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Evaluating the Relationship between Private Hospital Expenditure and Economic Growth in Malaysia: An ARDL Perspective

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Abstract

Using the Autoregressive Distributed Lag (ARDL) technique, this study examines the short- and long-term links between private hospital spending and economic growth in Malaysia. It is critical to comprehend how the growing investment in private healthcare affects economic indices such as GDP, employment, and health outcomes. Improved healthcare services boost worker productivity and overall economic performance, according to the data, which shows a strong positive correlation between GDP growth and private hospital spending. According to the findings, private healthcare investment has even more significant long-term consequences than short-term ones, highlighting the necessity of consistent spending in this area. To promote economic development, policymakers should give private healthcare investments top priority. They can do this by enacting measures like incentives for the expansion of private hospitals, strengthening regulatory frameworks, and encouraging public-private partnerships. This study adds to the body of knowledge on healthcare economics and emphasizes how crucial private healthcare spending is to Malaysia's economic development.

Keywords: Private Hospital Spending, Out-of-Pocket Expenditure, Private Healthcare expenditure, Economic Growth, Autoregressive Distributed Lag (ARDL)

Introduction

Nearly every other industrialized nation has seen rapid increases in healthcare spending (HCE) over the last forty years, outpacing the expansion of their economies, Barati and Fariditavana (2020). Malaysian healthcare history predates the country's independence. Workers in the tin mining business pay 50 cents a year for care at the hospital, which was built for their benefit. Subsequently, hospitals in Perak state and throughout Malaysia increased in number. As a result, everybody in Malaysia may now obtain essential medical treatment for a small fee because to the country's improved healthcare system.

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When Malaysia began to specialize in the manufacturing sector and privatization was implemented in 1983, the healthcare system evolved into a two-tiered parallel structure that is still dualistic today. The idea of "privatization," as defined by the Economic Planning Unit (EPU) in 2012, is the transfer of governmental (public sector) duties and activities to the private sector. The initial objectives of privatization are to increase market efficiency and the involvement of corporations will aid in economic growth, lessen the government's financial burden, attract foreign direct investment, increase Bumiputra's involvement in the corporate sector, and decrease the size of the public sector's participation (Liew et al., 2018; Mun, 2007; Yap, 2018). According to the Private Healthcare Facilities and Services Act 1998 (ACT 586), private hospitals treat patients or provide ward services anywhere that isn't a government hospital or facility. Private nursing homes are not included in this. A private maternity home is included, though.

The Ministry of Health's responsibility began to shift toward policymaking, regulation, and establishing the standards for acceptable, affordable, and high-quality care during the mid-term Sixth Malaysian Plan review. Later, the government began to progressively decrease its role as a provider of health services and expand its enforcement and regulatory capabilities in the Seventh Malaysian Plan (1996-2000) (Onn, 2015).

A person's healthcare is a vital part of their life, and both public and private spending on it is increasing more quickly than any other area of the economy. As a result, the public debate has been sparked by the provision of healthcare costs, whether they are private or public. The healthcare system has changed dramatically since Malaysia gained its independence. Being a growing nation, Malaysia has seen significant changes to its healthcare system, especially in the way the public and private sectors are balanced in terms of funding and delivering healthcare. Since the implementation of the Malaysia Industrialization Policy in the 1980s, the proportion of public healthcare spending has been trending downward. Consequently, Malaysia's effective healthcare system was hailed by the majority of international organizations (WHO, 2010).

Literature Review

Solow Human Capital Growth Theory

Barro (1996), clarified that the concepts of economic growth are divided into two stages. The initial stage of neoclassical theory held that the primary force behind economic growth was physical capital. Neoclassical theory states that physical capital promotes economic growth. The neoclassical model, which was the foundation of economic growth theory in the 1960s, held that all economies were equal save for capital intensity and that the poor would eventually overtake the rich. The convergence property originates from the diminishing return on capital. Economies with fewer capital expenditures per worker tend to have higher rates of return and faster growth.

Additionally, Barro (1996), noted that the model is being extended to incorporate additional sources of cross-country variation, such as consumer spending and government restrictions about the degree of protection afforded to property rights. In addition to tangible assets, the concept has been broadened to include human capital in the forms of health and education.

