What is a Proper (Retirement) Spending Rate?

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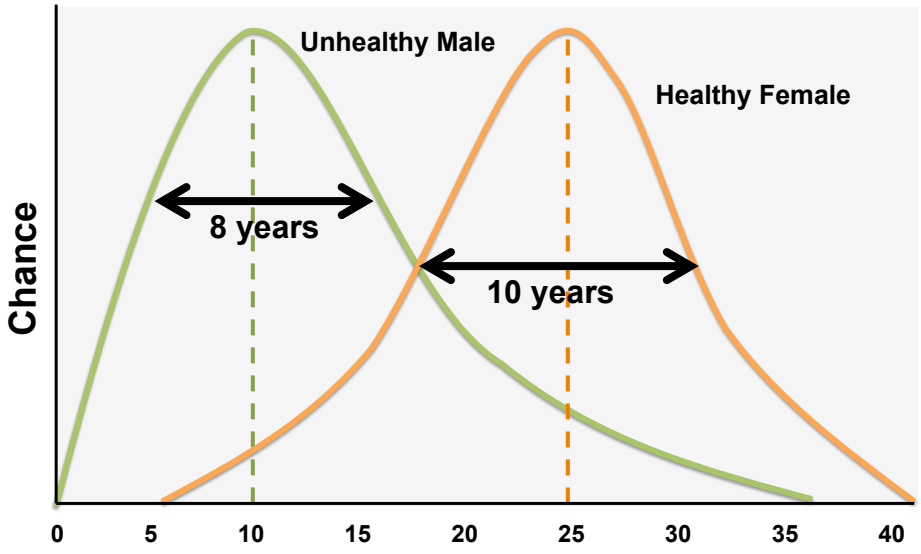
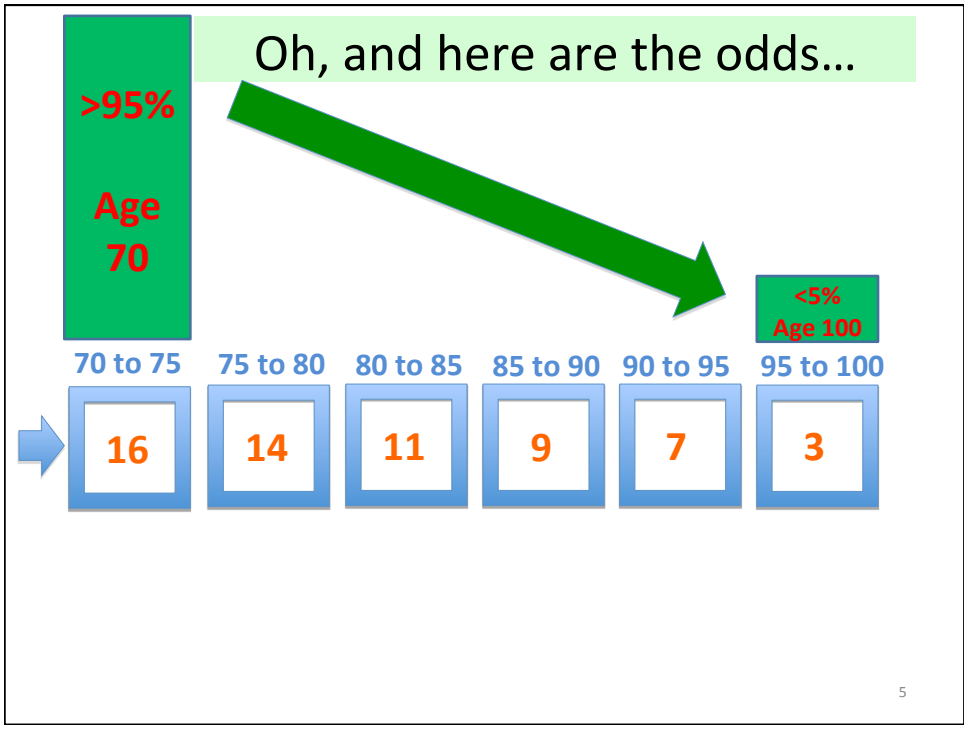
Outline of my Remarks

- What are the general income options available at retirement?
- What is the rational or optimal approach to withdrawal (spending) rates in the presence of longevity risk?
- What are the behavioral obstacles to implementing a rational and smooth plan?
- What insurance and annuity products are still missing in the (global) market?

