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The Development of Health and Education Model in Understanding the Insurance Expenditure Issue in Malaysia and Singapore

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ABSTRACT

This study is to determine the relationship between insurance expenditure and economy growth. Specifically, by adopting the Keynesian theory this study is to examine the dynamic relationship between insurances and economy growth with the presence of education variables as the control variables and health variables as a control variable in comparison of Malaya and Singapore from 1990 until 2023, annually data. Furthermore, this study also aims to determine the short run and long run relationship between variables under observation. This study is important since there are lack study focuses on insurance at aggregate level for Malaysia case, compare to other developed countries. This study is employed the Autoregression Distributed Lag (ARDL) model along with Augmented Dickey Fuller unit root test, and ARDL bound cointegration test. The results suggest that, insurances do have short and long run relationship with economy growth for model education and health except there is no long-run relationship in health model of Malaysia. Therefore, it is essential for policy makers to ensure by any means to strengthen insurances industry among insurances firms. Being persistent, innovation and competitive shall led insurances industry to be successful and could even be a one of the robust sectors that has the potential to provide critical support to emerging economies.

Keywords: insurances, economy growth, penetrates growth, short-run, long-run

INTRODUCTION

For the benefit of all parties involved in one economy, a positive economic growth is what every economy aspires to do. Government and central bank especially, work to advance society by developing more, increasing production, raising wages, advancing education, and advancing technologies to achieve economy sustainability. Positive growth in economy also including improved infrastructure, urban expansion, globalisation, job creation, higher worker earnings and higher living standards for the general public.

Next, economy growth indicator is a main indicator that government, analyst, investor or even the people of that country sought first over a specific period as it can provide information about how a certain economy is doing. Economic indicators offer data that can assist traders, analysts, and investors in finding new possibilities and modifying their portfolios. Hence, it is important indicator as it can be a key for potential investors, company or government or in short for direct foreign investment to invest in the country involved as an important monetary source. Thus, economy growth is a vital indicator to see if a country's economy is doing well or not, it is crucial for government to look out for the factors that could easily affecting economy growth. According to Raisová & Ďurčová (2014), in their research stated that economy growth is mainly because of increasing productivity input, Iamsiraroj & Doucouliagos, (2015) state that economy growth is important as it can attract more foreign direct investment to the country has a significant relationship and this statement also in line with Wang et al., (2021).

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However, the main issues of this study that should be focussed at is insurance sector. Insurance industry is made of businesses that offer risk management through insurance contracts. The fundamental idea behind insurance is that one party which is the insurer will promise to make payments in the case of an unpredictable future occurrence for its clients. The insured or policyholder, on the other hand, pays the insurer a lower premium in exchange for that security against that unforeseeable and uncertainty in the future event. Insurances is not just focussed on life and health condition, the category in insurances also include properties, long-term care, disability, renter, umbrella and asset insurances.

However, over years with government intervention and economy policy, insurance industry has become large and dynamic due to GDP growth. People start to invest in insurances for the uncertainties in the future and industry sector is getting more recognition when world pandemic crisis hit the world. More people are getting health and life insurances due to aftermath of this world crisis. However, the result is remained ambiguous as due to recent pandemic crisis, insurances industry witness losses as there are many insurances claims. The economy trend generally being in an economic recession with decreasing profit but increasing claim. According to Babuna et al., 2020, pandemic crisis has made the insurance industry and governments all over the world have become the beacons of hope to which people look for rescue from total annihilation. However, the pandemic has overburdened several governments and financially crippled certain insurance companies because to the rapid growth in infection cases higher than the recovery of affected persons. According to Przybytniowski et al., (2022), as death rates of insurers beyond mortality as risk exposure related to pandemic crisis, insurances sector may face the demand to change their structure insurance to be more dynamic as during pandemic, customer starts to noticed different needs which make them feel safer when it comes to their health. But even as it being said above, still insurances sector does helps and contribute to economy growth as organizations are able to engage in higher-risk, higher-return activities than they otherwise would, because insurance acts as a protective safety net.

Hence in this related problem, the question that will be addressed are: 1) Does insurances impact the economy growth in long-run and short-run in Malaysia and Singapore? 2) Does the presence of education variables a control variable influence insurance in affecting economy growth in long-run and short-run in Malaysia and Singapore? And 3.) Does the presence of health variables a control variable influence insurance in affecting economy growth in long-run and short-run in Malaysia and Singapore? Nevertheless, as the relationship between insurances and economic growth is ambiguous and in addition the lack of study in this field, therefore, the focus of the present research is different from other empirical studies, they are i) The ARDL cointegration technique is used in determining the long run relationship between series with different order of integration (Pesaran and Shin, 1999, and Pesaran et al. 2001) on yearly observation, ii) the analysis of Malaysia and Singapore's short and long-run relationship between insurances and economic growth with the presence of education expenditure and health expenditure in the model, and iii)The interesting of comparative research by the enclosure of Singapore's time series in this study.

Afterward, the specific objectives aim to achieve are 1.) To examine the bound co-integration between exogenous and endogenous variables in Malaysia and Singapore for educational model and health model, 2.) To analyse the long-term relationship exogenous and endogenous variables in Malaysia and Singapore for educational model and health model, 3.) To analyse the short-term relationship between exogenous and endogenous variables in Malaysia and Singapore for educational model and health model. To achieve the objectives, the methods to be adopted for this study are by performing autoregressive distribution lag (ARDL) method. The result of this analysis is potential to helps policy makers to make a compelling decision for the economic welfare. Without this analysis, the interaction between variables and economic growth will remain unclear, and it is difficult to draw conclusions about how recent improvements in key regional variables will affect the macroeconomic factor.