The focus of endogenous growth theories has been on factors including population, technology, public policy, and human capital. These articles claim that the development of human capital has a positive externality on capital accumulation and has a beneficial impact on the welfare and economic growth rate of a country. Numerous explanations have been proposed in the literature to explain the relationship between economic growth and health. The first holds that improvements in human capital promote economic growth, but that economic development also stimulates improvements in health and education, which raises the level of human capital.

Following World War II, when decolonization was at its peak, economic growth gained popularity. Growth studies are typically separated into two categories. The first is the neo-classical growth hypothesis, which dominated discourse until the 1980s. According to this idea, population growth and technological improvement are external. To guarantee that there is no long-term difference in the level of development among countries, neo-classical growth theories rely on factors like income, capital, and savings. Despite all of its shortcomings, the neoclassical economists' growth theory of Solow and Swan (1956) gave rise to growth studies. Nevertheless, Solow's theory has limitations of its own since it can only account for long-term economic development by presuming external technology advancement and concentrating too much on physical accumulation.

Following the introduction of the idea of human capital by Theodore W. Schultz according to Shi Mei (2014), the neoclassical growth model was expanded in the 1960s to include a number of social development indicators, including health, life expectancy, and literacy. Investments in production, education, training, health care, and migration that raise the caliber and volume of labor indicators and, eventually, labor output are referred to as human capital investments. Human capital was then incorporated into growth theory in the 1980s. Differences in economic performance over time could be explained by the buildup of human capital as determined by the model.

Numerous theoretical models assess the accumulation of human capital as a factor in the process of growth and incorporate it as a production factor. Barro (1991) contends that the dissemination of technology and the facilitation of global capital mobility depend on human capital. Using country panel data, Barro's study demonstrates that, when GDP per capita stays constant, nations with greater initial levels of education expand more quickly.

Despite the fact that education has long been regarded as the most crucial human capital, Becker (2009), and Schultz (1997), discovered that investments in health and nutrition are also seen as human capital. One of the most crucial treatments for emerging nations with numerous issues is education. Parents with higher levels of knowledge, for instance, are better equipped to address the educational and medical needs of their kids. In a similar vein, long-term economic growth and poverty alleviation are closely related to health. In emerging nations, the burden of disease can impede economic growth. Health and education can assist in overcoming exclusion based on gender, place of residence, and other poverty correlates in order to promote self-determination for the impoverished the quality of both education and health.

The lowering of sickness during the years of life when people are productive justifies spending on primary health care. If governments provided a minimal set of necessary, reasonably priced clinical services, the burden of sickness in developing nations may be decreased (World Bank, 1993).

Odrakiewicz (2012) asserts that the relationship between economic growth and health is clearer and simpler to understand. The amount spent on health care rose in tandem with income. Grossman's (2022) study demonstrated that, on average, higher health spending results in better health. Additionally, if one's wealth increases, they are more likely to spend their spare cash on higher-quality nourishment, which will improve their overall health.

The study conducted in Afghanistan by Nikzad and Thippeswamy (2024), examines the relationship between economic growth and health. The GFCF, maternal mortality using ARDL, child mortality rate, and health spending are the independent variables. While health spending is favourable and considerable, the child mortality rate is significant but negative in the short term. Health spending and the child mortality rate were important in the long run, but GFCF had a detrimental impact on economic growth. Economic growth can be stimulated by government initiatives to improve policies and increase financing for the healthcare sector.

Between 1993 and 2015, Cima and Almeida examined the trends in GDP and health spending in 25 OECD European nations. Among other things, the study computed a vector error correction model with nations' fixed effects and determined that the growth dynamics of health expenditure did not change much during the crisis. The study also evaluated a third variable related to the population's health status, and the findings show that a higher proportion of people reported being unwell during and after the crisis, and that GDP—rather than health spending—is the primary driver of the population's health status. Furthermore, the findings show that the mechanism used to measure the rise in health spending was not directly impacted by the Great Crisis, but a potential decline in health during the crisis may have extended beyond the effects of economic growth on health spending.

