we will call “enhanced” or “impaired” annuities. In the United States and Canada, these are offered to individuals who can prove that they are in substandard health. The applicant does this by submitting a medical certificate proving their impaired health. Although this market started a decade ago with smoker/nonsmoker annuities, it now encompasses a much broader proportion of the population.

Some interesting side stories came to the authors during the writing of this paper. In the United States and Canada the annuity applicant must supply the insurance company with “proof” of his or her substandard health. This can be expensive for the applicant in both dollars and time. Some applicants actually apply for life insurance policies wherein the life company pays for a medical examination. They then use this medical certificate to apply for their life annuity!

To date, in the United States and Canada, the only basis for issuing an “enhanced/impaired” annuity is a “medical” reason substantiated by the applicant. No substandard prices are available for potential annuitants based on any of the following factors: lifetime occupation, income, education, residential location, etc. This means that, at the moment, it is still extremely difficult for many potential annuitants facing retirement to purchase an annuity that fairly reflects the mortality risk being insured. That is, the annuity insurance industry is apparently not willing to provide competitive products to a large proportion of the population who may be looking for a way to mitigate the “longevity” risk that they face in retirement.

Why has this occurred, and what might be done about it?

## **2. The Level of Risk Classification in the U.S. and Canadian Life Annuity Marketplace**

Defining “risk classes,” each of which pays a different price for insurance, is a long-standing actuarial principle. We do this in life insurance. We do this for virtually all property-casualty products (e.g., young males pay more for auto insurance than do young females or mature males).

Can we determine risk classes for life annuities in which each risk class would face a premium commensurate with the risk that that class brings to the risk pool? The first-order response is yes.

In a recent paper Brown and McDaid (2003) found 12 variables that were significant in the analysis of post-retirement mortality. The 12 variables were (in alphabetical order): Age, Alcohol, Education, Gender, Health Behavior (lifestyle and use of health services), Income, Marital Status, Obesity, Occupation, Race and Ethnicity, Religion (participation), and Smoking. Today the U.S./Canadian life annuity industry uses the variables of age and gender in setting all annuity rates. With a medical certificate, prices will also be “rated” for medical reasons.

While the list of 12 factors is not meant to be exhaustive, Brown and McDaid state that all 12 are important enough to be included in any actuarial risk classification modeling to the extent that data are available for the named applicant. One must remember that many of these factors have strong cross-correlations (e.g., education and income). Brown and McDaid point out that, as a general rule, the larger the number of risk factors used in one’s model, the less significant are the effects of any omitted variables and the greater the likelihood that the assumption of independence of the omitted variables would be a reasonable approximation to reality.

It is the position of this paper that some of the risk variables listed by Brown and McDaid should be considered in the underwriting and pricing of life annuities. In particular, the variables of education, income, and occupation should be considered. For some variables, the mortality profile of the preferred risks (e.g., high education, high income) is less than 50% of the mortality of the impaired risks (e.g., low education, low income). If we assume an interest rate of 5% per annum, Table 1 shows the impact on U.K. annuity payouts for certain layers of mortality.

**Table 1**  
**Percentage Increase in Annuity Payout**

<b>Increase in <math>q_x</math></b>	<b>Age 65</b>	<b>Age 75</b>	<b>Age 85</b>
+ 25%	+ 7%	+11%	+15%
+ 50	+13	+21	+30
+100	+24	+40	+58

*Source:* Brown and McDaid (2003), p. 25.

It is the position of this paper that, in a competitive annuity market, enhanced/impaired annuities should be offered to a much wider proportion of the population. In fact, this represents an opportunity for some insurers to carve out a profitable, sizeable niche at the expense of their competitors. New players could do this without threatening any turnover of their existing book of business. In the Brown and McDaid summaries, education, income, and occupation showed up as being important variables in predicting mortality post-retirement.

As to “Education,” Vaillant and Mukamal (2001) found that it was one of the most important predictors of mortality. Deaton and Paxson (1999) show that, at the individual level, both income and education are separately protective against mortality. Rogers, Hummer, and Nam (1999) also suggest that education may be a good underwriting variable since it can generally be determined early in life and thus can be assessed for all individuals. They also state that not only does education affect mortality

through its link to employment, income generation, and information gathering, it also affects mortality by influencing health behavior and the use of health services. Bucher and Ragland (1995) found that those with less education had higher risk factors. This was confirmed by Lantz et al. (1998), who found that smoking, alcohol consumption, sedentary lifestyle, and relative body weight all varied significantly by educational attainment.

