

Cambodian Insured Lives Mortality With Data Science

By Nicholas Yeo Chee Lek

Our firm has developed the first publicly available insured lives mortality table for Cambodia using data science methods. This essay provides a brief background, our approach and the impact of our work.

BACKGROUND

Our firm is actively serving the Cambodian market, performing actuarial work for several insurance companies as well as pension schemes. Prior to this, there are no published mortality tables for insured lives in Cambodia. This poses a significant challenge to performing actuarial work with high confidence in this market. The mortality assumptions to price and reserve for life insurance products, as well as assess pension liabilities, could deviate significantly from actual experience.

The life insurance industry in Cambodia only started in 2012.¹ In 2018, the industry wrote USD 196 million gross premiums, with life insurance premiums totaling less than 1 percent of the country's GDP.² Whilst Cambodian population mortality statistics are publicly available, the expectation is that mortality for insured lives differs significantly with those of the general population due to socio-economic composition. The insured lives represent a small proportion of the highly affluent Cambodian population rather than the general population. As an example, the general population life expectancy of a Singaporean male is 81 years³ whilst the general population life expectancy of a Cambodian male is 67 years.⁴ Using general population rates, albeit with adjustments, is unlikely to yield accurate results.

In other countries around the region, it is common for the life insurance industry to pool together claims data to perform industry-wide mortality studies. However, in 2018, total death claims paid in the industry is around USD 2 million.⁵ Hence industry-wide mortality studies would not yield any credible results. Furthermore, performing such a traditional mortality analysis requires significant resources, which does not economically commensurate with the current size of the life insurance industry in Cambodia.

OUR APPROACH

Our approach is to apply data science methods to derive a mortality table that would better reflect the expected mortality of insured lives in Cambodia. The starting point of our work is the published mortality tables for insured lives from around the region including Malaysia, Singapore, Philippines, and Indonesia, as well as various macroeconomic indicators including population life expectancy, life insurance penetration and GDP per capita which we hypothesize to be a useful predictor of mortality rates.

Having gathered insured lives mortality tables as well as macroeconomic factors from around the region, we began training several models utilizing data science methods. Eventually, we have decided that the most suitable model (based on the best fit as well as actuarial judgment) to be used is a cubic quasi-binomial regression. With this, we produced a mortality table for insured lives in Cambodia from ages 0 to 70, for males and females, which we label NCIB2020 (n-actuarial Cambodian Insured-Lives Base). We also perform pension work in Cambodia. Thus, we have augmented our mortality tables, and then used

the Coherent Kannisto⁶—a modification of the Kannisto method to extrapolate for older ages, to create a table that reflects the mortality rates of annuitants in Cambodia. We have labelled this annuitant mortality table as NCAB2020 (n-actuarial Cambodian Annuitant Base).

The results of our work are published on our website. The main reason we have decided to make our work publicly available, as opposed to keeping it proprietary, is that we are of the opinion that this will enhance public interest in the long term. Actuarial science and its applications are beginning to grow in Cambodia, making more actuarial work publicly available would go a long way to advance actuarial science in the market.

IMPACT OF OUR WORK

The NCIB2020 is currently used in setting and benchmarking pricing assumptions for life insurance, enabling life insurance to be transacted at a fair price. The existence of a mortality table for insured lives reduces the scope for deliberate and/or erroneous over- and under-pricing in the market, promoting strong and stable growth of the life insurance industry. Accurate reserving mortality assumptions would further support the strong and prudent financial management of life insurance companies. Using our mortality tables in pension valuation also helps to ensure that pension benefit promises are adequately funded and accurately accounted for.

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¹ Insurance Association of Cambodia. (n.d.). Who We Are. [online] Available at: <http://www.iac.org.kh/index.php/about-us/brief-history> [Accessed 28 Jan. 2020].

² Bunthoeun, C. (2019). Insurance industry sees strong growth. Khmer Times. [online] Available at: <https://www.khmertimeskh.com/658069/insurance-industry-sees-strong-growth/> [Accessed 28 Jan. 2020].

³ The World Bank Data. (2020). Life expectancy at birth, male (years) - Singapore | Data. [online] Available at: <https://data.worldbank.org/indicator/SP.DYN.LE00.MA.IN?locations=SG> [Accessed 28 Jan. 2020].

⁴ The World Bank Data. (2020). Life expectancy at birth, male (years) - Cambodia | Data. [online] Available at: <https://data.worldbank.org/indicator/SP.DYN.LE00.MA.IN?locations=KH> [Accessed 28 Jan. 2020].

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- ⁵ Chan, S. (2019). Potential insurance growth in the horizon. Capital Cambodia. [online] Available at: <https://capitalcambodia.com/potential-insurance-growth-in-the-horizon/> [Accessed 28 Jan. 2020].
- ⁶ Ševčíková, H., Li, N., Kantorová, V., Gerland, P. and Raftery, A. (2015). Age-Specific Mortality and Fertility Rates for Probabilistic Population Projections. pp.6-7.