

Impact of Government Health and Education Expenditures on Insurance Demand: ARDL Model

(Kesan Perbelanjaan Kesihatan dan Pendidikan Kerajaan terhadap Permintaan Insurans: Model ARDL)

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ABSTRACT

The focal aim of this paper is to examine the relationship between government expenditure on health and administration on education, and insurance demand in Malaysia. Specifically, this study examined the short- and long-run impacts of gross domestic product, inflation rate, government health expenditure, government education expenditure and real interest rate on insurance demand in the country. The study focus on Malaysia, was mainly due to the substantial income generated through insurance demand since the COVID-19 pandemic in 2019. Time series data, spanning December 1990 to December 2022, were utilised. This study adopted the linear ARDL approach to identify the short- and long-run impact between observed variables. Specifically, the study examined whether the observed variables significantly affect insurance demand in Malaysia. The initial estimation model was subsequently divided onto two specification model, namely health model and education model. The results suggest that the health and education expenditures exerted significant impact on insurance demand in Malaysia. The error correction term (ECT) was found significant and was constantly negative indicating the existence of a long-term relationship between explanatory variables and insurance demand. By implication, the education and health spending by the government showed positively significant impact on insurance demand in the long-run thus indicating high dependency of the insurance industry on the government's financial competence. The more the government spends on the education and health sectors, the larger the insurance industry will grow. Therefore, a strengthened financial system may serve as a catalyst for the wellbeing of the insurance industry in Malaysia in the long-term. Likewise, the strength of the country's economy will also be sustained.

Keywords: Insurance demand; health expenditure; education expenditure; linear Autoregressive Distributed Lag (ARDL)

ABSTRAK

Fokus kertas kerja ini adalah untuk mengkaji hubungan antara perbelanjaan kerajaan untuk kesihatan dan perbelanjaan kerajaan untuk pendidikan terhadap permintaan insurans di Malaysia. Secara khusus, kajian ini dijalankan untuk mengkaji kesan jangka pendek dan jangka panjang keluaran dalam negara kasar, kadar inflasi, perbelanjaan kesihatan kerajaan, perbelanjaan pendidikan kerajaan dan kadar faedah sebenar terhadap permintaan insurans di Malaysia. Kajian ini memberi tumpuan kepada Malaysia, disebabkan sumbangan besarnya dalam menjana pendapatan melalui permintaan insurans semenjak COVID-19 melanda pada 2019. Kajian ini menggunakan data siri masa yang bermula dari Disember 1990 hingga Disember 2022. Kajian ini menggunakan kaedah ARDL linear untuk mengenal pasti kesan jangka pendek dan jangka panjang antara pemboleh ubah yang diperhatikan. Secara khusus, kajian ini bertujuan untuk meneroka sama ada pemboleh ubah yang diperhatikan secara signifikan mempengaruhi permintaan



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insurans di Malaysia. Kajian ini terbahagi kepada 2 model spesifikasi iaitu model kesihatan dan model pendidikan. Keputusan kajian mencadangkan bahawa pembolehubah perbelanjaan kesihatan dan perbelanjaan pendidikan di Malaysia memberikan impak yang penting terhadap permintaan insurans. Hasil kajian juga mendapati bahawa terma pembetulan ralat (ECT) adalah signifikan dan sentiasa mempunyai nilai negatif yang menunjukkan kewujudan hubungan jangka panjang antara pembolehubah penjelasan dengan permintaan insurans. Sebagai implikasinya, perbelanjaan pendidikan dan kesihatan oleh kerajaan memberi impak yang besar kepada permintaan insurans dalam jangka masa panjang. Ini menunjukkan pergantungan tinggi industri insurans terhadap keupayaan kewangan kerajaan. Lebih banyak perbelanjaan kerajaan untuk sektor pendidikan dan kesihatan, lebih tinggi industri insurans ini akan berkembang. Oleh itu, dengan memperkukuh sistem kewangan negara, ia mampu menjadi pemangkin kepada kesejahteraan industri insurans di Malaysia dalam jangka masa panjang. Begitu juga, kekuatan ekonomi negara juga akan terpelihara.

Kata Kunci: *Permintaan insurans; perbelanjaan kesihatan; perbelanjaan pendidikan; ARDL linear*

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INTRODUCTION

The role of insurance in driving economic growth in recent times cannot be denied. However, the role of economics performance in affecting the growth in insurance demand, in the short- and long-run, is also important and should be explored Sharku & Bajrami (2021). Many earlier studies have maintained that sustainable and stable economic growth is the main driver in increasing insurance ownership in most developing and developed countries. This issue has since assumed significant importance with the recent health crisis due to the COVID-19 pandemic at the end of 2019. The issue of health has subsequently become a prominent topic of discussion. The health impact has led to significant increase in insurance ownership nationally as well as globally. Given the perspective, this study will examine the relationship between government expenditure on health and administration on education, and insurance demand in Malaysia

According to the Department of Statistic, Malaysia (DOSM), insurance demand fluctuated between 2010 and 2017. From 2018 to 2022, the insurance had shown an upward trending pattern. Conversely however, a downward trend was recorded earlier with the demand in 2010 at 4.8% dropping slightly to 4.6% in 2011, with a percentage change of -0.2%. According to Funso et al. (2018) and Ismail et al. (2018) the demand for insurance in subsequent years increased annually involving not only vehicle or health insurance but also disaster insurance which rose to a significant level (Mushonga & Mishi 2022). In Malaysia, disaster incidence is not unfamiliar since flood events occur annually. In consequence demand for insurance has accordingly increased especially those related to loss of property caused by the disaster. Health and medical insurance coverage similarly showed increasing annual trend due to rising medical costs Jalali et al. (2023). The rate of insurance demand was at 4.8% in 2012, but remained stable until 2013. It is evident that the number of Malaysian insurance policy holders is increasing thus reflecting the growing awareness to invest in order to ensure a more secure future. The insurance

industry is appreciably maturing given the rising medical costs and the increasing number of companies entering the industry (Jalali et al. 2023).

