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The Distribution of Failure in Medical and Health Insurance Claim: The Implications of Multiple Binary Logistic Regressions

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Abstract

Purpose: Ownership of insurance policy among Malaysians is growing, especially since the Covid-19 pandemic at the end of 2019. The aim of this study is to examine the effects of economic and non-economic factors that may contribute to incidence of failures in medical and health insurance claims. **Research design, data and methodology:** This study used primary data with samples collected in an online survey involving 210 respondents, in Perak State. By adopting the Howards-Sheth consumer behavior theory, the multiple binary logistic regressions were used. **Results:** The study established that income, saving and prior experience is the significant factors effecting the incidence of claim failures in at least 95 percent cases. This is supported by the Howards-Sheth consumer behavior theory. When the odds ratio value of income is at 47.84 percent, insurance claim will have less probability of success. At a certain income level, the probability of failure in insurance claim will be lower. **Conclusions:** The study confirms that an increase in income will increase the probability success rate in insurance claim. Yet, rising income, the probability of the insurance policyholder to fail in insurance premium payment will be reduced. In conclusion, an increase in income of the policyholder is expected to reduce the probability of failure in insurance claims.

Keywords : Insurance Claims, Social and Economic Factors, Income, Insurance Claim Failure

JEL Classification Code: D1, D3, D7, I0, C8

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1. Introduction

The medical and health insurance can be defined as costs to cover medical care (Chung, 2020). A medical and health insurance policy is generally designed to cover the costs of private medical treatments, such as the expenditure of hospitalization and healthcare services, diagnosis of covered illnesses or an accident. The insurance can thus be classified as a guarantee of health protection in bearing the medical costs of the insured from health incidents which incur the burden of medical costs beyond their means (Brighetti et al., 2014). The health insurance is also a contract that requires an insurer to pay some or all of a person's healthcare costs in exchange for a premium (Rambeli et al., 2018). More specifically, health insurance typically pays for medical, surgical, prescription drugs, and sometimes dental expenses incurred by the insured. The insurance can reimburse the insured for expenses incurred from illness or injury, or pay the care provider directly. Academics have extensively explored the impact of social and economic factors on health insurance and claim incidents on the insurance policy holder. Numerous insurance claim literature reviews have been published. Nonetheless, the challenges and their consequences are worth investigating, not only for the public but also for the insurance and healthcare industries as a whole.

We however frequently hear of the failures incurred by medical and health insurance holders in making insurance claims. This may be due to many factors, especially social issues as often mentioned in past studies including Yusuf and Dansu (2012), Salleh et al. (2018), and Mohd Yusof and Abdul Razak (2019). Some researchers have also included the impact of economics factors (Salleh et al. 2018; Samsulhadi & Chalidyanto, 2020). This issue was also highlighted by Rambeli et al. (2022) who suggested that proper investigation or procedure need to be developed from fundamental level by the researcher in order to produce better claim procedures and thus reduce claim frauds. Rambeli et al. (2022) suggested that factors which influenced the expenditure for health and medical insurance in Malaysia should first be identified among the low-income households (B40). The focus was to examine the influence of household perception towards insurance companies, their knowledge and awareness on insurance purchase, household nutritional habits and expenditure incurred on health and medical insurance. In conclusion, the study highlighted that the premium contribution to health and medical insurance from low-income households (B40) is decreasing.

The trend could be attributed to many factors including claim issue, high premium payment and unattractive insurance plan. A similar study was also conducted by Marcus et al. (2016) who investigated factors that

encouraged contribution to health insurance among the population in Europe. There are however extant knowledge gaps that need to be elucidated, especially in terms of decision making in insurance claims. In this context, this study will aim to fill research gaps in identifying economic and non-economic factors that may be causal to failure cases in such claims. In other words, the study will elucidate the impact of economic and non-economic factors in determining the final decision for making insurance claims. In order to meet the main objective, the study adopted the Howard-Sheth consumer behavior theory in structuring the model specification. It implemented the multiple logistic regression model in estimating the probable impact of economic and non-economic factors on failure cases in medical and health insurance claims.

The following section comprises in-depth discussions on past empirical studies related to insurance claim issues and also the Howard-Sheth consumer behavior theory.