According to a study conducted in Bangladesh by Akter and Alam (2021), households rely on their income to pay for healthcare, putting their shelter, food, hygiene, and education at risk. Since non-communicable diseases affect the majority of households, the challenges in paying for ongoing medical care have an effect on the economy as a whole, which has led to a slowdown in economic growth. The findings of the 2020 study by Muraleedharan et al., which examined the relationship between economic growth and out-of-pocket expenses, indicated that healthcare should support public hospitals in India to upgrade their infrastructure and foster economic expansion.

The economic indicators Gross Fixed Capital Formation (GFCF), Aggregate Health Expenditure (AHE), Secondary School Enrollment (SSE), and Economic Active Population (PPT; Ages 15-60) were used in Osobase and Bakare's (2019) study of health expenditure and economic growth in Nigeria using time series (1981-2018) using ARDL. The results show that population expansion positively affects economic growth, and the PPT had a major effect on it. Economic growth is negatively and negligibly impacted by the GFCF.

Methodology and Data

Empirical Model

For this study's empirical model, the long-term and short-term relationships between the macroeconomic and human capital variables were assessed using the bound test of the ARDL model of time series econometrics of data analysis. The augmented Solow human-capital-growth model explains the relationship between economic growth and human capital in health. It is a dynamic process between the labour, capital, and technological factors of production and the shifts in the economy's output over time (Mironov and Konovalova, 2019).

The application of the Solow human-capital-growth model to the analysis of economic growth and private hospital spending. The Slow Growth model, which was initially the Cobb Douglas production function in equation, was improved upon by this model.
The mathematical expression explains the relationship between inputs and output is:

$Y_{t=}$f (A, K_t,L_t) (1)

Where Y is total production in economy, A is technology, K is capital, L is labour and f is the functionality, Solow (1956). Increased human capital Growth in output was considered the dependent variable in the Solow Model's production function, whereas growth in labor, physical capital, and human capital were considered the explanatory variables. (Ntuli, 2022; Wickremerante, 2020; Emeghara, Orji, & Ahamba, 2021).

The Solow human-capital-growth model is a continuous and homogeneous aggregate production function. There are two parts to capital: physical capital and human capital. Human capital is added to equation (1) by expanding it.

$$Y_t = K_t^{\propto} H_t^{\beta} (AL)^{1-\alpha-\beta} \quad (2)$$

Where, Y is total production in economy, A is level of Technological progress or Productivity, K is physical capital, L is the level of Labour Force, H is Human Capital, H will be extended into two, which are (α, β are output elasticities of capital and human capital).

To derive an empirical model, production function transformed into log-linear form for easy interpretation of coefficients as elasticities. Converting the equation to log-linear form, re-writing the equation (2), will give equation (3)

$$lnY_t = ln(A_t) + \alpha \ln(K_t) + \beta \ln(H_t) + (1 - \alpha - \beta) \ln(L_t) \quad (3)$$

Where, $lnY_t, \ln(K_t), \ln(H_t), \ln(L_t)$ are the natural logs of output, physical capital, human capital and labour, respectively and $ln(A_t)$ represent technology (assume exogenous over time). Equation (3) is used to develop the econometric model to determine the impact of education and health expenditure on the economic growth. However, Equation (4) is non-linear model where an appropriate model to explain the equation, in accordance to economic characteristic and allows for easy interpretation of coefficients as elasticities (Demirer, 2020; Hina & Qayyum, 2022; Lagomarsino, 2018).

$$\Delta lnY_t = \Delta \ln(A_t) + \alpha\, \Delta \ln(K_t) + \beta_{41} \Delta lnHE_t + \beta_2 \Delta lnHH_t + (1 - \beta_1 - \beta_2)\Delta \ln(L_t) \quad (4)$$

Where, ΔlnY_t is the economic growth rate, ΔlnK_t is the physical capital growth rate, ΔlnL_t is the labour growth rate, $\Delta lnHH_t$ is the human capital on health, $\Delta lnHE_t$ is the human capital on education. As the result, the human capital divided into two components: health and education. The model relationship between economic growth and human capital can be modified as:

$$\Delta lnY_t = \beta_0 + \beta_1 \Delta lnK_t + \beta_2 \Delta lnL_t + \beta_3 \Delta lnHH_t + \beta_3\, \Delta lnHE_t + \varepsilon t \quad (5)$$

