



Mortality and Longevity



Aging and Retirement

Chronic Diseases and Longevity Risk: An Application to Type II Diabetes Insurance Products





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Abstract

Prolonging life is a global trend and population ageing is speeding up in many countries. As a result, more medical expenditures are used for chronic diseases since the elderly often have chronic diseases. For example, about 3/4 and 1/2 of Taiwan's elderly have at least one and two chronic diseases, respectively. Diabetes is a common chronic disease and many serious health conditions are connected with diabetes. Total estimated cost associated with diabetes in the United States was \$245 billion in 2012. However, many people are not aware that diabetes is common and at least 23.8% of patients do not know they have diabetes. (Source: U.S. National Diabetes Statistics 2017) The numbers of deaths related to diabetes are increasing and it becomes the 5th and 4th cause of death in 2017 for the Taiwan men and women, respectively (Source: Taiwan's Ministry of Health and Welfare).

In this study, we aim to evaluate the cost of diabetes and to design insurance products to deal with the disease, using the data from Taiwan's National Insurance (NHI). In particular, we are interested in the incidence and mortality rates of diabetes, as well as its medical usage. We use mortality models, such as the Lee-Carter and Age-Period-Cohort models, to explore their trends. Also, we will use the continuous prescription for chronic diseases to determine whether people know they have diabetes, since people with the continuous prescription can have 3-month refillable prescription under the NHI. The empirical study is based on two data sets from the NHI, and both data sets are one-million random samples of Taiwan people: one for the group of ages 0-99 and the other for ages 65-99, accounting for about 4.6% and 45.7% of Taiwan's populations in each age groups. The advantage for using the data set of ages 65-99 is to increase the sample size of the elderly and thus increasing the stability of analysis results.

We found that the incidence and mortality rates of diabetes change with a constant and stable path, and the Lee-Carter model can provide fairly satisfactory estimates. The analysis results also indicate that the people with diabetes without taking diabetes medication have higher mortality rates, than those taking diabetes medication regularly. We also demonstrate how these results can be used to design insurance products associated with diabetes, which can help the insured and their families to face the consequence. In addition, we discuss different criteria for judging whether people have diabetes in commercial insurance and show that they can be related to the possibility of moral hazard for the diabetes products. The judging criteria of diabetes vary a lot between different doctors.

Keywords: Diabetes, Chronic Diseases, Mortality Models, Longevity Risk, National Health Insurance

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