But first, I would like to describe the results of a (non scientific) experiment on spending rates.

Longevity Risk: How Much Time is Left?





My takeaway:

- Everyone has a different attitude to longevity risk which can distort the biological probabilities of reaching advanced ages. In other words, you know there is a 10% chance of reaching age 100, but you don't care. This is risk tolerance.

Understanding Longevity Risk Aversion vs. Financial Risk Aversion

Coefficient of Relative Risk Aversion (CRRA)	Allocation to "Stocks" in Asset Allocation model
$\gamma = 1$	150%
$\gamma = 2$	80%
$\gamma = 4$	40%
$\gamma = 8$	20%

Assumptions: The Merton Model inverted.

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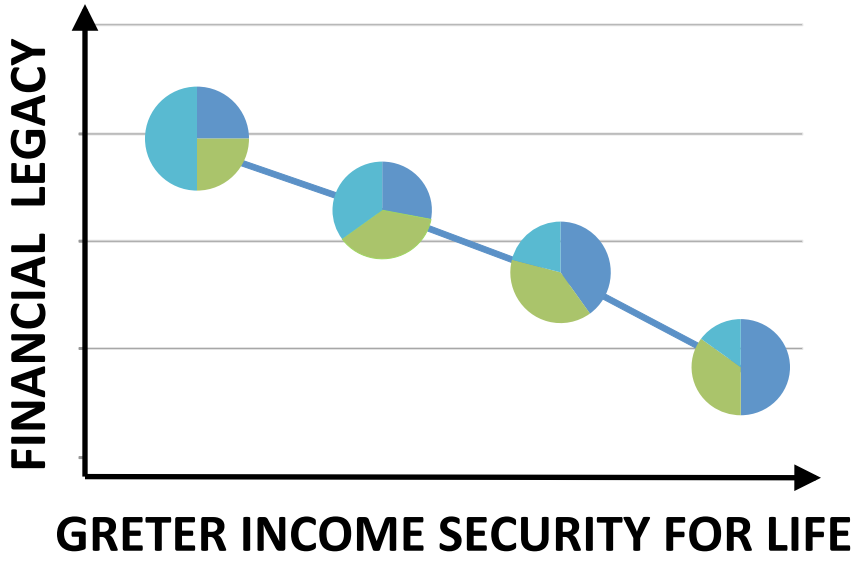
ECONOMIC TRADEOFF AT RETIREMENT



Irving Fisher (1930)
The Theory of Interest

…The shortness of life thus tends powerfully to increase the degree of impatience or rate of time preference beyond what it otherwise might be…

…He expects to die and he thinks: Instead of pilling up for the remote future, why shouldn't I enjoy myself during the few years that remain…

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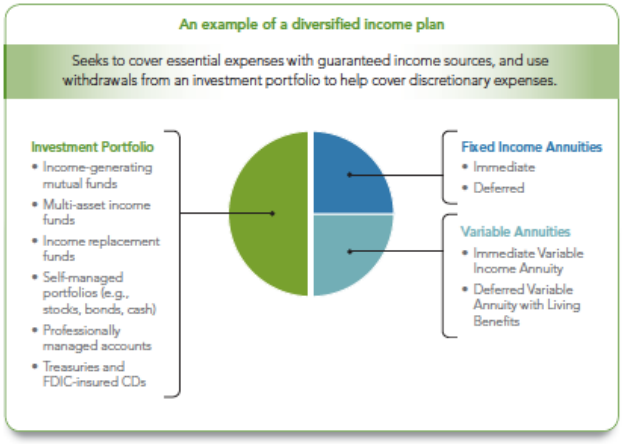
My takeaway

- Longevity risk aversion is similar to financial risk aversion. It impacts optimal risky allocations as well as consumption preferences. We need a spectrum of retirement income strategies and products that can reflect these preferences.

Guidance from one of the largest financial services company in the U.S.

Personalize your income plan

After taking into account your investing priorities and overall financial situation, the combination of income sources you choose becomes your diversified income plan.



