CHAPTER 9

INSURANCE POLICY DURATION ANALYSIS USING NON-PARAMETRIC AND SEMI-PARAMETRIC SURVIVAL ANALYSIS

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9.1 INTRODUCTION

Insurance is the world's oldest financial product and is critical to everyone's well-being. There are numerous sorts of insurance, including auto insurance, critical sickness insurance, travel insurance, personal injury insurance, and life insurance. According to Great Eastern, insurance is critical in everyone's life because it assists in paying bills during a period of illness and provides financial assistance to the unemployed and students. According to "The Essentials of Life Insurance in Malaysia" life is frequently unpredictable and uncertain, which is why insurance is critical. Insurance helps safeguard the victim's family from these unforeseen and unavoidable life catastrophes.

Insurance is the oldest financial product and is very important in everyone's life. Based on 2012/2013 Protection Gap Study by Life Insurance Association of Malaysia (LIAM), it is found that only 56% of Malaysians are covered by life insurance. Critical illness insurance is

known as one of the most unique products in the insurance world which covers up to 36 critical illnesses such as heart attack, stroke, and cancer. Although the statistic shows that critical illness is commonly known by Malaysian, but research found that only 90% of Malaysian have less than RM100, 000 critical illness insurance coverage. The data obtained in this study is critical illness insurance data taken from one of the biggest insurance companies, Great Eastern in Malaysia for April 2017 to March 2018.

9.2 THE EARLIER RESEARCH ON INSURANCE CLAIM MODELLING

Insurance claim modelling is a critical actuarial undertaking in property-casualty insurance (Shi & Ivantsova, 2015). In the study of Mazviona and Chiduza (2013), the distribution of insurance claims can be in terms of their number or size. Without utilising any statistical distribution, simple observations of individual claims and their frequency could be used to estimate the insurance claim distribution. However, most of the data acquired from an insurance claim is raw data, which can be used to estimate the model. As a result, developing a model and utilising theoretical distribution is critical. Poisson and binomial distributions are examples of theoretical distributions that can be used to describe the number of claims, whereas continuous distributions such as gamma, Pareto, normal, log-normal, and others can be used to model the claim size distribution.

9.2.1 Survival Analysis

Survival analysis is the analysis of time to event data. In the research of Despa (2010), the event varies depends on the research topic such as death, the occurrence of a disease, divorce, marriage, others. Time responses are typically continuous and may be imprecise subjects. It might be expressed in terms of days, weeks, or years.

Typically, responses that are not fully noticed are suppressed. Censorship happens when the survival time is unknown or insufficient. According to Kartsonaki (2016), the simplest yet most widespread form of censorship is referred to as right censorship. Right censoring happens when an individual is followed from a point in time to a subsequent point in time, even though the participant has demonstrated a lack of interest in the event. Censorship is critical in survival analysis because it denotes a particular type of observation. In comparison to conventional regression models, survival analysis delivers more precise information for both censored and uncensored observations when evaluating critical model parameters.

The original purpose of survival analysis, as stated in Jager et al. (2008) articles, is to model and analyse "time-to-event" data. The events in data associated with an endpoint at the time the event occurs are not limited to death but may include any other type of event. Numerous studies have been conducted to determine the prevalence of a combined or composite outcome. Regardless of the nature of the incident, researchers often utilise overall mortality as the data for the survival analysis. It is understandable that not all patients will experience the event throughout the follow-up period, which is why the survival time is seen to be censored.

A known nonparametric approach in survival analysis is Kaplan-Meier approach (Kaplan & Meier, 1958). The main concept of Kaplan-Meier approach is to estimate a population survival curve from a sample. It is a nonparametric method used for modelling survival distribution. According to Peto (1973), Log-rank test is a statistical comparison for groups of observation with event times where some of the observations may be censored. Cox proportional-hazards regression is a widely used statistical method in the analysis of time-to-event data with censoring and covariates (Fisher, 1999). In Koletsi and Pandis (2017), paper states that Cox regression enables us to calculate a special form of rate ratios called hazard ratios.