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Short report

A study on the effect of exclusion period on the suicidal risk among the insured

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ABSTRACT

An exclusion period (usually from 12 months to 2 years) is usually found in life insurance policies as a precautionary measure to prohibit people from insuring their lives with the intent to kill themselves shortly thereafter. Several studies have been conducted to investigate the effect of exclusion periods on the risk of suicide among the insured in the US and Australia. However, while Hong Kong has experienced an increase in the number of suicides among the insured, little is known about the dynamic between the exclusion period and suicide in Asia. Here we make use of death claims data from one of the major life insurance companies in Hong Kong to ascertain the impact of a 12-month exclusion period on suicide risk. We also use utility functions derived from economic theory to better understand individual choices regarding suicide among the insured. More specifically, we sought to determine whether there is a greater risk of suicide immediately following the 12-month exclusion period. We also examined whether the risk of suicide claims was higher than that of other non-suicidal claims. The study period for this investigation was from January 1, 1997 to December 31, 2011, during which time there were 1935 claims based on 1243 deaths. Of these, 197 were suicide-related claims for 106 suicide deaths. The mean number of life policies held by suicidal claimants and non-suicidal claimants was 1.6 and 1.4, respectively. The average/median size of the claims (total payment made on all policies held by the insured life) was HK$665,800/426,600 and HK$497,700/276,200 for suicidal and non-suicidal deaths, respectively. The policy lifetime of the claims, or the number of days from policy issuance to suicide occurrence, ranged from 38 to 7561 days, with a mean of 2209 days, a median of 1941 days, and a standard deviation of 1544 days. The peak density of suicide claims occurred on day 1039 of the policy. Our results revealed that suicide claims tend to occur earlier than other claims and that there is a greater risk of suicide observed following the 12-month exclusion period. Some suggestions are made in terms of extending the exclusion period, which is anticipated to significantly reduce suicide at the global level.

1. Introduction

Suicide is a major public health issue worldwide. About one million people kill themselves every year (World Health Organization [WHO], 2008; Yip, 2008; Chen et al., 2012; Lozano et al., 2012). Aside from the emotional cost to the families and friends involved, the economic costs that can be attributed to suicide are also significant (Yip et al., 2005; Law et al., 2011). A recent increase in suicide rates among life-insured individuals has raised concerns in the insurance industry (Kennelly, 2007; Yip et al., 2010; Actuarial Society of Hong Kong (ASHK, 2012). In this paper, we examine the timing of suicide deaths among life insurance policy holders of a major insurance company in Hong Kong to explore the effect of the exclusion period on suicide risk.

When a life insurance policy is purchased, a certain suicide exclusion period applies. If a life-insured individual commits suicide during the exclusion period, the life insurance company is not required to pay the sum indicated in the policy to the beneficiaries of the deceased insured. In setting a suicide exclusion period, life insurers attempt to strike a balance between the desire to provide complete coverage for death from all causes (which should naturally include suicide) and the need to avoid paying sums for those that intentionally insure their lives with the intent to kill themselves shortly thereafter (Kennelly, 2007; Chen et al., 2008b). The exclusion period in Taiwan, Hong Kong and the United Kingdom is twelve months. It is thirteen months in Australia, and twenty-four

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months in the United States (no exclusion period for military personnel). In 2006, Japan enacted a 36-month exclusion period to prevent suicide among the insured (Hiroko and Chida, 2011).

The first hypothesis examined in this paper regards the suicide exclusion period and the timing of suicide among life-insured individuals. We hypothesized that suicides among the insured are more likely to occur during and shortly after the exclusion period. Our second research hypothesis relates to the observed rate of suicide and the amount of money for which life-insured individuals are insured. We hypothesized that higher levels of insurance coverage, that is higher sums insured and/or a higher number of policies, would be associated with higher rates of death by suicide. In testing these hypothesis, we made use of utility functions derived from economic theory to better understand individual choices regarding suicide among the insured (Cutler et al., 2001; Hamermesh and Soss, 1974; Marcotte, 2003). Essentially, the concept of utility is premised on the assumption that, all things being equal, an individual's behaviour is governed by their quest to maximise their satisfaction, i.e., they will choose the option which is expected to bring the greatest benefit. We are not making the assumption that all suicide deaths among insured persons are premediated, with the insurer intending to kill himself at some future time while purchasing his policy. However, if an individual were to experience any misfortune, it may impact his mental health, leading him to contemplate suicide as a way out of his current difficulties. This may be even more likely if he were experiencing financial difficulties, and killing himself could mitigate some of the financial burden on his family members. In fact, a significant proportion of suicides have been previously shown to have suffered from financial difficulties (Yip et al., 2005).

Thus, by applying the concept of utility to suicide, we hypothesize that when individuals weigh up life and death choices, they will choose suicide in the event that they view the expected utility or benefit of killing themselves to outweigh that of continuing to live. In such instances, having a life insurance policy or policies may facilitate the decision to kill themselves by decreasing any financial burden their family may be experiencing. Within this theoretical model, the state of being insured following the expiry of the exclusion period can directly influence life and death choices and the timing of suicide (Chen et al., 2011a,b).

