

Risk Preference Heterogeneity and Private Health Insurance under National Health Insurance Program in Taiwan: Reexamination by Latent Class Analysis

1. Motivation

The risk attitude plays a prominent role in decision-making under the uncertain environment. Rothschild and Stiglitz (1976) provided the theoretical model to demonstrate that individual with higher expected claims intend to purchase more insurance than those with lower expected claims. That is to say, higher-risk type individuals tend to buy more insurance. The asymmetric information which documents the relationship between the individual's risk-type and insurance purchase has been regarded as important issues after Rothschild and Stiglitz (1976). Numerous studies attempt to investigate asymmetric information under different types of insurance markets such as health, automobile, long-term care, and pension insurance markets; however, the empirical results are mixed. Some studies supported the evidence that the asymmetric information exists in insurance market (Puelz and Snow, 1994; Cohen, 2001) while others did not support the asymmetric information (Cawley and Philipson, 1999; Cardon and Hendel, 2001; Chiappori and Salanie, 2000).

However, since the empirical results are mixed, there are studies had paid more attention to discuss the relationship between individuals' insurance preference and their risk type (Culter et al., 2005; Finkelstein and McGrary, 2006; Donni, 2010; Finkelstein and Poterba, 2014). Specifically, most of the studies often utilized drinking, smoking, uses of seat belt and the healthcare preventive examination as the proxies for risk tolerance or preference in their analysis. For example: Culter et al., (2005) used drinking and smoking as the proxies for risk tolerance and examined how measures of risk tolerance are related to the occurrence of risk, and to whether the individual has insurance in five different insurance markets (life insurance, acute health insurance, annuities, long-term care insurance, and Medicare supplement insurance). Finkelstein and McGrary (2006) demonstrated that insurance purchase decision is positively associated with use of seat belts and the healthcare preventive examination. Their results suggested that risk preference is an important factor affecting the long-term insurance demand.

The purpose of this paper is to investigate the relationship between risk preference and purchase of private health insurance based on latent class analysis (LCA) framework. Different from previous studies that utilize drinking, smoking etc. as the proxies for risk tolerance or preference, we will use Latent Class Analysis (LCA) to identify risk-tolerance classes. LCA can translate a set of

observed risk-tolerance variables (such as the observed drinking or smoking behaviors) into a set of latent variables and identify the mutually exclusive risk-tolerance classes where within-group risk-tolerance differences are minimal and between-groups differences are maximized. Therefore, LCA can adequately deal with the issue of heterogeneity since the within-group class shares the similar risk-tolerance patterns. We will then use probit model to analyze the relationship between the risk-tolerance classes and private health insurance. In general, LCA is widely used in studies regarding medical utilization and health care field (Deb and Trivedi 2002; Bago d'Uva 2005 a,b; Greene *et al.* 2008; Scharoun_Lee *et al.* 2008; Lafortune 2009; Laska *et al.* 2009 ; Thorpe *et al.* 2011). However, only a few papers applied the latent class analysis to the insurance field (Donni 2010). Thus, our study is the first research to use LCA examining the relationship between risk preference heterogeneity and private health insurance. Furthermore, in order to test for asymmetric information, we will also investigate the relationship between each latent risk-tolerance class and the utilization of subsequent inpatient services by probit model. Therefore, follow the methodologies provided by previous papers (Chiappori and Salanie, 2000; Finkelstein and McGrary, 2006; Finkelstein and Poterba, 2014), we can estimate the two probit equations simultaneously to implement the standard positive correlation test for asymmetric information. Specifically, it is worth noting that Taiwan has implemented the national health insurance (NHI) program since 1995. The NHI is a universal and compulsory social health insurance program (the coverage rate is 99%). The private health insurance in Taiwan is regarded as supplementary insurance to the public health system (Tian *et al.*, 2012). Therefore, the results of this study may offer evidences regarding asymmetric information of the supplementary health insurance market.

2. Data

Our data were obtained from two secondary resources. The first one is the 2005 National Health Interview Survey (NHIS). This database adopted the face-to-face interviews and a multi-stage stratified systematic sampling design method. The 2005 NHIS provides nationwide detailed population information on a series of individual characteristics, including age, gender, marital status, educational attainment and income, as well as detailed information on personal health conditions and other types of health-related behavior¹. We will adopt several measures of behaviors that are likely to capture individual risk preference to construct the risk-tolerance latent classes. These variables include whether the individual has health care prevention checkups, habits of drinking, smoking or betel nut chewing, uses of seat belts or helmets.

¹ The NHIS comprises 24,276 individuals, the numbers of those aged below 12 and above 65 years old being 3,900 and 2,727, respectively. In this study, we select the individuals aged between 20 and 65 years old to construct our sample. The numbers of observations in our sample consists 14,184.

The second database used in this study was released by the National Health Research Institutes (NHRI) directly. The NHRI created this database by drawing data from the Taiwan National Health Insurance Research Database (NHIRD) and linked it with the 2005 NHIS. The NHIRD database is one of the largest and most comprehensive population-based data sources that include registries of medical facilities contracted with the BNHI, board-certified physicians, a monthly claim summary for all inpatient/outpatient claims, details of all inpatient/outpatient orders, and expenditure on prescriptions dispensed at contracted pharmacies. Therefore, we can use the linked claim data in 2005, 2006, and 2007 to analyze the relationship between each latent risk-tolerance class and the utilization of subsequent inpatient utilization.

3. Expected Results

The expected results of this study are described as follows.

- (a) We use Latent Class Analysis (LCA) to investigate the relationship between the purchase of private health insurance and risk-tolerance classes. LCA can adequately deal with the issue of heterogeneity since the within-group class shares the similar risk-tolerance patterns. It may also provide references as proxies of the insured's risk categorization from other aspects which are different from previous papers. However, since the empirical results of asymmetric information are mixed, there are studies had paid more attention to discuss the relationship between individuals' insurance preference and their risk type (Culter et al., 2005; Finkelstein and McGrary, 2006; Donni, 2010; Finkelstein and Poterba, 2014). Specifically, studies indicate that despite the risk type, if the unobserved preference is positively with the insurance demand and negatively with the risk occurrence, the correlation between insurance coverage and risk occurrence can be negative. Thus, the unobserved heterogeneity preference may offset the adverse selection and obscures the expected positive correlation between insurance coverage and risk occurrence (Culter et al., 2005; Finkelstein and McGrary, 2006). Therefore, by further investigate the relationship among risk-tolerance classes and the subsequent inpatient utilization, the results of this paper may also address this issue.
- (b) To combine National Health Interview Survey (NHIS) and National Health Insurance Research Database (NHIRD), we are able to further investigate the relationship among risk-tolerance classes and the subsequent inpatient utilization. Thus, we can also implement the standard positive correlation test for asymmetric information. We predict that asymmetric information may still exist in health insurance market even if after controlling individual's risk preference.