From 2014 until 2018 however, the demand on insurance in Malaysia had shown a decreasing trend. The demand was 4.7% in 2014 which declined by 0.1% between 2015 and 2016. This followed further decreases in 2017 and 2018 by 4.4% and 4.3% respectively. According to the General Insurance Association of Malaysia (PIAM), the industry faced simultaneous difficulties of a low penetration rate and an increasing number of claims. The insurance penetration rate in Malaysia was low at 1.23% in 2018, well below the global average of 3%. The reason being the low total premium which contributed to a small percentage of GDP. However, insurance demand rose slightly between 2018 and 2019, from 4.3% to 4.5%, due probably to the increased insurance ownership by the public. Moreover, insurance demand rose drastically between 2019 and 2020, due to increasing demand for life insurance as well as medical and health insurance. The positive scenario occurred during the COVID-19 epidemic in 2019. Demand for life insurance and medical and health insurance continued to increase significantly until 2022.

According to numerous past studies in microeconomics, most researchers mainly focused on primary data that relate insurance demand to age, education level, risk aversion, product nature, company reputation and service, and financial distress (Knaul et al. 2005; Zhao 2015 and Meko et al. 2019). However, studies at the macroeconomic level should also be given important attention and must not be neglected. Research on insurance in developing countries were mainly marginalized due to difficulties in accessing quality data that are sufficiently accurate, regularly produced (such as on monthly basis) and reliable. Such quality data are limited and difficult to obtain, especially sensitive information as with individual insurance policies. These difficulties have resulted in a limited number of published studies on insurance in developing countries. The limitation has also prompted many recent studies to focus on panel data analysis in developed countries, such

as Rudra et al. (2017), Sharku and Bajrami (2021) and Yakubu et al. (2023). Very few investigations have focused on ASEAN countries, especially Malaysia. Most of the earlier studies were focused on developed countries, such as Fernando et al. (2023), Sharku and Kumi (2021) and Ul Din et al. (2017). Some have examined the dynamic relationship between insurance, economic growth and other macroeconomic variables in developing countries. According to Fernando et al. (2023) economic growth can lead to insurance demand nexus. In other words, in the long- and short- term, economic growth affects aggregate insurance demand, which in turn affects economic growth. However, the insurance-economic development nexus can be explained by several factors. Some studies have indicated a positive relationship between aggregate insurance demand and economic growth and vice versa (Wong et al. 2013; Rudra et al. 2017; Yakubu et al. 2023). For instance, economic development often leads to higher healthcare costs. As societies become wealthier, spending on healthcare services for advanced medical treatments typically rise, leading to better health insurance with high premium payment rate. In the long term the favourable effect enables the country to generate positive national economic growth at the aggregate level (Yakubu et al. 2017). According to Akalpler (2023) insurance also provides a safety net during times of crisis. When individuals or businesses face unexpected losses or disasters, insurance payouts can help them recover more quickly and maintain financial stability. This should contribute to economic growth through reducing the likelihood of bankruptcies and occurrence of financial crises. In this study the linear autoregressive distributed lag (ARDL) approach was utilized through using time series data generated between December 1990 and December 2022.

Given the information gap, this study was motivated to contribute in estimating the long- and short-run relationship between government expenditure on health and education with the occurrence of economic growth and other selected macroeconomic variables related to the demand on insurance in Malaysia. Inspired by Baruti (2022), this current study was extended further through dividing the insurance demand model onto two main models namely, the health model and education model associated with insurance demand in the country. The model specification will be detailed out in the methodology section. Separating the two models during the estimation process is important in order to observe differences in the results if any, given that government expenditures on education and health belong to two distinct sectors with different drivers of demand on the insurance industry. At the aggregate level, the separate analyses allow for a more precise understanding of the factors influencing insurance demand in each respective sector. In consequence, the magnitude of values generated from different models will clearly indicate specific impacts on the demand for insurance.

Under the education model the relationship between insurance demand and the independent variables, which comprised gross domestic product, inflation rate, government education health expenditure and real interest rate, were investigated in the long- and short-run. The health model included insurance demand as a dependent variable and gross domestic product, inflation rate, government health expenditure, and real interest rate as the independent variables. With the analysis based on Keynesian theory, the results have the potential to assist insurance companies and policy makers to comprehend the role of government expenditure on health, education and economic performance.

The literature review is discussed in the next section. Section three to five, respectively deal with the methodology, description of data, results and discussion. The final section provides the conclusion.

LITERATURE REVIEW

This section discusses in depth numerous past studies that relate the impact of insurance demand to selected macroeconomic variables, namely government health expenditure, education expenditure, gross domestic product (GDP), inflation rate and interest rate. Since the 18th century, the growth of insurance has expanded worldwide. According to Çelik & Kayali (2017) the business idea of building insurance on solidarity, business acumen, and the logic of calculation became widely accepted. It eventually nurtured global economic powers in the following centuries. The contribution of insurance demand at aggregate level increased in almost all advanced and emerging economies. Thus the role of the insurance sector at country level, as effected by increasing insurance demand, was undeniably important in economic growth. Many studies had established that the increase in insurance demand in the economy was due to various factors which included economic growth (Beck & Webb 2003; Cristea et al. 2014; Meko et al. 2019; Baruti 2022; Rudra et al. 2017; Yuan & Jiang 2015), government expenditure (Meko et al. 2019; Mushonga & Mishi 2022; Diane 1998; Fletcher & Frisvold 2009; Savitha & Banerjee 2021; Stefan 2021), inflation (Kyunghyun et al. 2023; Meko et al. 2019; Babbel 1981; Rudra et al. 2017), and real interest rate (Flores et al. 2021; Meko et al. 2019).