2. Data and method

In 2012, there were about 52 insurers operating in Hong Kong with a 7 million population. About 10 million number of life inforce policies and the annual premiums was about HK$175 billion (Office of the Commissioner of Insurance (2014)). In this study, we make use of data supplied by an insurance company with a market share about 3% in the number of policies. This data includes cause of death (i.e. accident, suicide or other cause of death), amount of payout, policy duration, and age and gender of the insured. As with all insurance companies in Hong Kong, this company has a 12-month exclusion period in place for suicide among its policy holders. However, due to commercial interest, the number of active policy holders was not available. Without information regarding the insured population (denominator), we were unable to determine either the crude suicide rates or the rates stratified by sex and policy duration (time since the policy was purchased), which have previously been used by Yip et al. (2010) to assess the impact of the exclusion period on suicide risk. Nevertheless, given that the total number of insured lives in the portfolio should be much larger than the number of deaths, we can assume that the number of people at risk (surviving insured) remained roughly constant throughout the study period. This allowed us to compare the risk of having a claim due to suicide and having a claim due to other reasons, and to see

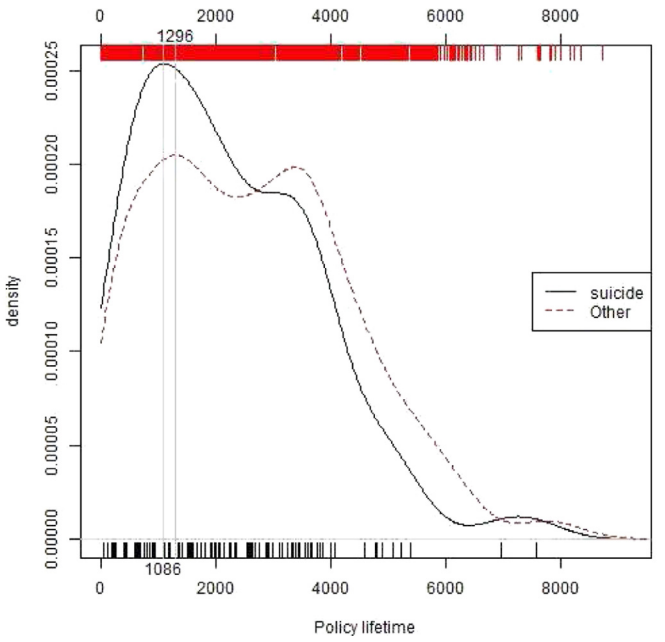

Fig. 1. Suicide claim policy lifetime distribution.

whether the suicide specific claim risk was influenced by the termination of the exclusion period. To avoid the essentially arbitrary choice of interval for data aggregation entailed by the discrete time approach used by Yip et al. (2010), we adopted a continuous time approach based on the counting process (Andersen et al., 1993).

In a continuous time framework, a natural measure of the risk of cause-specific claims is the hazard rate function of the policy lifetime (T), which has a definition similar to the more familiar mortality rate function of an insured life. For instance, the suicide specific hazard rate of the policy lifetime is defined by

$$h_S(t) = \frac{1}{dt}\Pr(T < t + dt, E = \text{“suicide”} | T \geq t),$$

where T is the policy lifetime and E is the claim reason ("suicide" or "other"). The hazard rate function for non-suicidal death claims is defined similarly. Let the total number of insured lives in the portfolio be n, the number of claims with policy lifetime less than or equal to t be $N(t)$, and the number of cause-specific claims for suicide and other reasons be $N_S(t)$ and $N_O(t)$, respectively. Then, given all the information about the policies until time t since policy issuance, the conditional intensity of the counting process $N_E(t)$ is $(n-N(t-))h_E(t)$. This represents the number of insured lives remaining in the portfolio right before time t. In other words, given the claim history of the portfolio right before time t, the conditional probability of having a claim in the time interval $(t, t + dt)$ is approximately $(n-N(t-))h_E(t)dt$, which is proportional to the size of the "risk pool" $(n-N(t-))$ and the cause-specific hazard rate $h_E(t)$, where $E = S$ for "suicide" and O for "other reasons". If we assume n to be reasonably large compared to $N(T) = N_S(T) + N_O(T)$ with T denoting the longest policy duration (or age of the oldest active policy) observed during the study period so that $n - N(t) \approx n$, for $t \leq T$, the cause-specific claim hazards $h_S(t)$ and $h_O(t)$ and their derivatives can be estimated up to the unknown portfolio size n using the local polynomial method (Chen et al., 2008a, 2011a, Chen, 2011). Our main purpose in estimating the hazard (and its derivatives) is to determine if a change point/jump point on the hazard rate at the end of the exclusion period is plausible. For this