Income Options at Retirement

	No Longevity Risk Pooling	100% Longevity Risk Pooling
More Liquidity & No Guarantee	1 (PW = SWiP)	3 (Tontine Pool)
Less Liquidity & Some Guarantee	2 (Derivatives)	4 (Life Annuity)

A rational approach to spending:

- *"...As far as I am aware, no one has challenged the view that if people were capable of it, they ought to plan their consumption, saving and retirement according to the principles enunciated by Modigliani and Brumberg in 1950s..."* **Prof. A. S. Deaton, Princeton (2005)**

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The Financial Economist Says:

$$\max_{c} V(c) = \int_0^D e^{-\rho t}({}_tp_x)u(c_t)dt$$

$$\dot{F}_t = vF_t - c_t + \pi_0$$

$$F_D = 0, F_0 = W$$

Smooth consumption, taking into account your "patience" and survival probabilities….

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I don't want to "spend" any time on the mathematics…

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Spending Retirement on Planet Vulcan: The Impact of Longevity Risk Aversion on Optimal Withdrawal Rates

Moshe A. Milevsky and Huaxiong Huang

Recommendations from the media and financial planners regarding retirement spending rates deviate considerably from utility maximization models. This study argues that wealth managers should advocate dynamic spending in proportion to survival probabilities, adjusted up for exogenous pension income and down for longevity risk aversion.

In our study, we attempted to derive, analyze, and explain the optimal retirement spending policy for a utility-maximizing consumer facing (only) a stochastic lifetime. We deliberately ignored financial market risk by assuming that all investment assets are allocated to risk-free bonds (e.g., Treasury Inflation-Protected Securities [TIPS]). We made this simplifying assumption in order to focus attention on the role of longevity risk aversion in determining optimal consumption and spending rates during a retirement period of stochastic length.

By longevity risk aversion, we mean that different people might have different attitudes toward

retirement spending behavior has not received as much attention, and most practitioners are unfamiliar with the concept.

Although neither our framework nor our mathematical solution is original—they can be traced back almost 80 years—we believe that the insights from a normative life-cycle model (LCM) are worth emphasizing in the current environment, which has grown jaded by economic models and their prescriptions. Our pedagogical objective was to contrast the optimal (i.e., utility-maximizing) retirement spending policy with popular recommendations offered by the investment media and financial planners.

But there is a closed-form analytic expression for the optimal consumption rate at retirement in the presence of longevity risk.

$$c_0^* = \frac{\left(W + \frac{\pi_0}{r}\right)e^{r\tau} - \pi_0/r}{a_x^{\tau}(r-k, m^*, b)e^{r\tau}}.$$

It is similar to the (Chilean) formula for programmed withdrawal (PW). The numerator is a pseudo-account value and denominator is an actuarial annuity factor. PW has strong basis in economic theory!

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Economics of Systematic Withdrawal Plan (a.k.a. Programmed Withdrawal)

1. A larger pre-existing pension income leads to higher spending rate, rationally.
2. The investment factor in the denominator is based on a risk-adjusted forward looking investment (TITRP) return, not historical.
3. The actuarial factor in the denominator is adjusted for longevity risk aversion and doesn't use pure biological mortality rates.

Net-Withdrawal Rates from $100 at age 65

Realistic Investment Assumption: v = 2.5%

	Increasing Longevity Risk Aversion….			
Pre-Existing Pension Annuity	$\gamma = 1$	$\gamma = 2$	$\gamma = 4$	$\gamma = 8$
$0 for life	**6.33%**	**5.30%**	**4.60%**	**4.12%**
$1 for life	**6.80%**	**5.65%**	**4.87%**	**4.32%**
$2 for life	**7.16%**	**5.92%**	**5.08%**	**4.48%**
$5 for life	**8.02%**	**6.55%**	**5.55%**	**4.83%**

Note: Assumes 5% Survival to Age 100, 25% Survival to Age 93 and 50% to Age 87. Subjective Discount Rate (ρ) assumed equivalent to real investment rate.