Many studies have suggested that the gross domestic product positively promote insurance demand in the country. In other words, economic growth indirectly encourages insurance demand, through its stimulation of the country's gross domestic product. There is thus a bilateral relationship between gross domestic product and insurance demand at aggregate level (Rudra et al. 2017). Rudra et al. (2017) used the dynamic interrelationships between a number of important macroeconomic variables on the insurance demand-economic growth nexus. They confirmed that a long-run equilibrium relationship exist between insurance market development, economic

growth, and six other macroeconomic variables. This finding is in line with Cristea et al. (2014) who claimed that gross domestic product is the main component in determining whether growth in the insurance sector is acceptable. Yuan and Jiang (2015) were optimistic on the development of China's insurance market and observed that the demand for insurance is more susceptible to the impact of economic, social, and political variables, as well as a number of other uncertainties, compared to the developed insurance markets. Similarly, Eshoet al. (2004) showed positive relationship between insurance demand and economic growth in 44 countries studied over the 1984–1998 period. Country income was considered to be the most important component among the macroeconomic factors examined, since it most directly leads to increased affordability and consequently to greater demand for insurance products (Browne & Kim 1993; Hammond et al. 1967; Sharku & Bajrami 2021).

It was apparent that periods of high inflation may result in insurance companies receiving higher claim payouts as well as incurring increased operating costs which consequently may lead to more expensive premiums for the consumer. As a result, some customers may have to drop their coverage or switch policies to save on costs (Babbel 1981). It can thus be concluded that there is a negative relationship between inflation and insurance demand in the long run. In other words, if inflation rises insurance demand will tend to decline. As mentioned earlier, many earlier studies agreed that gross domestic product significantly and positively promotes insurance demand in the country. Further, inflation rate can exert negative or positive impacts on insurance demand. These arguments were empirically supported by Akhter & Khan (2017). Based on this study, inflation produced positive and significant impacts on insurance and Takāful demand. The finding is also consistent with Rudra et al. (2017) who established that inflation rate produced a positive but non-significant effect on insurance demand. Beck and Webb (2003), using panel data, examined the factors that influenced the demand for life insurance in 68 different economies over the 1961–2000 period. They revealed that inflation rate had a great impact on the volume of insurance demand which may be reduced in the event of a price hike in the market. When coupled with restrictive rules, inflation may result in greater perceived real costs as associated with life insurance. Consequently, there is a decline in the demand for life insurance during periods of inflation (Babbel 1981). In addition, Çelik and Kayali (2017) also established that during times of high inflation, there is a decline in the public's desire to subscribe to life insurance.

Most past studies showed significant relationship between government health expenditure and insurance demand. A recent exposure indicated that health insurance is a vital approach for easing restrictions placed on health care finance and for hastening the process of achieving universal health coverage (Meko et al. 2019). Galárraga et al. (2009) further added that the popular insurance

system for the poor in Mexico has produced a protective effect on government health expenditure system to help the underprivileged in accessing better health services in public hospitals. In addition Zhao (2015) maintained that the event of health shocks could simultaneously increase health expenses due to the spontaneous upsurge in insurance demand. From microeconomic perspective, rational agents would neither fully insure their uncertain health expenses nor fully annuitize their wealth because the correlation between health expenses and longevity provides a self-insurance channel for both uncertainties. From macroeconomic point of view, the impact of government health expenditure is positive since raising the allocation on the health sector indirectly increases the probability of spending in insurance demand. Under some circumstances however, government spending in insurance demand may reduce the country's economic capacity. The catastrophic expenses incurred in insurance are normally ambiguous during disaster events (Knaul et al. 2005). It can thus be concluded here that the impact of government health expenditure on insurance demand is ambiguous under differing situations.

Education expenditure by definition refers to the funds that are allocated by the government to be spent on enhancing the quality of education in the country. This may include the quality of learning, infrastructural facilities, administration and management and aid. Based on the study by Ismail et al. (2018), improved financing of education in the country will lead to positive impact on insurance demand. According to Yun and Yusoff (2018), the Malaysian government has extensively developed policies to enhance the education sector on the acceptance that education is key to any country's economic growth. A consumer's ability to make informed decisions on their insurance needs can be attributed to increased finance literacy. An informative discussion on insurance terminologies and characteristics of various forms of insurance may improve on the ability of the consumer in choosing the suitable insurance products. Increasing awareness on the importance of insurance, the product of an improved level of education due to greater budget allocation, may boost the demand for insurance at the aggregate level (Sepehri et al. 2006). The average person will thus acquire greater awareness on the advantage of having insurance to secure his or her best health care services.

Meko et al. (2019), maintained that real interest rate has a positive and statistically significant influence on the demand for life insurance in Ethiopia. Contrarily however, this factor exerted the least impact on the demand for life insurance as revealed in this study. Funso et al. (2018) found that real interest rates determined the non-life insurance services in Nigeria. Li et al. (2007) examined the factors that influenced consumer decisions to purchase life insurance in OECD countries. They discovered that the country's level of financial development and degree of competition in its insurance market, appeared to stimulate life insurance sales,

whereas high inflation and real interest rates tended to reduce insurance consumption. In other words, high real interest rates tend to decrease insurance consumption. Conversely however Kjosevski (2012) found that real interest rate, quasi-money ratio, ratio of young liabilities, and ratio of old liabilities all constrained corruption, and that government performance did not appear to be greatly related to life insurance demand. The finding is consistent with Flores et al. (2021) who revealed that real interest rate positively impacted insurance demand thus opening investment opportunity in the long-term.