LITERATURE REVIEW

This section will discuss briefly about the previous literature.

The Relationship between Insurances and Gross Domestic Product

There are many past studies that discussed the relationship between insurances and economy growth. According to Outreville, (2011), as he conducts research regarding relationship between insurance growth and economy growth to confirming the claim of UNCTAD that the sustainability of insurances market is essential characteristic in economy growth, the study found out that indeed that insurance growth have significant relationship with economy growth and that the demand side of insurances is greater than the supply side of insurances. This statement also in line with research by Akinlo & Apanisile (2014), Arena (2008), and Kumar et al. (2020). Next, Peleckiene et al., (2019) which is also emphasizes that relationship between insurances penetration and economy growth exist in Luxembourg, Denmark, The Netherland and Finland. Research by Haiss & Sumegi (2008) also emphasize regarding how insurances industry is getting less attention than the bank and stock market in financial intermediation sector although the insurance price for insurance demand is ambiguous, and how the GDP, interest rate and inflation rate also effecting the performance of insurances sector, there is still relationship between insurance and economy growth.

The Relationship between Education and Gross Domestic Product

Economy growth also caused by education and health. Higher education levels provide skilled labour, and skilled labour either directly or indirectly boosts economic growth by working efficiently and effectively. According to Yahya et al., (2012) stated that, human capital such as education variables plays an important role in influencing economic growth. Mercan & Sezer (2014), also stated that education expenses in Turkey had a positive effect on economic growth positively and also mention that allocation of resources of education expenditure could make Turkish economy more dynamic. This is in line with results found out by Musila & Belassi (2004), Yousif (2008), Koktas (2022) and Đurović-Todorović et al., (2017).

The Relationship between Inflation and Gross Domestic Product

Other variables involved in this study as a controlled variable, is consumer index as a proxy of inflation, education and health expenditure. According to Ekinci et al. (2020), for consumer price index, it is proved to have nonlinear relationship with economy growth. this is in line with Javier & Ignacio (1997), S. Mario (2017) which state that the relationship between inflation and economy growth could be negative, positive and neutral based on economy situation, Munir et al., (2009) stated that there is nonlinear relationship between inflation and economy growth, and also found out that existence of positive relationship with economy growth.

The Relationship between Health and Gross Domestic Product

The last variables that involved in this model would be health education as it also have relationship with economy growth. Study by Raghupathi & Raghupathi, (2020) stated that health expenditure has a positive relationship with GDP, income and labour productivity. This statement is in line with study by Serge & Julius (2017) which also stated that health expenditure experienced positive relationship and has significant effect on economy growth. This result is supported by Zhang et al., (2020), Aboubacar & Xu, (2017), and Wang (2015). Hence as has been discussed above, this study will conduct research regarding insurances as a contributor to economy growth with the presence of education variables and health variables separately because it is never easy to understand how education and health are related. Poor health not only contributes to inferior educational achievement, but it can also hinder academic progress. Health issues, impairments, and bad habits can all have an impact on students' academic performance thus, this study will conduct these control variables separately to avoid correlation problem as change in one variable could cause change to another in which resulting the model to fluctuate significantly.

METHODOLOGY AND MODEL SPECIFICATION

The methodology for this study is using Autoregression Lag Distribution (ARDL) to investigate the short-run and long-run relationship between the variables namely economic growth, total life insurances, inflation rate,

education expenditures and health expenditure. Approximately, the data will run the Augmented Dickey-Fuller (ADF) unit root test to determine the data stationary. Then, F-bound test will be implemented to test the long-run relationship and long-run coefficient estimation to justify the significance of the variables, and whether the exogenous variables have positive or negative relationship with endogenous variable. Next is, error correction term to investigate the short-run relationship between variables involved.

Data Collection and Model Specification

For analysis purpose, Malaysia and Singapore's real gross domestic product (RGDP), total life insurances (INS), inflation rate (CPI), education expenditure (EDU), and health expenditure (HEALTH) data in yearly data from 1990 to 2023 were composed from various authorizes websites such as World Bank Data, Macro Trend Data and Federal Reserve Economic (FRED) Data. In fact, RGDP is selected as the proxy of economic growth and CPI as the proxy of inflation rate. Malaysia and Singapore's RGDP are respectively RM/USD and SD/USD. In order to measure the real term after adjusting for inflation, CPI is also collected from resources and used to deflate the data from the nominal form into real form data. Since the data were deflated by CPI, all variables are logarithmic for standardization. Tables 1 and 2 represented the data name and sources for Malaysia and Singapore.

Table 1: Data resources for Malaysia

Data	Sources	Link
Real gross domestic product (RGDP)	World bank data	https://data.worldbank.org/indicator/NY.GDP.MKTP.CN?locations=MY
Total life insurances (INS)	FRED data data	https://fred.stlouisfed.org/series/DDDI09MYA156NWDB
Consumer price index (CPI)	World bank data	https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=MY
Education expenditure (EDU)	Macro Trend data	https://www.macrotrends.net/countries/MYS/malaysia/education-spending

Table 2: Data resources for Singapore

Data	Sources	Link
Real gross domestic product (RGDP)	World bank data	https://data.worldbank.org/indicator/NY.GDP.MKTP.CN?locations=MY-SG
Total life insurances (INS)	OECD data	https://fred.stlouisfed.org/series/DDDI09SGA156NWDB
Consumer price index (CPI)	World bank data	https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=MY-SG
Education expenditure (EDU)	Macro Trend data	https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS?end=2021&locations=SG&start=1990
Health expenditure (HEALTH)	World Bank data	https://data.worldbank.org/indicator/SH.XPD.CHEX.GD.ZS?locations=MY-SG

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Moreover, Figures 1 and 2 representing trend for all the variables in Malaysia from year 1990 to 2023 in total of 30 years. In this diagram, the trend of economy growth, insurances, consumer price index, health and education expenditures are presented for the period of last 30 years. In the diagram, both countries for each variable is presented by different colour of line to differentiate each variable. For instance, economy growth is presented by blue line, insurance by red line, consumer price index for green line, health and education expenditure are black and grey line respectively.