Reviewing “Income” as a potential risk classification variable, several papers noted the strong correlation between income levels and life expectancy (Knox and Tomlin 1997; Kallan 1997; Montgomery and Pappas 1996; Rogers, Hummer, and Nam 1999; Pappas et al. 1993). It has been argued that, rather than income affecting health, health may impact on income. However, Deaton and Paxson (1999) show that only some of the effect of income is removed when allowing for reverse causality. Wolfson et al. (1990) agree. It is true, however, that the income effect decreases with age (especially after age 65). Again, income is also negatively correlated with risky behavior. Those with the lowest income were significantly more likely to smoke, be overweight, and be in the lowest quintile for physical activity (Lantz et al. 1998).

Other empirical evidence supports the use of “Income” as an underwriting variable. A Canada Pension Plan Mortality Study (Office of the Chief Actuary 2003) analyzed the mortality of recipients of Canada Pension Plan retirement income by quartile (i.e., 0–25% of a full pension up to 75–100% of a full pension). Each level of income had significantly and measurably lower mortality. In fact, at ages up to 64 for males and 60 for females, the mortality rates of the highest income level were less than half of those of the lowest income level. These mortality differentials decreased with age. At age 65 life expectancy for males in the highest income level was 16.43 years, while for those in the lowest income level it was 14.25 years. For females aged 65 the comparable life expectancies were 20.69 and 19.53, respectively.

In a more recent study of Old Age Security data (Office of the Chief Actuary 2006), data were subdivided by income levels showing a low-income group who qualified for the Guaranteed Income Supplement (a welfare benefit dependent on low income) up to a high-income group who did not receive all of their Old Age Security because of the claw-back of this benefit for high-income Canadians. For both males and females, the mortality rates for the low-income group were more than twice that of the high-income group even up to age 74.

This is very significant in the eyes of the authors. These are benefit values that can be obtained from the Canadian Revenue Agency from the applicant’s tax return. If buying an annuity is voluntary and being “rated” requires the submission of such data at the will of the applicant, it would seem that such underwriting should be possible.

Finally, we review the papers on “Occupation.” Lee (1995) and Sorlie, Backlund, and Keller (1995) found that employment status showed the largest correlation with mortality. They suggested this relationship could be due to both economic and health factors. Just being consistently employed can be used as an indicator of lower mortality (Williams and Collins 1995). Occupation influences mortality through income, health insurance, camaraderie, lifestyle, and living environment (Statistical Bulletin 1975). The effect of occupation also lessens with age (Brown 1997).

Why are we not seeing more risk classification in the annuity marketplace? One reason that industry sources indicate is that this is not a very competitive pricing market

because of the extra cost of underwriting substandard annuities. Another reason is that insurance companies must carry standard annuity reserves for substandard lives unless the annuitant is expected to have at least 25% extra mortality, adding to the cost of offering enhanced annuities at a lower price to higher mortality risks.

Several factors may affect the demand for annuities. High-income individuals are able to self-insure their retirement income through personal wealth. These high-income individuals are those who might purchase large annuities, producing higher commissions for annuity brokers. On the other hand, mid-income individuals are harder to identify and target for annuity sales. They likely lack the personal expertise to evaluate and compare annuity products, and they would benefit from the assistance of a broker. A general expansion of the annuity market through more sophisticated underwriting can help attract additional buyers into the market and provide a large enough sales base to generate an attractive level of commission to brokers.

### **3. The Level of Risk Classification in the U.K. Life Annuity Marketplace**

Given that, until April 2006, U.K. legislation mandated annuitization of tax-advantaged savings by age 75, there has been a growing and sophisticated “enhanced/impaired annuity” market. The authors believe the increased market demand for annuities encouraged insurers to create attractive products to gain a larger share of the annuity purchase market.

The first “enhanced annuities” were issued to smokers starting in 1995. Since then risk classification has developed further to include occupation, postal code, and medical conditions such as asthma and diabetes, through to more serious conditions such as many types of cancer. Those who have combinations of conditions will face even lower premiums. For example, a male aged 65 with high blood pressure and high cholesterol may be able to get £7,772 a year from a fund of £100,000, but if he is also obese this would increase to £8,528 (£756 more a year, or almost 10% extra). A male who has had a triple heart bypass in the last 12 months would get £8,034 (Money Management 2005). (Note: These are private-sector unregulated rates.) A male who is suffering from cancer and has received chemotherapy could get an impaired life annuity of £17,956 (ibid.).