Here β_0 is constant and εt is the error term. ΔlnK_t effect on ΔlnY_t because investment promote development, infrastructure, good governance and will give a positive impact on economic growth. ΔlnL_t effect on ΔlnY_t because increase in labour rate considered as one of productivity indicators that can affect economic growth. $\Delta lnHH_t$ effect on ΔlnY_t because education will become the value added for the labour and will increase the labour productivity (Jorgenson and Fraumeni, 1992). $\Delta lnHE_t$ effect on ΔlnY_t because investment in the labour will be able to increase the productivity which can generate economic growth (Piabuo & Tieguhong (2017); Kwak (2009); Bloom (2001).

To fit the study, the equation (5), will be adjusted. As a stand-in for economic growth, the study used real GDP growth expressed as an annual percentage (Yang, 2019). A stand-in variable is gross fixed capital formation (GFCF) (Yang, 2019; Yakubu et al., 2020). The following empirically estimable log-linear model type in (6) is proposed to change the production function into a log linear model based on this theoretical framework created by Mankiw, Romer, and Weil (1992), with some modification to accommodate other extra variables:

$$\Delta lnGDP_t = \beta_0 + \beta_1 \Delta lnOOP_t + \beta_2 \Delta lnGFCF_t + \beta_3 \Delta lnPOP2_t + \beta_4 \Delta lnSECOND_t + \varepsilon_t \quad (6)$$

Where, t is year (t=1993-2023), β_0 is constant, $\beta_0 - \beta_5$ are coefficients of explanatory variables, $\Delta lnGDP_t$ is output (real gross domestic product), $\Delta lnGFCF_t$ is fixed capital formation, $\Delta lnPOP2_t$ is working class population, $\Delta lnSECON_t$ is secondary education enrolment, $\Delta lnOOP_t$ is out of pocket expenditure and ε_t is error term.

Methodology

ARDL was used to estimate the data, which is a time series spanning 1997 to 2020. The unit root test will be used first, before the data is used for estimation. The first step involves testing the stationary of the time series data using unit root tests, which introduces spuriousness into the regression findings and disrupts the correctness of the parameters computed. We can make sure that no variable is integrated of order two or higher by running the unit root test, even if the ARDL testing approach does not need it. The ARDL technique assumes that all variables are either I(0) or I(1), which explains this. If it turns out that one of the model's variables, is I (2), then the computed F-statistics produced by Pesaran et al, (2001) and Narayan (2005), can no longer valid.

Using the Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) tests, the stationary test was used in the econometrics procedures to verify that the times series model was stationary. The long-term link was then examined by applying the co-integration test with the ARDL bound co-integration.

With both dependent and independent regressor lags, the ARDL is a typical least squares regression. Greene (2008). Compared to other cointegration tests, the method has some econometric advantages. First off, whether the series are I(0) or I(1) is irrelevant. Pesaran and Shin (1999) state that the test works regardless of whether the model's regressors are mutually cointegrated, solely I(0), or simply I(1); if the series are I(2), however, the test fails. In the case of limited samples, the ARDL technique also offers consistent estimates of the long-run coefficients and comparatively more robust results. Ghatak and Siddik (2001).

The models from the objectives will be converted into an unconstrained error correction model (UECM) in order to verify the cointegration of the variables. It is necessary to identify the model's lag components. The estimation will have a maximum lag of two because it uses annual data. OLS will be utilized in order to obtain suitable delays.

The UECM are as follows;

$$\Delta RGDP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \ \Delta RGDP_{t-i} + \sum_{i=1}^{p} \alpha_2 \ \Delta OOP_{t-i} + \sum_{i=1}^{p} \alpha_3 \ \Delta GFCF_{t-i} + \sum_{i=1}^{p} \alpha_4 \ \Delta POP2_{t-i} + \sum_{i=1}^{p} \alpha_5 \ \Delta SECON_{t-i} + \delta_1 Y_{t-1} + \delta_2 Y_{t-1} + \delta_3 Y_{t-1} + \delta_4 Y_{t-1} + \mu_t \quad (7)$$