METHODOLOGY

This study adopted the Autoregressive Distributed Lag (ARDL) model to investigate the relationship between insurance demand, gross domestic product, inflation rate, government education expenditure, government health expenditure and real interest rate in the short and long run. The Augmented Dickey-Fuller (ADF) test was conducted to examine the stationary level of the data series. The bound cointegration test of the variables was implemented to elucidate the integration between insurance demand and other variables in both models, namely the health and education model. Upon finding the bound cointegration the ARDL model was implemented. The entire tests were carried out using EViews 12. The ability to host sufficient lags best captured the mechanism for data generating process, meaning that the method can be applied irrespective of whether the time series was I(0), namely stationary at levels, or I(1) namely stationary at first differences or fractionally integrated, Pesaran et al. (2001). However, within the ARDL framework, the

series should not assume I(2), since this integration order invalidates the F-statistics and all critical values established by Pesaran. Those that were calculated were for the series I(0) and/or I(1). This argument is supported by Shrestha and Bhatta (2018) and Moutinho and Madaleno (2020), who used the ARDL method as estimated model as long as there is no I(2) data in the equation system. In this case, if all the data are stationary at I(1), then based on Shrestha and Bhatta (2018), the ARDL method is considered acceptable and adequate.

DATA COLLECTION

Annual data in Malaysia, spanning 32 years from 1990 to 2022, were used for the study. The variables, GDP, HEALTH, EDU and RIR were sourced from the World Development Indicator (WDI) and World Bank, while data for INS was obtained from the Federal Reserve Economic Data (FRED). For the INF, the inflation variable was sourced from Macro trend database, represented by CPI with base year 2010. The components of the insurance demand (INS) included the conventional insurance as well as life insurance, medical insurance, disaster insurance and vehicle insurance. Given the existing price inflation effect in a current series, the INS, GDP, HEALTH and EDU variables in this study were quoted in constant local currency unit (LCU), which accounts for the effects of price inflation in value adjustment, with the base year 2010. The RIR is in real form after removing the impact of inflation from its nominal form. All variables were transformed into logarithm prior to analysis (Kriskumar et al. 2022). Data descriptions are presented in Table 1.

TABLE 1. Data description

Variables	Descriptions	Measurement	Sources
INS	The insurans demand comprising conventional insurance including life insurance, medical insurance, disaster insurance and vehicle insurance.	LCU, 2010	FRED
GDP	Real Gross Domestic Product	LCU, 2010	World Bank
INF	Presented as Consumer price index with 2010=100	Index	Macro trend
HEALTH	Real government health expenditure	LCU, 2010	World Bank
EDU	Real government education expenditure	LCU, 2010	World Bank
RIR	Real interest rate	Annual %	World Bank

MODEL SPECIFICATIONS

The objective on this study was to observe the impact of selected macroeconomic data series on insurance demand using data in Malaysia spanning thirty two years from 1990 to 2022. This study was inspired by Baruti (2022).

Government Health Model

$$\ln INS_t = \beta_0 + \beta_1 \ln RGDP_t + \beta_2 \ln INF_t + \beta_3 \ln RHEALTH_t + \beta_4 \ln RIR_t + \varepsilon_{t1} \quad (1)$$

The study was however expanded further by dividing the estimation model into two different models, namely the Government Health Model (HEALTH) and Government Education Model (EDU). The model specifications are as follows:

Government Education Model

$$\ln INS_t = \gamma_0 + \gamma_1 \ln RGDP_t + \gamma_2 \ln INF_t + \gamma_3 \ln REDU_t + \gamma_4 \ln RIR_t + \varepsilon_{12} \tag{2}$$

Equations (1) and (2) are the empirical models comprising the constant terms, β_0 and γ_0 . $\beta_1, \beta_2, \beta_3$ & β_4 and $\gamma_1, \gamma_2, \gamma_3$ & γ_4 are the coefficients for the set of regressors (Gross Domestic Product ($\ln RGDP_t$), Inflation ($\ln INF_t$), real interest rate ($\ln RIR$) and Real government expenditure on health and education which are denoted by $\ln RHEALTH$ and $\ln REDU$, respectively. Lastly, the terms ε_{11} and ε_{12} are error terms in the empirical models. The economic factors can be positive or negative, exert significant or non-significant impact on insurance demand in the long and short term. All variables are in logarithm form.

developed by Dickey and Fuller (1976) and the PP test developed by Philips and Perron (1988) are also important in this regard. The performance of the ADF Test is however superior than that of the PP Test (Davidson & MacKinnon, 2004). To determine the unit root test, the following hypothesis was posited:

- $H_0 \delta = 0$ Null hypothesis (Failed to reject H_0 , series in non-stationary)
- $H_1 \delta \neq 0$ Alternative hypothesis (Reject H_0 , series is stationary)

AUGMENTED DICKEY-FULLER UNIT ROOT TEST

A unit root (also known as a unit root process or a difference stationary process) is a stochastic trend in a time series that is frequently referred to as a “random process with drift”. If a time series contains a unit root, it demonstrates an unanticipated systematic pattern. The unit root test is a well-known formal test that can be used to determine whether or not time series data is stationary. The unit root test plays an essential role in determining the degree to which each variable is integrated. Other tests, such as the Augmented Dickey Fuller Test (ADF)

According to the ADF Test, if a set of data fails to reject the null hypothesis ($\delta = 0; H_0$) at the first difference I(1) with an ADF t-statistic value that is smaller than 5% significance of t-critical, then the first difference of the variables has a unit root but is non-stationary. This occurs when the null hypothesis is not rejected at the first difference I(1). In addition, a non-stationary state is present when the probability was equal to 1.