Similarly, those with low retirement incomes have mortality rates 40–90% higher than those with high retirement incomes. Chris Daykin of the Government Actuary’s Department has pointed out that the mortality of those receiving pensions from life offices is lower than general population mortality.

The annuity marketplace in the United Kingdom can be subdivided into three sectors.

1. Enhanced annuities, which are priced allowing for mild medical conditions and lifestyle factors. Typical rating factors include postal code, occupation, and smoking habits. Underwriting relies on evidence collected on an insurer’s health questionnaire.
2. Impaired annuities, which are priced allowing for individual medical history based on a medical health questionnaire. For more severe impairments, a doctor’s report is generally required in addition to the health questionnaire. These policies include applicants with a history of heart attack(s), cancer, and stroke(s). It must be noted, however, that the

time-delay factor in this process lessens the market for the annuity product if the applicant is at risk of losing investment income in the interim. The loss of investment income can be avoided if annuity payments for an immediate annuity commence retroactively to the date of application or the annuity premium is refunded with at least minimal interest if the annuity is not issued.

3. Immediate care annuities, which are sold to people in long-term care for the elderly. Underwriting usually uses measures of activities of daily living (ADLs), which are common measures of a person's ability to live independently. Otherwise, underwriting relies on a doctor's report for evidence of frailty.

It is estimated that 40% of the U.K. population could qualify for an enhanced or impaired annuity. This is despite the fact that today only about 10% of annuities are enhanced. The authors are not aware of any research into the difference, but it may be a reluctance to admit lower-than-average life expectancy.

Enhanced/impaired annuities met a market that had become disappointed with ever-decreasing annuity income per dollar of premium because of decreasing interest rates combined with increasing life expectancy. Enhanced/impaired annuities have found demand in two separate market niches. They have increased incomes for those who retire with profiles of high mortality (e.g., those in poor health). They have also worked to provide annuities to fund nursing home care and other long-term care costs for ill or frail elderly people who are near the end of their lives.

In the United Kingdom risk classification in annuity pricing has created new rates for classes that include smokers, those with medical impairments (diabetics, high blood pressure, high cholesterol, stroke or heart attack victims), the overweight, and, more recently, manual workers living in geographic areas displaying higher than average mortality. As to the last risk classification, it has been reported that the average life expectancy for a male in North Devon was 81 years compared to just under 70 years in Manchester (Money Management 2005). The underwriting has become more and more sophisticated and has expanded into the field of medical and lifestyle conditions.

#### **4. Lessons from Property/Casualty Risk Classifications Techniques**

The property/casualty (P&C) industry has always used a very sophisticated risk classification system to attempt to provide a price to the policyholder that is truly commensurate with the risk that he or she brings to the risk pool. In terms of underwriting the individual applicant for auto insurance, common risk classification parameters have included age, gender, driving record, driver training, and territory (now often measured by postal code). Some companies go further and offer differing prices based on personal variables such as "good student discounts."

This sophisticated use of risk classification has now advanced to "predictive modeling." Predictive modeling has been standard practice for P&C ratemaking in the United Kingdom for many years. It has now gained widespread acceptance in the United States and Canada. Predictive modeling involves using historical data on the policyholder available to the underwriter (often in the company records) to construct a model to help predict expected future claims (frequency/severity or both).

Early predictive models were used for auto insurance, and the early entrepreneurs realized a measurable competitive advantage. Others followed. Predictive modeling is now also being used in homeowners' insurance and commercial lines (Guyen 2006).

Companies are using predictive models to identify new risk classification factors such as credit rating (credit scores). P&C insurers have argued that the predictive power of credit scores is too strong to ignore. Further, credit scores are readily available and easy to measure (Vass 2004). However, the authors are aware of resistance to the use of credit scores as an underwriting factor because of the impact on low-income individuals. To the extent credit scores are correlated with income, insurers can merely use income as an underwriting criterion. Similar techniques are now being used by some companies to calculate better claims reserves estimates (although they are beyond the scope of this paper) and to better focus marketing strategies.

In total, it appears that the life annuity actuaries may have a lot to learn from their colleagues in the United Kingdom and their colleagues in the P&C industry.