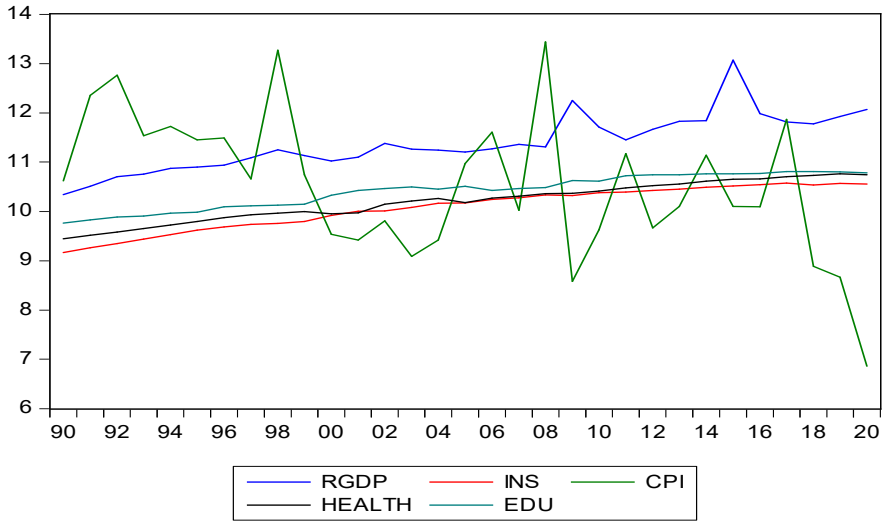

Figure 1: Trend for Malaysia

According to diagram above, roughly, it can be seen that insurance, health and education expenditure are steadily increase from year 1990 to 2020. However, for economy growth, it can be seen from trend that it steadily increases at the beginning of the research period which is from year 1990 to 1996, and the trend began to constant to year 1998 and increase a bit at year 2000 before fall down until year 2002. However, the trend is rising in the year of 2003 and stay constant from 2004 until 2008 before fall a bit at year 2009. After 2009, the trend is reaching its peak at year 2010 and decreasing until 2012 and constantly until 2015 before reaching its highest point at 2016 before steadily going back decreasing in increasing manner. For consumer price index trend, the trend seems to be in fluctuates situation over the span of the 30 years period. The lowest point of consumer index is at year 2020, second lowest from the previous year which is at 2009. Consumer price index reaching its highest peak at year 2008 where the world financial crisis believed taking place around the world. the trend seems to be in frantic fluctuation from year 2009 until 2017 before drastically fall at year 2018.

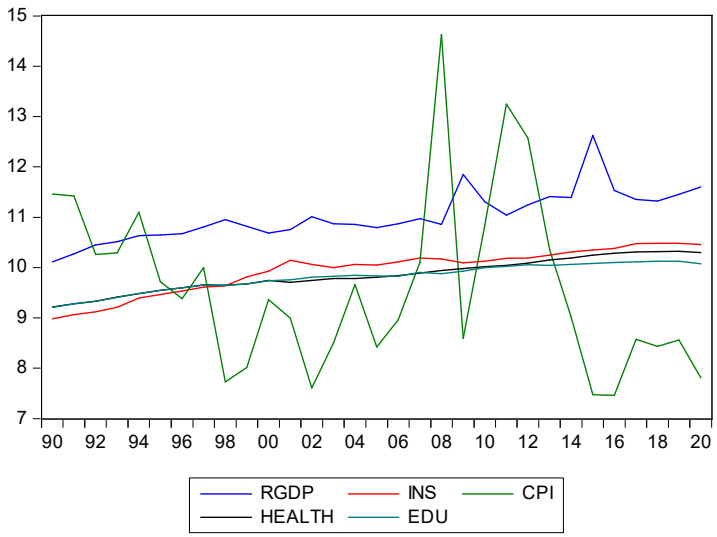

Figure 2: Trend for Singapore

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For Singapore, like Malaysia, the trend for insurance, education and health expenditure is steadily increase over the span of 30 years roughly. As for economy growth, the data seems to be steadily increased before decrease a little bit at year 1998 until 2003. The highest point for Singapore's economy growth would be at year 2015 while the second highest is at year 2010 and the lowest point for economy growth is at year 1990. For consumer price index, the trend is going through frantic fluctuates situation from year 1992 until 2008. The highest point for consumer price index is recorded on the year 2009 while the second highest would be at year 2011. Consumer price index recorded to have drastic fall after 2009 and rose back at year 2012 but unfortunately drastically fall at year 2013 until 2016.