Empirically, the construction of ADF test is based on three equations as follows:

$$\Delta Y_t = \delta Y_{t-1} + \sum_{i=1}^p \beta \Delta Y_{t-1} + \varepsilon_i \tag{3}$$

$$\Delta Y_t = \alpha_0 + \delta Y_{t-1} + \sum_{i=1}^p \beta \Delta Y_{t-1} + \varepsilon_i \tag{4}$$

$$\Delta Y_t = \alpha_0 + \alpha_2 + \delta Y_{t-1} + \sum_{i=1}^p \beta \Delta Y_{t-1} + \varepsilon_i \tag{5}$$

The symbols used are as follows,

- ΔY_t = First differential level ($Y_t - Y_{t-1}$)
- δ = $p - 1$
- p = $1 - d/2$
- d = Statistical value of Durbin Watson
- α = Deterministic elements
- t = Time
- ε = White noise term

A random walk is represented by the equation (5), a random walk with an intercept is represented by the equation (6), and a random walk with an intercept and a temporal trend is represented by the equation (7) (Gujarati 2003). With reference to the equation, Y_t represents the level form, whereas ΔY_t represents the first difference. In addition, the data set is considered to be in covariance stationary if the mean does not change in value and remains comparable to the variance (σ^2) regardless of the changes in time origin (Enders 1995). The following are the values for the mean, variance, and covariance:

$$E(X_t) = \mu \tag{6}$$

$$Var(X_t) = E(X_t - \mu)^2 = \sigma^2 \tag{7}$$

$$E(X_t - \mu)(X_{t-k} - \mu) = \gamma_k \tag{8}$$

BOUND COINTEGRATION TEST

After determining the optimal lag a test was conducted to determine whether or not the exogenous and endogenous variables were cointegrated. The term “cointegration” refers to a concept that imitates the existence of a long-

term link between the variables. When it is not clear whether the data generating process underlying a time series is a trend or first difference, stationary bound testing was carried out. The test is an extension of ARDL modelling which employs F-statistics and t-statistics to test the significance of the lagged levels of the

variables in a univariate equilibrium correction system. It is conducted in cases where the correction system is a univariate equilibrium. The following hypothesis is thus posited.

$$H_0 \mu_1 = \mu_2 = 0: \text{A long run relationship does not exist} \quad (9)$$

$$H_1 \mu_1 \neq 0 \cup \mu_2 \neq 0: \text{A long run relationship exist} \quad (10)$$

ARDL Long Run Model

After estimating the level of integration of the variables, the next step was to determine the long-run dynamic relationship among the dependent and independent variables. The purpose of this step was to determine the long-term coefficient estimation in order to justify the significance of the variables. Additionally, it will determine whether the exogenous variable known as insurance demand (INS) has a positive or negative relationship with the endogenous variables known as gross domestic product (GDP), inflation rate (INF), government health expenditure (HEALTH), government education expenditure (EDU) and real interest rate (RIR) in Malaysia.

ARDL Short Run Model

Through a straightforward linear transformation, an error correction model (ECM) can be generated from ARDL. Similarly, the ECM integrates the short-run dynamics

with the long-run equilibrium without sacrificing long-run information while avoiding issues such as false relationships caused by non-stationary time series data. Additionally, where cointegration exists between the variables, the next step is to estimate the equation via ARDL technique by choosing the order of the model using the Akaike Information Criteria (AIC) to achieve the short- and long-run dynamic parameters and Error correction term.

EMPIRICAL FINDINGS

As a mentioned earlier, the Autoregressive Distributed Lag (ARDL) was adopted to investigate and compare the long-run and short-run relationships in determining the insurance demand (INS), gross domestic product (GDP), inflation rate (INF), government health expenditure (HEALTH), government education expenditure (EDU) and real interest rate (RIR) in Malaysia. The unit root test, also known as a formal test for stationary determination in the time series variables, was conducted through the Augmented Dickey-Fuller (ADF). Further, the F-Bound cointegration test was conducted to identify the long-run association in the time series variables. Once the cointegration association was identified, the following test was performed with the ARDL long-run coefficient estimation or the Error Correction Model (ECM) Regression for the short-run.

UNIT ROOT TEST

TABLE 2. Augmented Dickey-Fuller (ADF) of Unit Root Test for Malaysia

Variables	At level			At first difference		
	Pure (none)	Without trend (intercept)	With trend and intercept	Pure (none)	Without trend (intercept)	With trend and intercept
Insurance Demand (INS)	1.7095 [2] (0.9759)	-2.0821 [2] (0.2528)	-1.1307 [2] (0.9053)	-3.4922 [0] (0.0011)***	-4.1396 [0] (0.0032)***	-4.7301 [0] (0.0037)***
GDP (GDP)	4.5282 [7] (1.0000)	1.0121 [7] (0.9952)	-2.1504 [7] (0.4927)	-3.1369 [0] (0.0028)***	-4.3187 [0] (0.0021)***	-4.5119 [0] (0.0062)***
Inflation Rate (INF)	-1.3767 [2] (0.1528)	-0.9541 [7] (0.7516)	-1.7644 [7] (0.6886)	-6.1137 [1] (0.0000)***	-6.2491 [1] (0.0000)***	-6.1760 [1] (0.0001)***
Government Health Expenditure (HEALTH)	2.4812 [2] (0.9956)	-2.1303 [3] (0.2350)	-1.3657 [3] (0.8480)	-2.9043 [0] (0.0052)***	-3.9827 [1] (0.0049)***	-5.0274 [1] (0.0019)***
Government Education Expenditure (EDU)	0.7003 [7] (0.8596)	-1.4482 [7] (0.5410)	-1.7919 [1] (0.6825)	-3.9538 [0] (0.0003)***	-4.0651 [0] (0.0039)***	-4.3996 [0] (0.0081)***
Real Interest Rate (RIR)	-0.3227 [7] (0.5580)	-1.7005 [7] (0.4177)	-0.9618 [7] (0.9302)	-9.3319 [1] (0.0000)***	-9.1541 [1] (0.0000)***	-9.2529 [1] (0.0000)***

Source: Calculated by using EViews 12 Software

Note: The value in brackets [] is the number of lag lengths that follows Akaike's Information Criterion (AIC).

The value between brackets () is the p-value from Mackinnon (1996). In addition, the notation with *** represents the level of significance at 1%.