### **5. Antiselection in the Annuity Marketplace**

A person purchasing a life annuity in the current marketplace is one who expects to live a relative long life. There are no economic incentives for substandard risks to buy annuities. The life annuity insurer underwrites the life expectancy and has an actuarial gain in the event of an early death—the opposite of the result from a life insurance policy. As a result, the interests of the company (making a profit through early death) and the interests of the annuitant (the desire for a long life and the financial benefit from receiving more annuity payments) are not aligned.

Moving into the enhanced annuity market does not help align these interests. However, it does level the playing field for poor risks and allows those individuals to enter the market and purchase an annuity reflecting their mortality risk. As long as the annuity underwriting controls for buyer fraud and premium rates contain an adequate profit margin, the insurer will benefit by selling more annuity products than are currently being sold. Similarly, the annuitant with substandard mortality will benefit by having access to an annuity market where prices more accurately reflect the risk being insured.

To control for a temporary change in one of the enhanced underwriting factors, annuity insurers could require factors to be present for a minimum amount of time. For example, if a person has just been diagnosed with a medical risk, that factor would not be reflected in the annuity underwriting. After the increased medical risk has been present for a reasonable period of time, which might vary among enhanced risk categories, the factor would be reflected in annuity underwriting.

### **6. Legal Constraints on Annuitant Risk Classification in the United States and Canada**

This paper has suggested that the annuity industry adopt a more sophisticated risk classification system so as to provide a broader proportion of the population with market-value annuities. It must be admitted, however, that there are legal impediments to the use of several of the proposed risk classification variables. Because annuity underwriting currently is based on all applicants being in the lowest risk category, expanded underwriting criteria leading to the expectation of a shorter life span will result in cheaper annuity products. As a result, the buying public and regulators may be more accepting of

these expanded underwriting criteria. In the United States insurance is regulated at the state level, complicating the use of new underwriting criteria. Underwriting criteria must be actuarially justified, requiring data for any new risk classification categories to show a category is the *cause* of or directly correlated with increased or decreased risk.

Gender as an underwriting criterion for life insurance has been challenged. It was successfully defended by showing strong statistical evidence that gender is linked to mortality, and it is not merely a surrogate for any other factor. While the use of gender is generally acceptable in the underwriting of “life contingent” products, there are two states in the United States (Montana and Massachusetts) that do not permit separate underwriting classifications based on gender. Recently two Canadian provinces (Nova Scotia and New Brunswick) banned the use of gender in the underwriting and pricing of automobile liability insurance.

The use of “Income” as a risk classification parameter may be challenged by groups who would argue that “Income” is just a proxy for race or ethnicity. It is far from clear how these cases would be adjudicated, but the strength of underlying statistical data will have a significant impact of the outcome.

We would predict that “Marital Status” would withstand a legal challenge because of available data supporting the link between marital status and mortality. However, it could create political problems for the annuity industry if members of the gay and lesbian community argued discrimination in states where same-sex unions are not recognized. At this point we have no data on the mortality profile of couples in long-term same-sex marriages or unmarried heterosexual relationships. However, many of the logical arguments to support the enhanced life expectancy of persons in marital pairings (enhanced social activities, stronger ties to community) would seem to apply equally as well to long-term same-sex or unmarried heterosexual pairings. Because of the debate on the definition of marriage in several U.S. states as well as in some Canadian provinces, it would be important to research the mortality impact of long-term relationships regardless of marital status. If the impact is similar, insurers would avoid inconsistent definitions of marriage as the debate continues.

Research is needed to determine whether long-term homosexual and long-term unmarried heterosexual relationships produce the same favorable results. Long-term-care policies in the United States give the same favorable risk classification to long-term homosexual relationships as heterosexual marriage because the partner is available to provide care and support in both types of relationships. The authors do not know whether the same underwriting applies to unmarried heterosexual relationships.

“Obesity” may fall into a similar categorization as “Marital Status.” It would probably survive a legal challenge, but may create serious political backlash to the annuity industry. Studies of obesity as a mortality risk factor could look into whether genetics play a role in the link with mortality. For example, is expected mortality different for those with or without the genetic predisposition to obesity? “Smoking” should be admissible because data already link mortality with smoking, and life insurance policies use this underwriting criterion.

“Occupation” is not prohibited in the underwriting of life-based contingencies. The buying public would probably accept risk classification using “Occupation” if the “Occupation” was clearly dangerous or life threatening. However, our data show that just having been in a blue-collar occupation over one’s lifetime is a predictor of shortened life



expectancy in retirement. Using blue-collar occupations as an underwriting criterion may create public debate even though it would result in more favorable annuity purchase rates for blue-collar occupations.