2. Literature Review

Past studies related to medical and health insurance claims in the Malaysian context are reviewed. Such insurance is commonly taken by the public to mitigate the future cost of treatments in case they contract harmful illnesses and diseases, or are involved in accidents. We also often hear of failures incurred by insurance holders in making subsequent claims. Studies that focus on such claim issues in Malaysia is still lacking. Insurance claims occupy a major role in the insurance industry and from the consumer perspective it becomes vitally important in choosing the insurance company most accommodating to their needs (Joji Rao & Pandey, 2013). Some past studies, such as Yadav and Mohania (2013, 2015), had addressed issues on the supply side of the insurance service. Such issues had also included instances of insurance companies foiling claims made by premium holders.

2.1. The Distribution of Consumer Behavior Theory and Decision Making

Investigation into consumer behavior and decision-making process has advanced and has become an important topic reported in the literature. Consumer behaviour is the study of how individual customers, groups or organizations select, buy, use, and dispose ideas, goods, and services to satisfy their needs and wants. It refers to the actions of the consumers in the marketplace and their underlying motives for those actions. The consumer behavior theory thus has a close relationship with the consumer income level (Hunt & Pappas, 1972; Solomon et al., 2015; Mohd et al., 2017). In past literature, the study on consumer behavior in the decision-making process, was related to various economic

fields including tourism, energy usage, pollution and others, (Savvides, 2006). Most of the studies have also examined the potency of consumer behavior from the perspective of critical insurance decision-making process. According to several studies, the adoption of the consumer behavior theory had greatly facilitated the decision-making process and displayed a well-planned approach (Aurelija et al., 2013; Ko-Lun & Shang-Yin, 2020; Qubtan et al., 2021, Ramdan et al., 2020).

In the scope of this research, consumer behavior is defined by the response of the users upon receiving feedbacks on the status of their previous insurance claims. These feedbacks will influence their subsequent decision-making in future claims. The novelty of this research is thus to fill the knowledge gap on consumer behavior through developing the appropriate empirical model using the Howard-Sheth approach to analyse for the optimal decision-making process on insurance claims (Jin Baek Kim, 2014; Harrison & Ng, 2016). Wright (2006) had earlier offered an impressive explanation regarding basic consumer behaviour theory from the economic perspective.

2.2. The Issue on Success or Failure Factors of Insurance Claim

An investigation into the reasons for the high claim rejection rates was earlier made by Seth (2008), and Loke and Goh (2012). The explanations given included false claim statements, failure to disclose relevant facts, the items claimed were not in the insured list under the policy, failure to comply with the terms of the agreement, fraud and inordinate and unseasonable delay for reporting medical report. Further investigations from the perspective of demand are vital, to examine from all angles the reasons for claim rejections. However, past claims were exclusively made from the supply side. The perspective from the demand side is thus crucial since it originates from the viewpoint of the consumer.

As mentioned earlier, some past studies maintained that low coverage premium was the main factor that contributed to the failure in claim cases (Rambeli et al., 2018; Beenstock et al., 1986; Ahmed et al., 2016). However, the ability of choosing the appropriate premium value for the right coverage amount varies between consumers.

In this research scope the success and failure on insurance claim will therefore be examined further by including the impact of economics, social and demography factors in the claim decision-making process.

2.3. Theoretical Modeling on Insurance Claim Mechanism and the Howard-Sheth Consumer Behavior Theory

This study explored the effects of economic and non-

economic factors that may contribute to failures in medical and health insurance claims. The enquiry was inspired by the article proposed by Rambeli et al. (2021) who adopted the multiple logistic regression model and the Howard-Sheth consumer behavior theory to explain the magnitude of underlying values. According to the theory, from the economic perspective there are three main channels that basically influence decision-making in securing claims; namely income effect, substitution effect and price effect (Rambeli et al., 2018). In the earlier study by Howard and Sheth (1969) the model used in decision-making approach was quite exacting. It was used to analyse the combination of economic, social and demographic factors on buying behavior. In this study insurance premium was the factor examined in analysing buying behavior as related to claim incident. This study expanded further the extant model by generating the interaction variable under economic criteria namely, income and insurance premium of the consumer. The premium was specified as a monthly individual contribution for the insurance coverage imbursement, whereas income was the individual monthly salary. The novelty of this study is thus to develop the premium-income interaction that can be defined as the simultaneous effect of premium payment based on monthly salary. According to some earlier empirical studies, the relationship between these two factors was positive (Brighetti et al., 2014; Browne et al., 2000; Beck & Webb, 2003).

3. Research Methods

This section aims to provide a better understanding of data distribution and methodology used in the study. The section is divided into two subsections, namely data distribution and the development of multiple logistic regression model.