Table 2 displays the results of the ADF test in Malaysia, including the level form and the first difference. The p-value significance level was determined from MacKinnon (1996) and used to analyse the probability of the series accepting or rejecting the null hypothesis. The results showed that the insurance demand (INS), gross domestic product (GDP), Inflation Rate (INF), Government Health Expenditure (HEALTH), Government Education Expenditure (EDU) and Real Interest Rate (RIR) were non-stationary at the level form that accepted the null hypothesis of the unit root test because the t-statistic of each variable was greater than the critical value. For instance, time series data of INS for Malaysia showed the value of ADF test statistic at the level form was greater than the critical value which was for none at 1.7095 was greater than -2.6501, -1.9533 and -1.6097 at lag length 2. Without trend (intercept) at level form the INS value was -2.0821 which exceeded the critical value at -3.6891 with 1% significance level. With trend and intercept, INS value was -1.1307 which was also better than the critical value of -4.3239 at lag length 2.

At the first difference for the two INS values, the null hypothesis was successfully rejected, with the statistical significance estimated at 95 percent and 99 percent respectively. For instance, at the first difference probability value of the INS data series for none, without trend (intercept), and with trend and intercept were all significant at 99% under homogeneous lag length 1 and 0, respectively. Also, value at first difference in Malaysia was -3.4922 which was smaller than the critical value of -2.6471 at none. For without trend, the t-statistic

value was -4.1396 with the critical value of -3.6793 at the 99% significance level. Furthermore, for the trend and intercept, the ADF t-statistic value at -4.7301 was smaller than the critical values of -4.3098, -3.5742 and -3.2217 which were respectively significant at 99 percent, 95 percent and 90 percent levels. It was concluded that the time series data in the first difference was stationary. For example, the variable time series data with trend and intercept for GDP, INF, HEALTH, EDU and RIR showed smaller t-statistic values compared to critical values. These values, -4.7301 (GDPCC), -6.1760 (INF), -5.0274 (HEALTH), -4.3996 (EDU) and -9.2529 (RIR) were lower than the critical value of -4.3239 at the 99 percent significance level.

BOUND COINTEGRATION TEST RESULTS

In this section the bound cointegration test for Malaysia is briefly discussed. The test was conducted for the two main models, namely Government Health Model and Government Education Model. Tables 4 and 5 simplify the cointegration bound test for both models.

Government Health and Education Models

Based on Table 3, the computed F-statistic value is 6.1078, which is higher than the lower and upper bound critical values of 3.29 and 4.37 respectively, with 99 percent level of significance. Thus, the null hypothesis of no cointegration is rejected at the 99 percent significance level. It can thus be concluded that the long-run relationship between insurance demand, gross domestic product, inflation rate, government health expenditure and real interest rate exists in Malaysia for the government health model.

TABLE 3. Bound test result in health model

Level of Significance	Lower Bound Value	Upper bound value	F-statistics value
10%	2.2	3.09	6.1078
5%	2.56	3.49	6.1078
2.5%	2.88	3.87	6.1078
1%	3.29	4.37	6.1078

Source: Calculated by author using EViews 12 Software

TABLE 4. Bound test result in education model

Level of Significance	Lower Bound Value	Upper bound value	F-statistics value
10%	2.2	3.09	9.6181
5%	2.56	3.49	9.6181
2.5%	2.88	3.87	9.6181
1%	3.29	4.37	9.6181

Source: Calculated by author using EViews 12 Software

Table 4 simplifies the cointegration bound test results for Malaysia under the government education expenditure (EDU) model. The computed F-statistic is 9.6181 for Malaysia which is higher than the lower and upper bound critical values of 3.29 and 4.37 respectively, with 99 percent of level of significant. Thus, the null hypothesis of no cointegration is rejected at 99 percent significance level. The long-run relationship between

insurance demand, gross domestic product, inflation rate, government education expenditure and real interest rate exist and detected in Malaysia.

ARDL LONG RUN RESULTS

Government Health Model

TABLE 5. The estimated for ARDL long run model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	-1.3690	0.3030	-4.5180	0.0020***
INF	-0.0091	0.0041	-2.2044	0.0586**
HEALTH	1.1161	0.0925	12.061	0.0000***
RIR	-0.1606	0.0344	-4.6624	0.0016***
C	5.3571	0.7102	7.5429	0.0001***

Note: **and *** indicates at 5% and 1% significance level respectively.

Source: Calculated by author using EViews 12 Software

The next step is to estimate the coefficients for the long-run models for both HEALTH and EDU. Table 5 simplifies the ARDL long-run estimation HEALTH model for Malaysia. The government health expenditure shows a positive impact on insurance demand whereas gross domestic product (GDP), inflation rate and real interest rate exert negative impacts. When the GDP of a country is declining or experiencing negative growth an economic recession or downturn is often imminent. During such periods, many industries may face financial challenges, including investment losses and reduced income. Consequently, the industries may cut back on discretionary spending, including insurance premiums, to save money and prioritize essential expenses (Miguel et al. 2022).

The coefficients for GDPPC, HEALTH and RIR show statistical significance at 99 percent level. In addition,

the coefficient for inflation rate (INF) similarly indicates 95 percent significance level. HEALTH registers a value of 1.1161 which signifies that an increase of 1 percent in government health expenditure may generate 1.11 percent increase in insurance demand with 99 percent significance level. According to Mohamad et al. (2021), the relationship between health services and insurance demand is positive. A rise in health services will also increase insurans demand in medical and health. Further, INF rise by 1 percent may reduce insurance demand to 0.9168 percent. The estimated results thus establish that factors of real interest rate, government health expenditure, inflation rate, and gross domestic product exert significant impact on insurance demand in the long-run.

Government Education Model

TABLE 6. The estimated results for ARDL long run model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.1242	0.2863	0.4339	0.6746
INF	-0.0342	0.0141	-2.4191	0.0387**
EDU	0.8185	0.1386	5.9036	0.0002***
RIR	-0.5867	0.0745	-7.8717	0.0000***
C	1.1523	1.0361	1.1122	0.2949

Note: ** and *** indicates at 5% and 1% significance level respectively.