We would expect the use of “Race and Ethnicity” and “Religion” to be prohibited as they are today for other life contingent products. In fact, these underwriting categories would likely fail a constitutional challenge in the United States.

Other criteria likely to be supported by data include health conditions such as cardiovascular disease (e.g., high blood pressure or cholesterol) or a history of heart disease. Risky vocations, like risky occupations, are likely to be shown to be a reliable risk classification, although the insured can change vocations and alter the risk and expected annuity payouts.

The U.K. factor of “Postal Codes” should be expected to be challenged. Certainly it has been when used in the underwriting and pricing of automobile insurance. The argument will be made that “Postal Code” is just a proxy for race and ethnicity and thus should be prohibited. At this stage we would expect this to be a very difficult hurdle to clear in many jurisdictions.

The P&C factor of “Credit Scores” continues to be allowed in the product lines sold by P&C companies. One would expect acceptance to this extension to life contingent products as long as a sufficient causal link can be established between credit scores and mortality. However, one might expect some backlash if it were viewed that “Credit Scores” were just a proxy for “Race and Ethnicity.”

Obviously these are not all well-defined judgments at this time. One would expect a certain level of controversy at the very least.

## **7. Role of the Actuarial Profession**

In the United States there is a trend toward allowing lump-sum distributions rather than having employer-sponsored retirement plans make distributions in the form of an annuity. DC plans can avoid the administrative burden of obtaining spousal consent prior to distributing benefits to married participants merely by paying the full benefit as a lump-sum distribution. From a revenue perspective, lump-sum distributions are front-loaded for tax purposes because the tax is payable at the time of the distribution rather than spread over time, giving Congress an incentive to permit lump sums.

Lump sums shift the longevity risk to the individual, who is often unaware of the risk and unable to adequately evaluate it. The actuarial profession has the skills to assist in this risk evaluation.

Actuaries can help individuals assess the most effective annuity purchase for their situation. For example, wealth relative to living expenses is an important factor in the individual’s ability to self-insure the longevity risk. Determining the optimal time to annuitize can be daunting, but actuaries have the professional training to assist with this evaluation.

To facilitate more accurate pricing of annuities, actuaries can play a significant role in assembling the necessary data to support various underwriting categories. These data will help both regulators and insurers determine appropriate underwriting categories.

Actuaries can also encourage insurers to venture into more precise underwriting of annuities to allow more accurate pricing of these products. Actuarial studies can

establish the fairness to both insurers and annuitants of using more accurate pricing and underwriting.

If annuity markets expand, medical underwriting should become more common. For larger annuities, perhaps insurers will be motivated to fund medical exams to ensure accurate underwriting. Of course, there is a tension between paying for a medical exam so the annuitant may be able to pay less for the coverage (rather than paying more as is the case with life insurance). However, if individuals are able to submit a medical certificate of substandard mortality, the possibility of fraud increases.

## **8. Conclusion**

It is the thesis of this paper that the U.S. and Canadian life annuity industry needs to work harder to provide “market value” annuities to all applicants, not just those who are in good health. If this does not happen, then it is the belief of the authors that consumers will either continue to avoid the annuity marketplace and forego the opportunity to purchase longevity insurance, or they will argue loudly enough about the unfairness of the private-sector pricing to cause the government to consider intervention in one form or another.

Providing a more-complete pricing structure through more sophisticated risk classification is not without potential negative side effects, however. One side impact that more-refined risk classification could cause in the annuity marketplace is increased prices and/or decreased annuity income for those who are truly healthy risks. This is because, to the extent that the risk classification is successful, poorer risks who are currently in the annuity market will no longer be in the “Standard” class, and their removal will also remove the subsidy they create in the risk pool when they die early. However, it may be the case that only the best mortality risks are currently in the annuity market, and enhanced underwriting will have no effect on them. That is, one would expect the same side effect, however, if those in poor health cannot get a “fair value” annuity and just self-fund their retirement.

Still, annuities provide the only means of guaranteeing that one’s capital will not be exhausted in retirement, no matter how long one lives. This is an extremely important point. Planning one’s post-retirement income strategy without the benefit of pooling the “longevity” risk is very difficult. Either you accept less than the optimum income through your retirement lifetime or you run a significant risk of running out of money altogether.

This is even more true for those who can qualify for “enhanced” annuities since they offer a better income return with no downside in terms of longevity risk.

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