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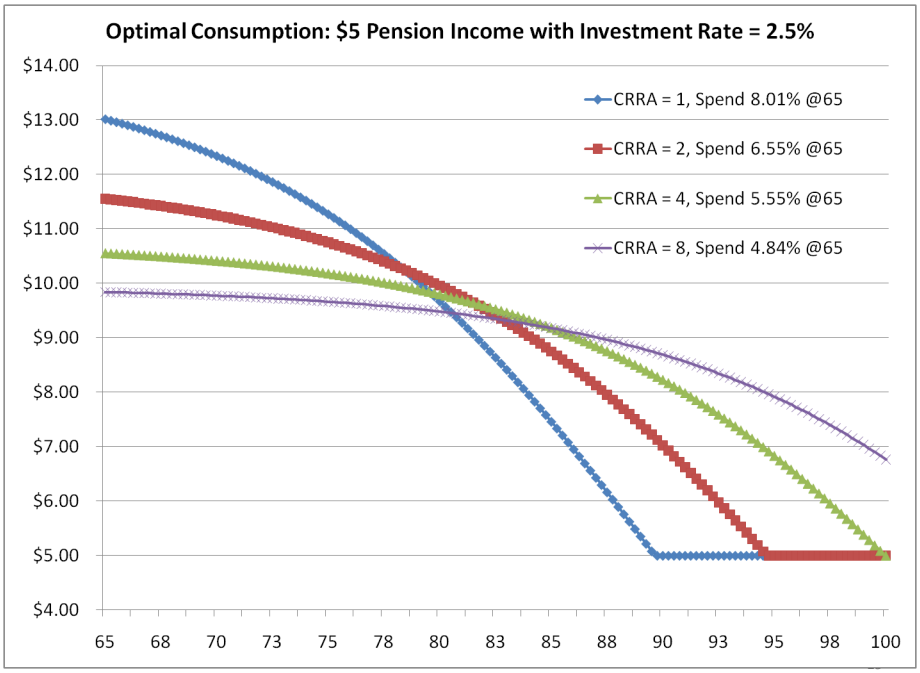

My takeaway:

- Optimal withdrawal rate are complicated and are not universal (e.g. 4%, which is popular in North America).
- Optimal ***Pensionization*** depends on:
  - (i.) current interest rates, and valuation P/E ratios.
  - (ii.) pre-existing pension income, and
  - (iii.) longevity risk aversion (LoRA)

How Does "Pensionization" Impact Retirement Consumption at age 65?

Percent of $100 Pensionized	Medium Risk Aversion (CRRA = 4)	High Risk Aversion (CRRA = 8)
0%	$4.605	$4.121
20%	$5.263	$4.801
40%	$5.795	$5.385
60%	$6.227	$5.937
100%	$6.330	$6.330

Note: Cost of $1 lifetime income annuity is $15.791 at age 65, assuming a real pricing rate of 2.5% per annum.

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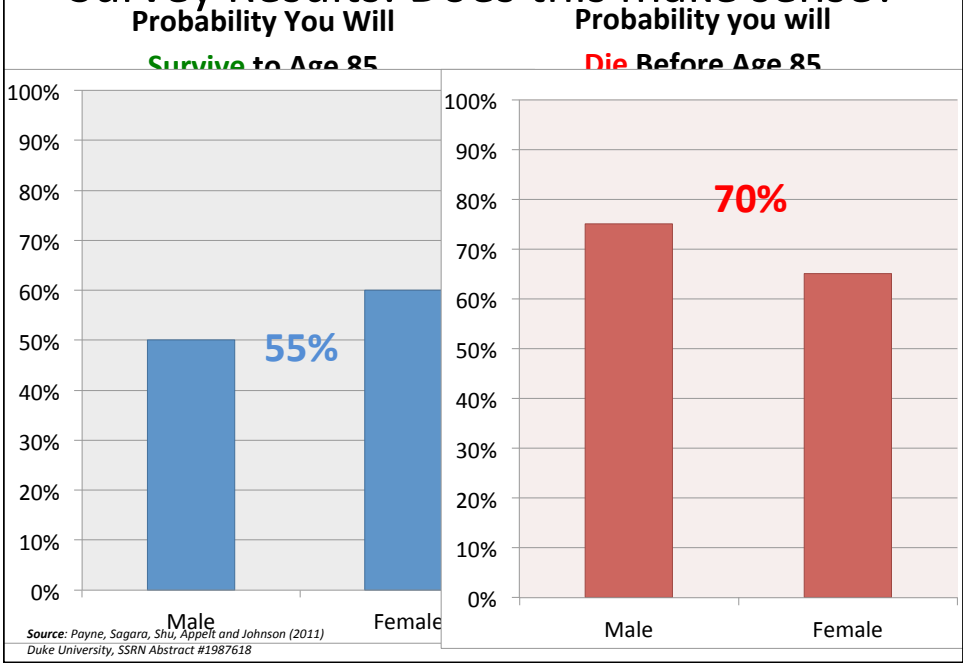
The behavioral finance obstacles are numerous, especially at retirement.