Source: Calculated by author using EViews 12 Software

Table 6 shows the estimated long-run coefficient in the ARDL approach for Malaysia with focus on the Government Education Expenditure (EDU). Both the GDP and EDU exert positive impacts on insurance demand (INS). When GDP increases by 1 percent insurance demand will rise by 0.1242 percent. The finding is consistence with Scharner et al. (2023), Miguel et al. (2022), Sharku and Kumi (2021), and Singhal et al. (2020). Singhal and coworkers examined the causality

between insurance and economic growth. Result from the Granger causality test showed that unidirectional causality related economic growth to the insurance sector thus supporting demand that led to insurance growth as recorded in the literature. The study suggests that increased economic activities with regulated price levels, and enhanced banking activities with credit rationing and outreach programmes, importantly contribute to growth in the insurance sector. Seo & Jang (2021) agreed that

education is one of the factors influencing insurance demand. However, inflation rate (INF) and real interest rate (RIR) have negative relationships with insurance demand due possibly to rising interest rates and inflation which may lead to a perception of greater economic stability and confidence in financial markets. As the public become more optimistic with their financial prospects, they may feel less inclined to purchase insurance to protect against adverse events (Stefan 2021). Both coefficients of EDU and RIR indicated that they are statistically significant at 99% level. In addition, INF is also significant at the 95% level. EDU has a coefficient value of 0.8185 which suggests that an increase of 1% in government education expenditure will increase insurance demand by 0.8185 percent. However, 1% increase in real interest rate will reduce it by 0.5867. The reverse reactions between these two indicators are due to the negative relationship between real interest rate and insurance demand. The results thus confirmed that INF, EDU and RIR significantly impacted insurance demand in the long-run.

ARDL SHORT-RUN RESULTS

The next step estimated the coefficients for the short-run health and education models. Table 7 presents the short-run coefficients based on ARDL model. Under the health model, total inflation negatively and significantly impacted insurance demand in the short-run. A 1.0000% increase in inflation will reduce the insurance demand by -0.007530% at lag 2. Similar relationships consistently occur for real interest rate (lag 1) which exerts negative impact on insurance demand. In other words, if real interest rate increases, insurance demand will conversely decrease. Generally however, the effect of real interest rate showed mixed results that hover between negative and positive values. Nevertheless, the

GDP exerts significantly positive impact on insurance demand in Malaysia. If GDP increases by 1.0000%, the insurance demand will rise by 4.2059%. The indicator also significantly affect insurance demand in the short-term at 99% significance level (lag 2). Interestingly, the study successfully highlighted the role of government health expenditure in the model. According to the result, government health expenditure negatively impacted insurance demand in the short-run. Specifically, at lag 2, if the government health expenditure rises by 1.0000%, insurance demand will accordingly decline by -0.7755%.

Under the education model, the results are however slightly different. Based on Table 8, inflation exerts negative and significant impact on insurance demand. If the inflation increases by 1.0000%, insurance demand will duly decline by -0.010944%. The results further indicate that, education expenditure and real interest rate will impact insurance demand, but with mixed results ranging between negative and positive values. Similarly, GDP also significantly impacts insurance demand in the short-run. The values of R^2 and adjusted R^2 were estimated to be more than 90%, which confirmed that both models are strongly fitted. The calculated values for F-statistic are 58.3245 and 68.7712 for health and education models, respectively. The significant negative error correction term coefficient is also presented in Tables 7 and 8. The results revealed that the error correction term (ECTt-1) for health and education models are -1.372976 and -0.892838 respectively. The error correction term (ECT) is significant and constantly negative which indicates the existence of a long-term relationship (co-integration) between the explanatory variables with demand of insurance. In addition, negative ECT values for both models also indicate speed time adjustment (speed of adjustment) required to reach equilibrium in the long term. The study also confirms that the ARDL models have successfully passed all the diagnostic analyses.

TABLE 7. The ARDL short run health model estimated results

Dependent Variable: D(INS)					
Selected Model: ARDL (1, 3, 3, 4, 3)					
Case 2: Restricted Constant and No Trend					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	
D(GDP)	0.0621	0.2335	0.2661	0.7969	
D(GDP(-1))	2.5335	0.5112	4.9560	0.0011***	
D(GDP(-2))	4.2059	0.6704	6.2735	0.0002***	
D(INF)	-0.0196	0.0033	-5.9259	0.0004***	
D(INF(-1))	-0.0124	0.0024	-5.1603	0.0009***	
D(INF(-2))	-0.0075	0.0025	-2.9608	0.0181**	
D(HEALTH)	0.9366	0.0863	10.849	0.0000***	
D(HEALTH(-1))	-0.3568	0.1200	-2.9727	0.0178**	
D(HEALTH(-2))	-0.7755	0.1539	-5.0383	0.0010***	
D(HEALTH(-3))	0.1534	0.0644	2.3819	0.0444**	

continue ...

... continued

D(RIR)	-0.1003	0.0200	-4.9933	0.0011***
D(RIR(-1))	0.0734	0.0199	3.6887	0.0061***
D(RIR(-2))	0.0429	0.0136	3.1539	0.0135**
CoIntEq(-1)*	-1.3729	0.1779	-7.7169	0.0001***
R-squared	0.9773	Mean dependent var		0.0251
Adjusted R-squared	0.9547	S.D. dependent var		0.0522
S.E. of regression	0.0111	Akaike info criterion		-5.8540
Sum squared resid	0.0016	Schwarz criterion		-5.1820
Log likelihood	93.029	Hannan-Quinn criter.		-5.6542
Durbin-Watson stat	1.9895	F-Stat		58.3245

Note: **and *** indicates at 5% and 1% significance level respectively.