Model Specification

This study is inspired by Rambeli et al. (2023), and the log-linear equations are as follows;

$$rgdp = f(ins, cpi, edu, health) \quad (3.1)$$

While the econometric equation can be written as,

$$rgdp_t = \alpha 0 + \beta ins_t + \gamma cpi_t + \delta edu_t + \theta health_t + \varepsilon t \quad (3.2)$$

The linear equation by using log shall be shown as below,

$$lrgdp_t = \alpha 0 + \beta lins_t + \gamma cpi_t + \delta ledu_t + \theta lhealth_t + \varepsilon t \quad (3.3)$$

Where,

$lrgdp_t$	=	Log of Real gross domestic product for year t
$lins_t$	=	Log of Total life insurances for year t
cpi_t	=	Consumer price index for year t
$ledu_t$	=	Log of Education expenditure for year t
$lhealth_t$	=	Log of Health expenditure for year t
β 0	=	Coefficient for determination variables
β,γ,δ,θ	=	Parameter
ε	=	Error term
t	=	Period from 1990 to 2023

For this study, the ARDL equation is inspired by Thi Lwin (2017). Through his research, ARDL test equation can be used as below;

Education model,

$$\Delta lrgdp_t = \delta_0 + \sum_{i=1}^{i} \tau i\, \Delta lrgdp_{t-i} + \sum_{i=0}^{m} \theta i\, \Delta lins_{t-i} + \sum_{i=0}^{n} \omega i\, \Delta cpi_{t-i} + \sum_{i=0}^{0} \alpha i\, \Delta ledu_{t-i} + \varphi 1 lrgdp_{t-1} + \varphi 2 lins_{t-1} + \varphi 3 lcpi_{t-1} + \varphi 4 ledu_{t-1} + \eta_t \quad (1)$$

Health model,

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$$\Delta lrgdp_t = \delta_0 + \sum_{i=1}^{i} \tau i\, \Delta lrgdp_{t-i} + \sum_{i=0}^{m} \theta i\, \Delta lins_{t-i} + \sum_{i=0}^{n} \omega i\, \Delta cpi_{t-i} + \sum_{i=0}^{p} i\, \Delta lhealth_{t-i} + \varphi 1 lrgdp_{t-1} + \varphi 2 lins_{t-1} + \varphi 3 lcpi_{t-1} + \varphi 4 lhealth_{t-1} + \eta_t \quad (2)$$

In this equation, ΔΔ means at first different while l, m, n, o, p is the lag length and ηt is stand for error term. H0: φ1 = φ2 = φ3 = φ4=0 is the null hypothesis that will be tested. In the ARDL bound test, if F-statistic is higher than the value of critical statistic, this will be concluded that there is a relation between the variables in the long run. This result is able to explain the effect of dependent variables on independent variables. The model can be applied to the following equation in the long-run as suggested by Thi Lwin (2017) below,

Education model

$$lrgdp_t = \alpha_0 + \sum_{i-1}^{k} \partial_{1i}\, lrgdp_{t-1} + \sum_{i-0}^{p} \mu_{1i}\, lins_{t-1} + \sum_{i-0}^{q} \theta_{1i} cpi_{t-i} + \sum_{i-0}^{i} \omega_{1i} ledu_{t-i} + \varepsilon_{1t} \quad (3)$$

Health model

$$lrgdp_t = \alpha_0 + \sum_{i-1}^{k} \partial_{1i}\, lrgdp_{t-1} + \sum_{i-0}^{p} \mu_{1i}\, lins_{t-1} + \sum_{i-0}^{q} \theta_{1i} cpi_{t-i} + \sum_{i-0}^{m} \omega_{1i} lhealth_{t-i} + \varepsilon_{1t} \quad (4)$$

While the effect of independent variables can be seen in the short-run, the equation will be as below from Error Correction Term,

Education model,

$$\Delta rgdp_t = \alpha_0 + \sum_{i-1}^{g} \partial_{1i}\, lrgdp_{t-1} + \sum_{i-0}^{h} \mu_{2i}\, lins_{t-1} + \sum_{i-0}^{i} \theta_{2i} cpi_{t-i} + \sum_{i-0}^{j} \omega_{2i} ledu_{t-i} + \theta ect_{t-1} + \varepsilon_{2t} \quad (5)$$

Health model,

$$\Delta rgdp_t = \alpha_0 + \sum_{i-1}^{g} \partial_{1i}\, lrgdp_{t-1} + \sum_{i-0}^{h} \mu_{2i}\, lins_{t-1} + \sum_{i-0}^{i} \theta_{2i} cpi_{t-i} + \sum_{i-0}^{j} \omega_{2i} lhealth_{t-i} + \theta ect_{t-1} + \varepsilon_{2t} \quad (6)$$

The error correction term $ect_{t-1}ect_{t-1}$ denoted the respond of stabilizing disequilibrium system. In the existence of co-integration, $ect_{t-1}ect_{t-1}$ should be negative and the probability is ought to be significant and also the value of $ect_{t-1}ect_{t-1}$ should be higher than 1, so it can adjust the speed.

Further, ARDL method could be used on most cases which is means that even the variables that are stationary at mixed levels which are at level and its first different. It is an appropriate method for these types of stationary condition (Pesaran et al., 2001). This methos suggested that φ1, φ2, φ3, φ4, φ5 parameters are multiplier for short run while $\partial i, \mu i, \theta i, \omega i, vi \partial i, \mu i, \theta i, \omega i, vi$ are meant for long-run. $\alpha 0$ is constant term and εt is error term.

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H0 of the ARDL regression analysis is that all long run multipliers' values are equal to zero, $\partial i=\mu i=\theta i=\omega i=\upsilon i=0$ which indicates that there is no long-run relationship between dependent and independent variables. H1 is that long run multipliers' values are different and not equal to zero, $\partial i\neq\mu i\neq\theta i\neq\omega i \neq 0$ $\upsilon i \neq 0$ which means that there is long-run relationship between dependent and independent variables.