Survey Results: Does this make sense?



*"…Overall, the estimated mean life expectancies, across three studies, were between 7.3 to 9.2 years longer when solicited in **live-to** vs. **die-by** frame…."*

Source: Payne, Sagara, Shu, Appelt & Johnson, 2011
Life Expectancy as a Constructed Belief

My Takeaway:

- Humans have a difficult time conceptualizing longevity risk and the associated probabilities. They need help to think it through and understand the tradeoffs.

What does the Retirement Income "product of the future" look like?

Prediction is very difficult, especially about the future.
Niels Bohr
Danish physicist (1885 - 1962)

Missing Products?

1. Slow Dynamic Annuitization (SDA) Funds
2. Delayed Income Annuities (DIA) Product
3. Variable Income Annuities (VIA) Product
4. Ruin-Contingent Life Annuities (RCLA)
5. Service (vs. Income) Annuities

Linking the Beginning and the End

- There is a strong argument to be made for having individuals purchase longevity protection early-on in the lifecycle…
- In a DC system there is a huge sensitivity to investment rates and realized returns around the retirement age.
- Perhaps this "timing risk" should be hedged earlier as opposed to mitigated in expectation (only).

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One particular annuity design…

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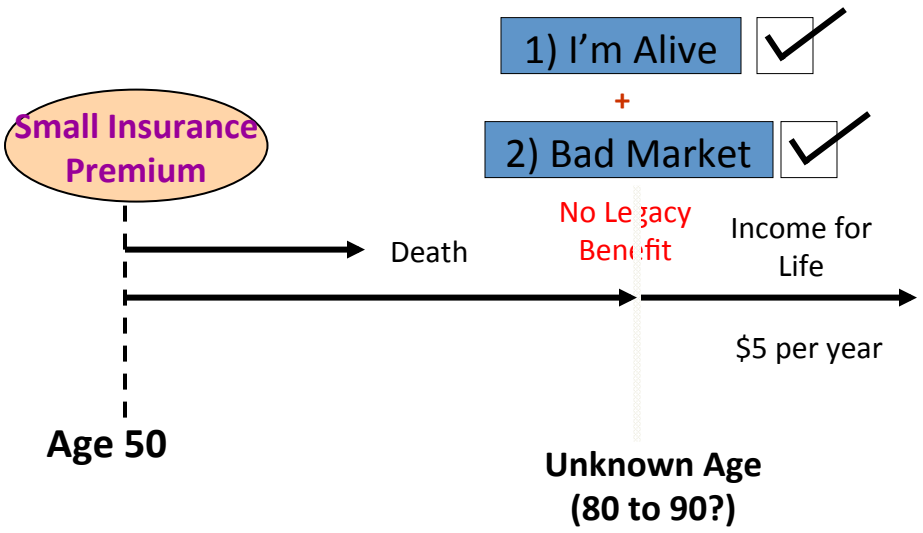
VALUATION AND HEDGING OF THE RUIN-CONTINGENT LIFE ANNUITY (RCLA)