Source: Calculated by author using EViews 12 Software

TABLE 8. The ARDL short run education model estimated results for Malaysia

ARDL Error Correction Regression				
Dependent Variable: D(INS)				
Selected Model: ARDL(1, 3, 2, 3, 4)				
ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP)	0.6593	0.2514	2.6226	0.0277**
D(GDP(-1))	1.3301	0.3219	4.1314	0.0026***
D(GDP(-2))	2.0071	0.2963	6.7734	0.0001***
D(INF)	-0.0222	0.0034	-6.5177	0.0001***
D(INF(-1))	-0.0109	0.0033	-3.2299	0.0103**
D(EDU)	0.4386	0.0825	5.3161	0.0005***
D(EDU(-1))	-0.4449	0.1033	-4.3039	0.0020***
D(EDU(-2))	-0.8163	0.1062	-7.6814	0.0000***
D(RIR)	-0.0369	0.0200	-1.8453	0.0981*
D(RIR(-1))	0.4035	0.0563	7.1595	0.0001***
D(RIR(-2))	0.3010	0.0417	7.2055	0.0001***
D(RIR(-3))	0.0848	0.0195	4.3418	0.0019***
CoIntEq(-1)*	-0.8928	0.0942	-9.4746	0.0000***
R-squared	0.9490	Mean dependent var		0.0251
Adjusted R-squared	0.9054	S.D. dependent var		0.0522
S.E. of regression	0.0160	Akaike info criterion		-5.1165
Sum squared resid	0.0036	Schwarz criterion		-4.4926
Log likelihood	82.073	Hannan-Quinn criter.		-4.9310
Durbin-Watson stat	2.8512	F stat		68.7712

Note: **and *** indicates at 5% and 1% significance level respectively.

Source: Calculated by author using EViews 12 Software

DISCUSSIONS

This study emphasised two models to elucidate the impact of selected macroeconomics variables on insurance demand in Malaysia. The results however revealed that the two models, namely the health and the education model, were not much different in the short- and long-run. The role of government spending in shaping insurance demand in Malaysia is undoubtedly important and should be examined. With the cointegration bound test analysis, for joint significance of lagged level hypothesis, the calculated F-statistics were 6.1078 and 9.6181 for the health and education models respectively. Thus, the null hypothesis of no cointegration among the variables between endogenous and exogenous variables was rejected. This clearly indicates that there is a cointegration relationship between insurance demand and its key determinants namely, gross domestic product, government spending on education, government spending on health, inflation and interest rates in Malaysia. Furthermore, results of the study also supported the variable role of government expenditure in education and health in influencing the dynamic fluctuations in insurance demand, in the long-term ARDL model. Based on findings related to the health model, government expenditure on health is becoming a priority in some developing and developed countries. Among the developed countries that prioritize health spending is the United Kingdom and among the developing countries Malaysia can also be included. According to Seo et al. (2021), through sufficient government spending for the public the demand for insurance will increase, especially in health insurance. Increased government allocations on health care infrastructure, facilities and services may increase access to medical care for the society. As individuals gain better access to health care services, they may realize the importance of health insurance to help cover the costs of medical treatment and services in the short- and long-term. The increased access could lead to higher demand for health insurance. Similar findings were shown for the ARDL short-term model. The study thus lends support to government spending on health which consequently may effect insurance demand that is also significantly important in the short-run. However, the results on the government spending-health insurance demand relationship is somewhat mixed with negative or positive values. With the long-term ARDL model, the relationship is positive and significant. The negative outcome may be attributed to high confidence in public health generated on the belief that the government health system is effective and reliable. As such, the public may be less inclined to seek additional insurance coverage. This confidence may reduce the demand for private health insurance which, in some cases, may be poorly organized or costly (Fernando et al. 2023). The public often face difficulties in obtaining affordable private insurance or constrained by issues of imbalance between benefits and

costs. This could be an important factor influencing the decline in overall insurance demand.

The education model in the long-run presents findings that are slightly different. Undeniably, the government expenditure in education contributes to the development of human capital in a country. A highly educated workforce is often more productive and earns higher income. In consequence, this group is expected to be exceedingly aware of the importance of owning insurance to protect themselves and their families from unforeseeable risks. Additionally, according to Zhao (2015), when individuals and families invest in education to improve their skills and earning potential, they may also seek insurance coverage to protect their financial well-being and future income in the event of future unexpected events. Nevertheless, public reaction shown to government spending in education and consequent relationship to insurance demand was rather mixed with both positive and negative outcomes. The negative relationship may be due to the quality and adequate education given by the government, which may incline the community not to take large risks that may require insurance coverage. Such risks may include chronic diseases, accidents or fires. In addition, some countries with strong public education systems may also offer better social protection, such as financial aid for students or income support for needy families which may reduce the need for insurance that protects against large financial burden associated with education.

CONCLUSION

This study evaluated the impact of the determinants of insurance demand for Malaysia in a thirty-two-year period from 1990 to 2022. It explored the dynamic relationship between insurance demand with selected macroeconomic variables including gross domestic product, inflation rate, government health expenditure, government education expenditure and real interest rate in Malaysia through adopting the Autoregressive Distributed Lag (ARDL) model. The results were mixed with positive and negative impacts on insurance demand from observed variables, either in the short- or long-run. For instance, in the short-run, the gross domestic product affect insurance demand negatively but not in the education model. However, real interest rate produced mixed results under the education model, but was consistently positive under the health model. The impact of inflation rate on insurance demand was consistently negative in both models. Unexpectedly, both education and health expenditures gave mixed positive and negative values in the short-run. It can thus be suggested that the government's appropriate allocation of expenditure for the development of health and education in the country, has resulted in an increase in society's dependence on insurance ownership in the long-run. By implication, it is clear that government spendings in education and health are important in

influencing insurance demand in Malaysia. As such, it is undeniable that the insurance industry significantly depends on government's expenditure in the health and education sectors. This economic dependence however may create a positive effect on the government and the insurance industry in the long- and short-term. The converse may also be true. Therefore, strengthening the country's financial system in the long- and short-term, may turn it into a catalyst for the long-term wellbeing of the insurance industry in Malaysia. At the same time, the strength of the country's economy will also be preserved. Future studies should also consider examining other government expenditures, such as social expenditure, to elucidate their potential role in influencing insurance demand in the country over the long- and short-run.

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