3.1. Data Distribution

The study respondents were residents in Perak state who possessed medical and health insurance, including experience in making insurance claims. The sample comprised 210 respondents from a total of 1780. The simple random sampling method was used through online questionnaire distribution using the Google platform from early October 2021 until end of February 2022, which spanned the Movement Control Order (MCO) period. The questionnaire format as proposed by Rambeli et al. (2022) was adopted. The number of samples was determined using a formula from Krejcie and Morgan (1970). The study applied the cluttered random sample design wherein only the insurance holder will participate in the data collection

process. A filter question was also included to verify the respondent's experience in insurance claim. The respondent was required to state YES or NO on whether insurance claim has been made earlier. If affirmative, he or she has to indicate whether the claim succeeded or otherwise.

From the 1780 total samples, 890 respondents were insurance policy holders. From these only 210 had experience in making insurance claim. Of the total, 1570 respondents were insurance policy holders but without any such experience. From the 210 policy holders with experience, 101 were unsuccessful in their claims, while the remaining 109 succeeded. In other words, 48% respondents failed in their insurance claims, while 52% were successful.

3.2. The Development of Logistic Regression Model

The study employed the SPSS software to derive Cronbach Alpha values, from the sourced data, as measures of reliability for the study instrument. Items divided in the form of study questions can be tested for their reliability using this measure (Abdullah et al., 2022). Table 1 shows the cut-off value of Cronbach Alpha test. The main purpose of this study was to determine whether the selected independent variables, namely economic, and non-economic factors, can influence decision-making in insurance claims.

The independent variables specifically included income, savings, premiums, selection of insurance company (Part B), knowledge & awareness (Part C), and previous experience in claiming insurance (Part D). The dependent variable Y (outcome on insurance claim decision), is a dichotomous variable that takes a value of 0 if the respondent "successfully claimed insurance" and 1 if the respondent "failed to claim insurance". This study utilized the Binary Logistic approach. By using the preliminary pilot sampling (30 observations), the value of Alpha Cronbach was found to be 0.79 which is satisfactory according to Mohd et al. (2018) and Samsudin et al. (2022).

For the Binary Logistic Regression, four methods were used in the procedure; namely, Enter, Forward Selection Likelihood Ratio (LR), Generalized Linear [Last (highest value)], and Generalized Linear [First (lowest value)]. The approach can elucidate whether the probability of success or failure in claiming insurance can be influenced by the independent variables, as mentioned above, that were categorized as ordinal in the SPSS system. Additionally, Part B to D in the survey adopted the Linkert scale to gauge respondent's answers. Consistent with Rambeli et al. (2021), the general logistic regression function is structured as follows:

Table 1: Range of reliability and its coefficient of Cronbach's Alpha

No.	Coefficient of Cronbach's Alpha	Reliability Level
1	More than 0.90	Excellent
2	0.80-0.89	Good
3	0.70-0.79	Acceptable
4	0.60-0.69	Questionable
5	0.50-0.59	Poor
6	Less than 0.50	Unacceptable

$$Claim(Failure/1) = f(Economic, NonEconomic) \quad (1)$$

The second model used the same format as model 1 but instead of using the ordinal data in each section, it used the mean data that were also categorized as continuous or scaled for Section B, Section C, and Section D. The second Binary Logistic Regression is written as follows:

$$Claim(Failure/1) = \beta_0 + \beta_1 Income + \beta_2 Saving + \beta_3 Premium + \beta_4 Company + \beta_5 Awareness + \beta_6 ClaimExperience + \varepsilon_i \quad (2)$$

Where,

$Claim(Failure/1)$	= the dependent variable, 1 for failed and 0 for successful claim
β_i	= coefficients of the explanatory variables (i=1,...,6)
Income	= Family monthly income less than RM5000
Saving	= amount of household saving less than RM5000
Premium	= amount of insurance monthly payment more than RM150
Company	= insurance company selection
Awareness	= knowledge & awareness
Claim Experience	= having previous experience in failed insurance claim
ε_i	= error term

This section aims to give a better understanding of data distribution and methodology used in this study. The logistic estimated model was further evaluated in a robustness test by utilising the Nagelkerke R-square value. The logistic results were interpreted by adopting the odd ratio approach (Muraya & Obare, 2018).

