

Life Insurance and Life Annuity Demand Explaining the Annuity Puzzle
Proposal submitted to the Scientific Committee for the Fourth Longevity Risk and
Capital Market Solutions Conference for Presentation

By

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March 2008

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1. Preface

As populations in countries around the world age, governments, corporations and individuals face increasing longevity risk. Pay-as-you-go state pensions and corporate pension plans are putting severe financial pressure on governments and companies; IBM and Verizon are just two of many recent examples in the US of companies switching pension plans from defined benefits to defined contribution plans in an attempt to reduce corporate exposure to longevity risk. 1 Fertility rates have also fallen in many countries around the world, which further increased the severity of the longevity risk problem for pay-as-you-go government pension plans: Aside from an extension of the payment period, the tax base has been reduced. Strong mortality improvements at older ages have also increased the severity and make it ever more necessary that individuals with inadequate pension arrangements manage their longevity risk themselves. 2 Longevity risk exists at an individual and aggregate level. For the individual, it is the risk of outliving one's accumulated wealth. In the aggregate, it is the risk that the average member of a birth cohort will live longer than expected. Tools have long existed for the management of individual longevity risk; some of the modern means include social security systems provided by governments,

defined benefit plans provided by corporations through pension funds and life annuities³, provided to individuals by insurers.⁴ The aggregate form of the problem, however, has made the provision of risk management tools for individuals an increasingly difficult task.

1 Similar examples for the UK are British Airways and Co-op, who also shifted their pension plans from defined benefits to defined contributions.

2 See MACMINN et al. (2006).

3 The life annuity is an instrument that provides a known cash flow for an individual until death. It differs from a fixed annuity because its maturity is stochastic.

4 Other instruments contain embedded options that also provide the individual with protection against longevity risk. Some variable annuity contracts include guaranteed minimum income benefits (GMIB) that allow the policyholder to annuitize a guaranteed amount at the contract maturity with annuitization rates specified at the inception of the variable annuity contract. Hence, the GMIB is an option on a life annuity and so exposes the insurer to added aggregate longevity risk. See BAUER et al. (2006).

Capital markets do provide governments, corporations and individuals with a means of transferring risks and resources across time as well as spreading risks across individuals. Individuals can transfer money forward via security purchases to fund their retirement years. Part of the existing literature suggests that individuals can reduce longevity risk by purchasing life annuities and making them a significant part of the retirement portfolio; life annuity markets have not, however, flourished here or elsewhere and that is a puzzle. A solution to the puzzle is increasingly important because corporations and governments are reforming pension programs in a manner that leaves the individual with more longevity risk.

The “Annuity Puzzle” Consumption-saving behavior has been studied and discussed by economists including MARSHALL (1920) and FISHER (1930), but until YAARI (1965) the question of how a consumer should optimally allocate her limited resources over an uncertain lifetime had not been carefully addressed. In his seminal piece, YAARI (1965) extends the analysis of optimal consumption plans by maximizing an investor’s expected utility over a random time horizon. Using variational techniques, he validates the hypothesis that „uncertainty of human life increases the rate of preference for present over future income for many people, although for those with loved dependents it may decrease impatience”⁵ In particular, YAARI (1965) shows that investors without bequest motives will find it optimal to completely annuitize their savings. In view of this result, FRIEDMAN and WARSHAWSKY (1990) note:

It is startling, at least for economists who view consumption-saving behavior within the framework of the familiar life-cycle model, to confront the fact that in the United States few individuals purchase life annuities. According to the life-cycle model, the chief principle governing individual saving behavior is the desire to smooth consumption patterns over one’s lifetime, within the constraints imposed by limited lifetime resources.⁶

Indeed the full annuitization results have become known as the annuity puzzle because the life annuity markets in the United States and elsewhere are so thin. The objective of this analysis will be to not only review the attempts to solve the puzzle

5 See FISHER (1930: 216-217).

6 See FRIEDMAN und WARSHAWSKY (1990: 135).

but also to extend the expected utility paradigm to provide the economic foundations for the investigation of life insurance and life annuities. The working hypothesis here is that the foundations of life insurance and life annuities have never been adequately developed and that a new paradigm that explains the demand for life insurance is also key to understanding the anemic annuity market.