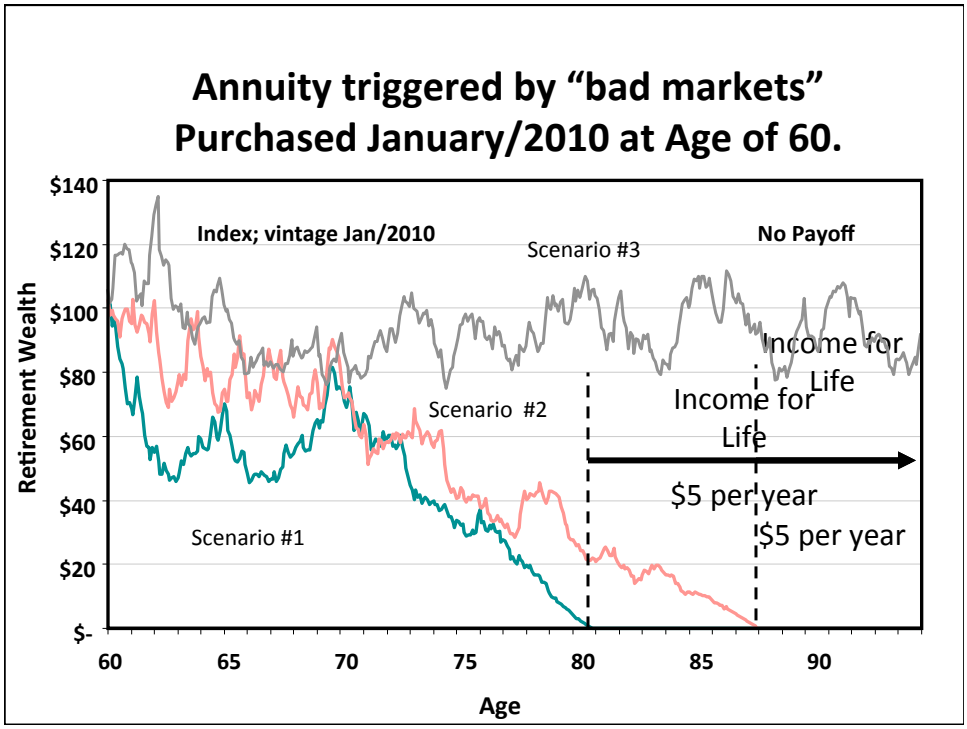
H. Huang
M. A. Milevsky
T. S. Salisbury

ABSTRACT

We analyze an insurance instrument called a ruin-contingent life annuity (RCLA), which is a stand-alone version of the option embedded inside a variable annuity (VA) but without the buyer having to transfer investments to the insurance company. The annuitant's payoff from an RCLA is a dollar of income per year for life, deferred until a certain wealth process hits zero. We derive the PDE satisfied by the RCLA value assuming No Arbitrage, describe efficient numerical techniques, and provide estimates for RCLA values. The practical motivation is twofold. First, numerous insurance companies are now offering similar Contingent Deferred Annuities (CDAs). Second, the U.S. Treasury and Department of Labor have encouraged DC plans to offer longevity insurance to participants and the RCLA might be the ideal product.

Return Contingent Life Annuity (RCLA) "Conceptual Idea"





In ancient times, pension annuities were paid-out in food and services…

Kings II, Chapter 25, Verse 27-38

And it came to pass…that the king of Babylon did lift up the head of the king of Judah out of prison….And he spoke kindly to him, and he did eat bread continually before him all the days of his life. And his allowance was a daily rate for every day, all the days of his life.

First documented pension annuity in the year 550 B.C. (approx.)

More enjoyable pension…

King Edward III granted the 35 year-old poet a "gallon of wine daily for the rest of his life" to be served at Port of London

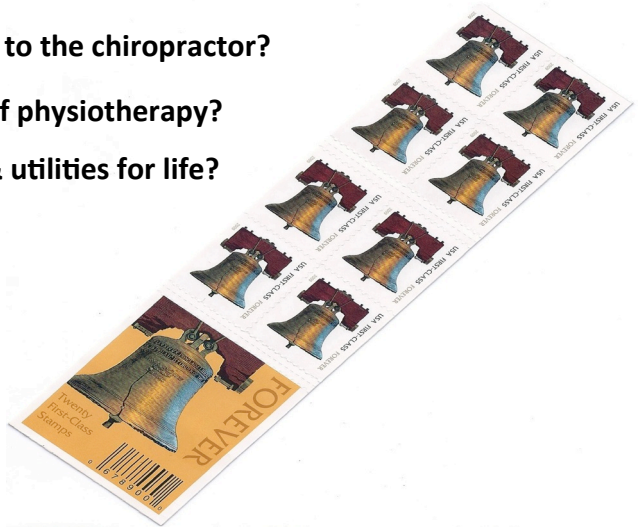
Geoffrey Chaucer
b. 1343 – d. 1400

Product of the Future: **Forever Services**

20 visits to the chiropractor?

A year of physiotherapy?

Water & utilities for life?



Concluding Remarks

- The optimal income portfolio is a cocktail (mixture) not a corner (either-or-solution).
- Allow for different preferences around consumption now vs. consumption later as well as bequest and longevity risk aversion.
- Finally: Chile has a reputation around the world as a leader in the design of individual account pension schemes. It should continue to innovate!

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More in recent (2012) book….