RESULT AND DISCUSSION

Augmented Dickey-Fuller Unit Root Test

As being mention previously, the methodology for this study is using Autoregression Lag Distribution (ARDL) to investigate the short-run and long-run relationship between the variables namely economic growth, total life insurances, inflation rate, education expenditures and health expenditure. Approximately, the data will run the Augmented Dickey-Fuller (ADF) unit root test to determine the data stationary. Then, the data will proceed to estimate optimal lag selection using Akaike Information Criterion (AIC). Below are the results from Augmented Dickey-Fuller (ADF) unit root test at the level form and at first different form of Malaysia.

Table 3: Augmented Dickey Fuller (ADF) of Unit Root Test for Malaysia

Malaysia	LEVEL			1st DIFFERENT		
Data Series	Intercept	Trend and Intercept	None	Intercept	Trend and intercept	None
RGDP	-0.456805(5) (0.8841)	-3.039073(9) (0.1456)	4.379878(5)(1.0000)	-6.763320(4) (0.0000)***	-6.591709(4) (0.0001)***	-1.19919(7) (0.2036)
INS	-4.10765(2) (0.0036)***	-0.488405(3) (0.9778)	-0.28104(7) (0.5736)	-0.685457(6) (0.8314)	-4.137854(2) (0.0156)**	-1.96951(3) (0.0484)
CPI	-1.472544(9) (0.5274)	-1.758904(9) (0.6879)	-1.26680(2) (0.1840)	-6.249161(1) (0.0000)***	-6.175985(1) (0.0000)***	-6.11370(1) (0.000)***
HEALTH	-2.50063(9) (0.1294)	-0.770074(9) (0.9527)	-0.77007(9) (0.9527)	-4.496425(2) (0.0015)***	-3.464209(5) (0.0665)*	--.442613(3) (0.1359)
EDU	-2.10571(13) (0.2448)	-1.448036(2) (0.8233)	2.750056(1) (0.9977)	-2.802844 (0.0707)	-6.063679(0) (0.0001)	-2.20782(1) (0.0286)

(Sources: Calculated using Software EViews 10)

Table 3 shows the results of the ADF test at level form and first different form in Malaysia. The significance of the p-value is from MacKinnon (1996) to examine the probability of the series whether to accept or reject the null hypothesis that have been set earlier. The results shows that real gross domestic product, consumer price index, total life insurances, education and health expenditure are a mixture of stationary and non-stationary either at level or first different form. For instance, RGDP at level form are non-stationary at intercept, trend and intercept and at none while at first different, the variables are stationary at 0.01 significant level at intercept and trend and intercept with lag 4 for both however are not stationary at none.

For total life insurances variables, the data is stationary at 0.01 significant level at intercept but not stationary at trend and intercept and at none. At first different, the variables seem too also not stationary at intercept but stationary at trend and intercept and at none at 0.05 significant level with lag 2 and 3 respectively. For consumer price index, the data is not stationary at level form but stationary at first different at intercept, trend and intercept and at none at lag 1. Other than referring to probability to determine the stationarity of data,

stationarity of the data can also be seen from comparing Augmented Dickey-Fuller statistic and test critical values. For instance, health variables are not stationary at level form at intercept, trend and intercept and at none as t-statistic which is -2.500636, -0.770074 and -0.77007 respectively are greater than critical value at -3.012363, -3.644963 and -3.644963 respectively. However, at first different, the variables seem to be stationary at intercept (0.0015) and trend and intercept (0.0665) but not at none (0.1359). Lastly, for education expenditure, the data are reported to be not stationary at intercept, trend and intercept and at none at lag 13, 2 and 1 respectively. However, in first different, t-statistic for intercept, trend and intercept and at none are showing -2.802844, -6.063679 and -2.20782 respectively greater than critical value which is -2.971853, -3.574244 and -2.650145 accordingly which lead to fail to reject the null hypothesis and hence the result is stationary at 0.10, 0.01 and 0.05 significant level respectively.

Table 4: Augmented Dickey Fuller (ADF) of Unit Root Test for Singapore

Singapore	LEVEL			1st DIFFERENT		
Data Series	Intercept	Trend and Intercept	None	Intercept	Trend and intercept	None
RGDP	-0.298792(5) (0.9119)	-1.574733(6) (0.7728)	3.537076(5) (0.9997)	-6.134504(4) (0.0000)***	-5.967290(4) (0.0003)***	-1.274605(7) (0.1803)
INS	-14.413298(7) (0.55580)	-3.004455(7) (0.1522)	0.611031(8) (0.8407)	-4.148302(0) (0.0032)***	-4.730905(0) (0.0037)***	-1.168775(7) (0.2136)
CPI	-2.188642(5) (0.2149)	-2.325356(9) (0.4037)*	-0.611031(8) (0.4272)	-6.004080(1) (0.0000)***	-5.877311(1) (0.0002)***	-6.067623(1) (0.0000)***
HEALTH	-1.1166170(3) (0.6738)	-0.326789(13) (0.9817)	2.556646(1) (0.9964)	-3.631298(0) (0.0112)**	-1.247418(2) (0.8794)	-1.579626(2) (0.1058)
EDU	-2.449956(12) (0.1432)	-0.326789(13) (0.9817)	-0.12328(9) (0.6294)	-1.431718(6) (0.5491)	-5.248316(0) (0.0011)***	-2.454196(6) (0.0166)