4. Result and Discussion

As mentioned above, the first model was examined in the study and this included the ordinal categorized data for Section B, Section C, and Section D. Additionally, the

model also included continuous data comprising Income, Saving, and Premium. Table 2 simplifies the estimated logistic regression result. The model is considered a good fit if the significance value of the Hosmer and Lemeshow test exceeds 0.05 ($p > 0.05$) and similarly the Omnibus Tests of Model Coefficients is less than 0.05 ($p < 0.05$). In this model, the chi-square value for the Hosmer-Lemeshow was 4.433 with a significance level of 0.729 whereas the chi-square value for Omnibus Tests of Model Coefficients was 4.407 with a significance level of 0.354. Both tests showed good fit for the model thus enabling further analysis and interpretation. Further, the chi-squared model showed a value of 65.118 and the Nagelkerke R-square was 0.502. The model thus accounted for roughly 50.2% of the findings. Finally, 93.6% of the cases were accurately categorized using the multiple logistic regression model. The result also supported the Howard-Sheth consumer behavior theory wherein the estimated model showed that income factors play a significant role in explaining claim instances.

As mentioned earlier, the logistic parameters will be interpreted using the odds ratio approach, while keeping other covariates constant (Obare & Muraya, 2018). In general, the results suggested that, Income, Saving, Premium and Awareness exert negative impacts on failed insurance claims (Table 2). Conversely, Insurance Company and claim experience produced positive impacts on failed claims. The p-values indicated that respondent's income, saving, and medical and health claim experience were statistically significant. Nevertheless, premium, company and awareness were not significant. For instance, the results showed that income variable provided was negative and statistically significant at 95% level. In other words, the policyholder with some income (in this case, less than RM5000) is 47.84% ($100 [\text{Exp} (-0.651) - 1]$) less likely to be unsuccessful in insurance claims. This demonstrates that the higher the policyholder income level, the less probability for them to fail in medical and health insurance claims, thus conversely increasing the probability of success. This may also be due to the ability to pay more in insurance premium when income increases. Hence, higher premium payment will lead to greater probability to succeed in making insurance claims (Jeffrey et al., 2015; Aurelija et al., 2013; Islam & Hossain, 2018; Samsulhadi & Chalidyanto, 2020). Further, the findings are consistent with Tan et al. (2014), who proposed that respondents' income level is an essential element that would influence decision making in securing claims. In general, higher income implies that the individual will be more successful in making medical and health insurance claims.

The results also suggested that the saving variable was negative and statistically significant at 95% level.

Additionally, a medical and health insurance policyholder with monthly saving of less than RM5000, is included among the 34.36% ($100[\text{Exp} (-0.421)-1]$) less likely to fail in making insurance claims. In other words, by increasing monthly saving of policyholders will reduce the probability of failure in insurance claim. This finding is consistency with Kimani et al. (2014). Conversely, the insurance company indicator showed no significant impact on incidences of failed insurance claims. Similarly, the awareness variable was also not significantly associated at the 95% level. The study thus established that a healthy life style will probably engender better health which may subsequently lead to a decline in failed insurance claims.

Table 2: Multiple Regression Logistic Model results

	Coefficient	p-value
Constant	-1.643	0.642
Income	-0.651	0.000**
Saving	-0.421	0.041**
Premium	-0.343	0.877
Company (B)	0.02	0.969
Awareness (C)	-0.571	0.386
Claim experience (D)	0.664	0.038**
Hosmer & Lemeshow Test 4.433 (Prob = 0.729)	75.631	
Omnibus Test 4.407 (Prob= 0.354)		
Log-Likelihood		
Chi squared	65.118	
Nagelkerke R square	0.502	
Percentage correct	93.6	

Note: ** denotes significance at 5% level

5. Conclusions

In summary, the study supports the Howard-Sheth consumer behavior theory through the development of augmented modeling. This study adopted the multiple logistic regression model to estimate the magnitude of failed insurance claims by policy holders. Further, it also verified the role of income and saving of policyholders in determining the probability of failure in making medical and health insurance claims. It similarly proved that experience in making insurance claims influence the probability of failure or success. In general, the factors of policymaker income and saving are able to reduce failure cases in medical and health insurance claims. However, the practice of insurance companies tends to increase cases of claim failures. The study thus infers that insurance companies should provide better package that is appropriate for all income levels of insurance policyholders in order to protect them from partial insurance premium payment. With such assurance, policyholders should be

able to reduce the probability of failure rates in incidences of insurance claims.

6. Limitations and Future Research

This study has weaknesses and limitations. The data collection was basically focused on the state of Perak. In a way this was unavoidable since Malaysia was constrained by the Movement Control Policy (MCO) during the Covid-19 epidemic. The data were thus collected online through the Google platform and conveniently limited to Perak state. In future studies, face-to-face field data collection will be prioritised in order to obtain more representative and accurate results. The study should thus be expanded to cover other Malaysian states.

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