

## Adjustable Biological-Age Pricing For The Global Market

by Chiu-Cheng Chang

Just as stated in the Call for Essays, we are witnessing an evolutionary shift in almost every aspect of the life insurance industry. The demographic profile of our primary client base is changing. New distribution channels are emerging. We are even changing the way that we assess and manage risk.

There are many active participants in the life insurance industry in addition to life insurance companies. The line between financial service companies has blurred. Risks are written in one market and shifted to other markets, or combined with other unrelated risks as a means to mitigate risk. Operating in a rapidly changing global economy adds a level of complexity to the management of life insurance companies.

The Call for Essays emphasizes the need for the life insurance industry to continuously adapt in order to be in a position to effectively and efficiently operate. It is because of this emphasis that I feel obliged to write this essay to present my view of “Life Insurance 2020 Foresight.”

Pricing life insurance products equitably has been a great challenge to our industry. From the time when a combined male and female mortality table was used to the time when male and female distinct tables are used, we have also come up with various risk classification methods such as the use of levels of substandard risks and preferred risks, smokers versus nonsmokers, etc. Although it is well known that married policyholders have much better mortality rates than those of unmarried, and the differences are just as large as those between smokers and nonsmokers, it seems that no life insurance company has used this factor to further classify risks. One wonders whether it is too cumbersome to trace married versus unmarried status.

In 1992, I presented a paper titled, “Mathematical Approaches to Estimate Human Biological Age” to the 24th International Congress of Actuaries (ICA) in Montreal, Canada (*ICA Transactions* Vol. 4, pp. 401–406). For that

paper, I used a large volume of World War II data of Japanese survivors from the atomic bombs. About 20 physiological variables were used to determine a person’s biological age.

Time flies, and technological advances exceed our expectations. Today we have medical devices (scans, scanners, tools, equipment, etc.) that also utilize about 20 inputs (variables, indexes, measurements, etc.) to calculate human physiological (biological) ages. These devices are noninvasive and so simple to use; they are truly handy and convenient. Moreover, many studies conducted by the manufacturers of these devices confirm that the calculation results are very much consistent with today’s common knowledge regarding, for example, healthy lifestyle. In other words, we can predict, based on those 20 variables, whether one’s biological age will be more or less one’s chronological age before we actually measure it. I feel that these devices have achieved what I had envisioned in my 1992 paper: A human being’s true biological age should be measurable or at least closely estimated, and every human being should have two (most likely) distinct ages—a chronological and a biological age.

The traditional approach to pricing life insurance products on a single fixed age over the entire policy duration is clearly outdated. Policyholders could change from being a smoker to a nonsmoker or vice versa; from being obese to overweight, then to standard weight; to a preferred risk or in reverse order, from being a substandard risk to a preferred risk and vice versa; from being married to divorced to remarried to divorced to becoming single; or any of all the possible mathematical combinations of the above and beyond. Clearly the traditional approach is not suitable to today’s highly dynamic and rapidly changing global lifestyle since it is considered piecemeal, unsystematic, static, short-term, local, regional, less scientific, too cumbersome and non-global.

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Pricing life insurance products according to one's biological age (supplemented by well-established but simple underwriting tools if necessary at the very beginning of 2020) is simple, systematic, dynamic, more scientific and global. It is nothing but a simplified and unified approach to traditional risk classifications. It may also be viewed as a clear-cut summary or a very condensed form of traditional multiple sets of mortality tables. Using modern medical devices to measure one's biological age, we can see very clearly that throughout one's lifetime one can definitely and significantly decrease or increase one's biological age versus one's chronological age. One important but perhaps forgotten social (now global) function of the life insurance business is to change policyholders' behavior for the very benefit of the policyholders themselves. Pricing according to biological ages can rekindle and highlight this function most effectively.

More than 30 years ago, life insurance companies used a single fixed interest rate to price life insurance products over the entire policy period. It was truly revolutionary when the life insurance industry replaced a single fixed interest rate with floating (variable, adjustable) interest rates for pricing purposes just as other financial service industries adopted floating interest rates for all financial transactions. What I am suggesting now is nothing but to catch up with the transition from a single fixed interest rate to floating interest rates: a new transition from a single fixed chronological age to dynamic adjustable biological ages.

This new transition is expected to become more intense in a time of rapidly intensified economic globalization for the following reasons:

1. Today's human beings are undergoing much faster and more intense changes throughout their lifetime than at any time in history; the more intensified the economic globalization, the more so. These changes will be reflected in one's biological age most directly and

effectively. This is because biological age is so dynamic; it is unlike chronological age, which is fixed and static.

2. Because of the deterioration of the environment, work-related stress, unemployment, financial crises, natural disasters, etc., many old and new diseases and ill health are attributed to unhealthy lifestyles. In fact, a growing number of researchers have even concluded that all modern diseases are lifestyle diseases. And far more people are now paying much more attention to the relationship between their lifestyle and their health. Since biological age is such an effective indicator, people will be using it more intensively.

Armed with the adjustable biological-age pricing tool, life insurance companies can then target the global market simply as never before. To envision how such a biological-age-pricing scheme may end up globally in 2020, let us first look at the automobile insurance market in California where auto insurers use about 20 variables (including high school GPAs) to price auto insurance premiums for young drivers. All the drivers have to do is to keep calling various insurers until they are satisfied with the best offer they can get. Similarly in the United States, where large amount term life insurance premiums are highly competitive, potential buyers shop for the best offer just like the young drivers in California shop for auto insurance. Finally, today's Internet is booming with all sorts of similar auctioneering approaches to buying and selling.

I envision the future life insurance market with the adjustable biological-age-pricing scheme will look like those phenomena I describe above. Obviously, we have to deal with a number of issues between now and 2020 as highlighted below:

1. Find a base (state, country, nation, territory, legal entity, tax haven, etc.) where the insurer is allowed to issue policies using biological age for pricing purposes.

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2. Work closely with regulators in various jurisdictions worldwide convincing them that adjustable biological-age pricing is nothing but a simplified and unified version of the traditional but much more complicated risk-classifying scheme. Once a regulator is so convinced and approves the sale of a biological-age-priced product, it is expected that other regulators will follow suit just as smoker versus nonsmoker distinct premium rates have experienced.
  3. Work out in great detail a global underwriting manual covering the medical devices to be used, the underwriting procedure and process to be followed, all the safeguards to be employed, etc.
  4. Establish a detailed but effective system to evaluate policyholders' requests for a change of their biological age. Since the devices are simple to use, the system will help push policyholders to lead a very healthy life-style, which in turn will bring about lasting benefits to all parties concerned.
  5. Establish a sophisticated system (paralleling to the system used to support floating interest rates) to effectively and adequately support dynamic changes in the biological ages.
- The adoption and popularization of the biological-age idea will have profound effects on the whole world. I will cite a few in the following:
1. We need a new definition of normal retirement age.
  2. We need to redesign pension plans.
  3. We need to redesign annuity products.
  4. Since upward mobility is part of human nature, we will witness a healthier world with higher and longer human productivity contributing to the global good.

*Chiu-Cheng Chang, Ph.D., FSA, FCIA, FAIRC, FSII, CLU, ChFC, MAAA, is chair professor in Risk Management at Asia University in Taichung, Taiwan. He can be contacted at [chiucheng@asia.edu.tw](mailto:chiucheng@asia.edu.tw) or [chiucheng@mail.cgu.edu.tw](mailto:chiucheng@mail.cgu.edu.tw).*