(Sources: Calculated using Software EViews 10)

Next, table 4 above shows the result of ADF unit root test for Singapore's variables. Table 4.2 shows the results of the ADF test at level form and first different form in Singapore. The significance of the p-value is from MacKinnon (1996) to examine the probability of the series whether to accept or reject the null hypothesis that have been set earlier. The results shows that real gross domestic product, consumer price index, total life insurances, education and health expenditure too are a mixture of stationary and non-stationary either at level or first different form. For instance, RGDP at level form are non-stationary at intercept, trend and intercept and at none while at first different, the variables are stationary at 0.01 significant level at intercept and trend and intercept with lag 4 for both however are not stationary at none at lag 7. For total life insurances variables, at level form, the data is not stationary at intercept, at trend and intercept and at none. At first different, the variables seem too also not stationary at none but stationary at intercept and trend and intercept at 0.01 significant level. For consumer price index, the data is not stationary at level form but stationary at first different at intercept, trend and intercept and at none at lag 1. Other than referring to probability to determine the stationarity of data, stationarity of the data can also be seen from comparing Augmented Dickey-Fuller statistic and test critical values. For instance, health variables are not stationary at level form at intercept and at none as t-statistic which is -1.166710 and 2.556646 respectively are greater than critical value at -2.976263 and -1.952910 respectively. However, at first different, the variables seem to be stationary at intercept (0.0112) but not at trend and intercept (0.8794) and also at none (0.1058). Lastly, for education expenditure, the data are reported to be not stationary at intercept, trend and intercept and at none at lag 12, 13, and 9 respectively. In first different, t-statistic for intercept is -1.431718 which are greater than critical value which is -2.998064

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which lead the data to be not stationary. However, still at first different, at trend and intercept and at none, t-statistic are -5.248316 and -2.454196 which is smaller than critical value -3.574244 and -1.956406 accordingly which lead to fail to reject the null hypothesis and hence the result is stationary at 0.01 and 0.05 significant level respectively. Mixture of stationarity at level form and at first different also there have none one of the data that been stationary at second different, this warrants the use of ARDL method to analysis further for this research.

Long-Run Bound Test (F-Bound Test)

Now as the data have been confirmed that none of the selected series I (2) or beyond and the determination of the optimal order of the lag, further analysis would be about to investigate long-run cointegration using F-bound test as resulted in table.

Education Model

Below is the F-Bound test result for education model for Malaysia. The table illustrate that the value of F-statistic (10.25724) is larger than the critical value of both lower (2.37) and upper bound (3.2) at 10% and lower (2.79) and upper (3.3.67) bound at 5% significant level by using restricted constant and no trend. This is means that the null hypothesis is rejected and thus cointegration exist for this equation. This determine that there is the presence of long-run relationship between dependent variables (RGDP) and independent variables (INS, CPI, EDU).

Table 5: F-Bound Test for Malaysia

Null Hypothesis: No long run relationship exists		
Test Statistic	Value	K
F- Statistic	10.25724	3
Critical Value Bounds		
Significance	I (0) Bound	I (1) Bound
10 %	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

The result for this F-bound test for Singapore will be displayed at table 4.4 below. The table illustrate that the value of F-statistic (7.022195) is larger than the critical value of both lower (2.37) and upper bound (3.2) at 10% and lower (2.79) and upper (3.3.67) bound at 5% significant level by using restricted constant and no trend. This is means that the null hypothesis is rejected and thus cointegration exist for this equation. This determine that there is the presence of long-run relationship between dependent variables (RGDP) and independent variables (INS, CPI, EDU).

Table 6: F-Bound Test for Singapore

Null Hypothesis: No long run relationship exists		
Test Statistic	Value	K
F- Statistic	7.022195	3

Critical Value Bounds		
Significance	I (0) Bound	I (1) Bound
10 %	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

Health Model

Below is the F-Bound test result for health model for Malaysia. The table illustrate that the value of F-statistic (3.760831) is larger than the critical value of both lower (2.37) and upper bound (3.2) at 10% and lower (2.79) and upper (3.3.67) bound at 5% significant level by using restricted constant and no trend. This is means that the null hypothesis is rejected and thus cointegration exist for this equation. This determine that there is the presence of long-run relationship between dependent variables (RGDP) and independent variables (INS, CPI, HEALTH).

Table 7: F-Bound Test for Malaysia

Null Hypothesis: No long run relationship exists		
Test Statistic	Value	K
F- Statistic	3.760831	3
Critical Value Bounds		
Significance	I (0) Bound	I (1) Bound
10 %	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

The result for this F-bound test for Singapore will be displayed at table 4.4 below. The table illustrate that the value of F-statistic 6.872904) is larger than the critical value of both lower (2.37) and upper bound (3.2) at 10% and lower (2.79) and upper (3.3.67) bound at 5% significant level by using restricted constant and no trend. This is means that the null hypothesis is rejected and thus cointegration exist for this equation. This determine that there is the presence of long-run relationship between dependent variables (RGDP) and independent variables (INS, CPI, HEALTH).

Table 8: F-Bound Test for Singapore

Null Hypothesis: No long run relationship exists		
Test Statistic	Value	K
F- Statistic	6.872904	3
Critical Value Bounds		

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Significance	I (0) Bound	I (1) Bound
10 %	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

ARDL Long-Run Coefficient Estimation

After bound test's result determined that there is long-run cointegration relationship between independent variables (RGDP) and its determinant factor, total life insurances, consumer price index, education and health expenditure. The following table showed the result for ARDL long run coefficients for both education and health model.

Education Model

Table below shows the estimation of coefficient for the long run with ARDL model for Malaysia. The results indicate that consumer price index and education expenditure have positive relationship in the long-run while total life insurance have a negative relationship with RGDP. According to the result, total life insurance, consumer price index, education expenditures are statistically significant at 1 %. Consumer price index's coefficient is 0.287269 which is means that a 1% increase in consumer price index is related to approximately 0.28% increase in economy growth. Next, education's coefficient is 4.935016, this means that an increase of 1 % in education will led to a increase of 5.0 % in economy growth. However, for total life insurances, an increase of 1 percent, will lead to the decrease of -2.73 % in economy growth as the coefficient for insurances is -2.738441.

Table 9: Long Run Coefficient Estimation for Malaysia

Variables	Coefficient	Std. error	t-statistic	Probability
INS	-2.738441	0.683080	-4.008964	0.0039
CPI	0.287269	0.052240	5.498985	0.0006
EDU	4.935016	0.778271	6.341003	0.0002

Table below shows the estimation of coefficient for the long run with ARDL model for Singapore. The results indicate that total life insurance are significant at 5%, and education are significant at 1%. However, consumer price index is not significant. The result also shows positive relationship for education expenditure but negative relationship for insurances and consumer price index. The coefficient for insurances is -1.644199 which means that an increase of 1% will lead to a decrease in economy growth by 1.64%. Next is coefficient for consumer price index is -0.014024 which means that an increase of 1 % will lead to a decrease of 0.01% in economy growth. For education expenditure, as it have positive relationship and the coefficient are 3.486708%, an increase of 1 % will lead to an increase of 3.48% in economy growth accordingly.

Table 10: Long Run Coefficient Estimation for Singapore

Variables	Coefficient	Std. error	t-statistic	Probability
INS	-1.644199	0.702307	-2.341140	0.0345

CPI	-0.014024	0.043473	-0.322581	0.7518
EDU	3.486708	0.917573	3.799924	0.0020

Health Model

Table below shows the estimation of coefficient for the long run with ARDL model. The results indicate that consumer price index, education expenditure and insurances have positive relationship in the long-run with RGDP. However, according to the result, insurance, consumer price index is not statically significant while health is the only one significant at 0.05 percent level of significant. Health's coefficient is 1.346648 which is means that an increase of 1 % in education will be led to an increase of 1.35 % in economy growth at 5 % significant level.

Table 11: Long Run Coefficient Estimation for Malaysia

Variables	Coefficient	Std. error	t-statistic	Probability
INS	0.015906	0.573852	0.027718	0.9782
CPI	0.045467	0.046511	0.977549	0.3400
HEALTH	1.346648	0.590159	2.281839	0.0336

Table below shows the estimation of coefficient for the long run with ARDL model for Singapore. The result also shows positive relationship for health expenditure but negative relationship for insurances and consumer price index. The results indicate that only health is significant at 0.01% level of significant while insurances and consumer price index is not significant. The coefficient for health is 1.462441 which means that an increase of 1% will lead to an increase in economy growth by 1.46%.

Table 12: Long Run Coefficient Estimation for Singapore

Variables	Coefficient	Std. error	t-statistic	Probability
INS	-0.086609	0.150537	-0.575335	0.5722
CPI	-0.019333	0.012443	-1.553735	0.1377
HEALTH	1.462441	0.172748	8.465742	0.0000

Short-Run Dynamic Test (Error Correction Model)

Next, to investigate the short-run relationship, error correction model will be implemented in both education and health model. In table below, the value of coefficient of the error correction term must significant and have negative sign to shows that there is cointegration relationship between variables involved.

Education Model

The ECM obtained from the education model in Malaysia is -2.415182 which is negative and significant at 1% level of significant in tandem with theory. The negative sign of error term means that error in the short run converge or adjust towards long run equilibrium with the speed of 241 percent. In short, error is corrected in the present period and tied to long run equilibrium with 241 percent magnitude in one year. The statistical value of Durbin Watson is 2.811523which indicates that there is no autocorrelation exist between the

variables. The value of R2 is 0.916407 which suggest that 96 percent change in variation in dependent variables is due to independent variables. Adjusted R2 is 0.818882 while F-statistic value is 10.25724. Therefore, it can be concluded that the variables are jointly significant at 1% level and with good fit. The results also suggest that insurances, consumer price index, education expenditure have both short run and long run impact on economy growth in Malaysia

For Singapore, the ECM obtained from the result is -1.496389 which is negative and significant at 1% level of significant in tandem with theory. The negative sign of error term means that error in the short run converge or adjust towards long run equilibrium with the speed of 149 percent. In short, error is corrected in the present period and tied to long run equilibrium with 149 percent magnitude in one year. The statistical value of Durbin Watson is 2.644116 which indicates that there is no autocorrelation exist between the variables. The value of R2 is 0.841124 which suggest that 84 percent change in variation in dependent variables is due to independent variables. Adjusted R2 is 0.770512 while F-statistic value 7.022195. Therefore, it can be concluded that the variables are jointly significant at 1% level and with good fit. The results also suggest that insurances, consumer price index, and education expenditure have both short run and long run impact on economy growth in Singapore.

Table 13: Short-Run Dynamic Test (Error Correction Model) for Malaysia

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	1.330878	0.227772	5.843035	0.0004
D(RGDP(-2))	1.038643	0.185520	5.598540	0.0005
D(INS)	-10.86440	2.473080	-4.393064	0.0023
D(INS(-1))	2.965313	1.479465	2.004314	0.0800
D(INS(-2))	-4.778362	1.695657	-2.818000	0.0226
D(INS(-3))	4.064751	1.886474	2.154681	0.0633
D(CPI)	0.096578	0.044015	2.194205	0.0595
D(CPI(-1))	-0.466602	0.070608	-6.608339	0.0002
D(CPI(-2))	-0.267398	0.062725	-4.263051	0.0027
D(CPI(-3))	-0.226372	0.048319	-4.684953	0.0016
D(EDU)	3.294498	1.039185	3.170271	0.0132
D(EDU(-1))	-3.475462	1.058544	-3.283248	0.0111
D(EDU(-2))	-7.313331	1.354953	-5.397479	0.0006
D(EDU(-3))	-2.622100	0.935790	-2.802018	0.0231
CointEq(-1)*	-2.415182	0.275362	-8.770937	0.0000

R-squared	0.916407	Mean dependent var	0.048636
Adjusted R-squared	0.818882	S.D. dependent var	0.403484
S.E. of regression	0.171714	Akaike info criterion	-0.385789

Sum squared resid	0.353830	Schwarz criterion	0.334121
Log likelihood	20.20815	Hannan-Quinn criter.	-0.171722
Durbin-Watson stat	2.811523		

Table 14: Short-Run Dynamic Test (Error Correction Model) for Singapore

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CPI)	-0.183210	0.030488	-6.009207	0.0000
D(CPI(-1))	-0.128285	0.045043	-2.848078	0.0129
D(CPI(-2))	-0.048867	0.026985	-1.810912	0.0917
D(CPI(-3))	-0.060077	0.026176	-2.295096	0.0377
D(EDU)	4.353469	1.395545	3.119548	0.0075
D(EDU(-1))	1.068675	1.571434	0.680064	0.5076
D(EDU(-2))	-6.840042	1.641034	-4.168130	0.0009
D(EDU(-3))	-8.217874	2.331704	-3.524407	0.0034
CointEq(-1)*	-1.496389	0.222716	-6.718830	0.0000

R-squared	0.841124	Mean dependent var	0.040186
Adjusted R-squared	0.770512	S.D. dependent var	0.410018
S.E. of regression	0.196419	Akaike info criterion	-0.155937
Sum squared resid	0.694444	Schwarz criterion	0.276009
Log likelihood	11.10514	Hannan-Quinn criter.	-0.027496
Durbin-Watson stat	2.644116		

Health Model

The ECM obtained from the health model in Malaysia is -1.35939 which is negative and significant at 1% level of significant in tandem with theory. The negative sign of error term means that error in the short run converge or adjust towards long run equilibrium with the speed of 135 percent. In short, error is corrected in the present period and tied to long run equilibrium with 135 percent magnitude in one year. The statistical value of Durbin Watson is 2.216013 which indicates that there is no autocorrelation exist between the variables. The value of R2 is 0.627090 which suggest that 62 percent change in variation in dependent variables is due to independent variables. Adjusted R2 is 0.580476 while F-statistic value is 3.760831. Therefore, it can be concluded that the variables are jointly significant at 1% level and with good fit. The results also suggest that insurances, consumer price index, health expenditure have both short run and long run impact on economy growth in Malaysia.

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Table 15: Short-Run Dynamic Test (Error Correction Model) for Malaysia

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	0.447258	0.223115	2.004606	0.0587
D(RGDP(-2))	0.332259	0.167239	1.986730	0.0608
D(CPI)	-0.047923	0.031360	-1.528163	0.1421
CointEq(-1)*	-1.359399	0.286173	-4.750262	0.0001

R-squared	0.627090	Mean dependent var	0.048969
Adjusted R-squared	0.580476	S.D. dependent var	0.395945
S.E. of regression	0.256456	Akaike info criterion	0.247847
Sum squared resid	1.578476	Schwarz criterion	0.438162
Log likelihood	0.530145	Hannan-Quinn criter.	0.306028
Durbin-Watson stat	2.216013		

For Singapore, the ECM obtained from the result is -2.410231 which is negative and significant at 1% level of significant in tandem with theory. The negative sign of error term means that error in the short run converge or adjust towards long run equilibrium with the speed of 241 percent. In short, error is corrected in the present period and tied to long run equilibrium with 241 percent magnitude in one year. The statistical value of Durbin Watson is 2.568062 which indicates that there is no autocorrelation exist between the variables. The value of R2 is 0.822691which suggest that 82 percent change in variation in dependent variables is due to independent variables. Adjusted R2 is 0.790453 while F-statistic value 6.872904. Therefore, it can be concluded that the variables are jointly significant at 1% level and with good fit. The results also suggest that insurances, consumer price index, and health expenditure have both short run and long run impact on economy growth in Singapore.

Table 16: Short-Run Dynamic Test (Error Correction Model) for Singapore

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	1.149545	0.267713	4.293941	0.0004
D(RGDP(-2))	0.860151	0.193453	4.446297	0.0003
D(RGDP(-3))	0.462914	0.132449	3.495027	0.0026
D(CPI)	-0.097762	0.019942	-4.902361	0.0001
CointEq(-1)*	-2.410231	0.371902	-6.480824	0.0000

R-squared	0.822691	Mean dependent var	0.040186
Adjusted R-squared	0.790453	S.D. dependent var	0.410018

S.E. of regression	0.187691	Akaike info criterion	-0.342464
Sum squared resid	0.775014	Schwarz criterion	-0.102494
Log likelihood	9.623260	Hannan-Quinn criter.	-0.271108
Durbin-Watson stat	2.568062		

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