In order to test the cointegration, the Wald coefficient test procedure and F statistic will be used after equating $\delta_{1=}\delta_{2=}\delta_{3=}\delta_4$. The value of the test statistic will be compared with the critical values.
The ARDL cointegration procedure to show the long-run relationship in the model.

$$\Delta RGDP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \ \Delta RGDP_{t-i} + \sum_{i=1}^{p} \alpha_2 \ \Delta OOP_{t-i} + \sum_{i=1}^{p} \alpha_3 \ \Delta GFCF_{t-i} + \sum_{i=1}^{p} \alpha_4 \ \Delta POP2_{t-i} + \sum_{i=1}^{p} \alpha_5 \ \Delta SECON_{t-i} + \mu_t \quad (8)$$

Where γECT_{t-1} is the error correction term. The values of the error term were computed from the long-run models. If there are evidence of a long-run relationship, then ECM will be estimated that will indicates the speed of adjustment back to long-run equilibrium after a short-run disturbance. After the estimation, for the short-run coefficients represent the immediate impact of changes in the independent variables on the dependent variables, the long-run coefficients representing the long run relationship between the variables if the cointegration exists and the error correction term (ECT), indicates that if the cointegration is found, the ECT will show how quickly deviations from the long-run equilibrium are corrected (Azmi et al, 2023; Shrestha & Bhatta, 2018).

Data Sources

The sources for data are very important in every study when the data is is secondary sources. Data in this study was collected from different sources mostly from trusted sources and agencies. This study used secondary data from Department of Statistics Malaysia (DOSM), Ministry of Health Malaysia and World Development Indicators (WDI), World Bank Data Bank.

Table 1 presents the sources of data, measurement and descriptions of the variables used in this study. The dependent variable is GDP percapita. The independent variables are out-of-pocket expenditure (OPP), gross fixed capital formation (GFCF), number of working-class population (between 15 to 64 years) (POP2) and secondary enrolment rate (SECOND).

Table 1
The Summary of Variables and Source of Data

Variables	Description	Measurement	Source of Data
GDP	It measures the total values of goods and services produced within a year, usually annually	The ratio changes in the Real GDP	WDI, World Bank
OOP	It is an out-of- pocket expenditure from financing private hospital	OOP from private expenditure in healthcare	Malaysia National Health Accounts (MNHA), Ministry of Health Malaysia
GFCF	Gross fixed capital formation	The real gross capital formation to GDP	Department of Statistics Malaysia (DOSM) time series
POP2	It is number of working-class population (between 15 to 64 years)	Number of working-class populations	Department of Statistics Malaysia (DOSM) time
SECOND	Secondary enrolment rate	Enrolment of secondary education	Department of Statistics Malaysia (DOSM) time

Result Estimation

Descriptive Statistics

Table 2 is the descriptive statistics of the variables, it shows the years observation, the mean, the median, the standard deviation, minimum and maximum values of all the variables used in the study.

The average RGDP is 4.39, with a median of 4.40. The standard deviation of 0.19 for the 31 observations made throughout the research period indicates fairly stable economic growth with very minor oscillations around the mean. Between the lowest and maximum figures (4.10 and 4.67, respectively), the economic performance seems to have fluctuated somewhat, indicating that the effects of external shocks might not have been as significant. OOP has a mean of 1.46626, a median of 1.4704, and a low standard deviation of 0.0237. This implies that there is a close clustering of OOP values around the mean. Low variability and consistent OOP expenditures over time, representing slight variations in patient healthcare spending, are indicated by the minimum and highest values of 1.4079 and 1.5031, respectively, Baharin et al (2022).

The GFCF values exhibit a large fluctuation across the studied period, ranging from a low of 8.07 to a maximum of 31.82. These oscillations could be related to changes in government policy that impact infrastructure development or investment activity (Kim et al, 2020). In comparison to RGDP and OOP, GFCF displays a greater degree of variability, with a mean of 14.1461 and a standard deviation of 4.7840, indicating a broader distribution of data.
With a standard deviation of 0.07545 and a mean of 4.2557 and median of 4.26, POP2 shows little variation in population increase over the time. The small range (highest 4.36 and minimum 4.12) indicates that population growth has been comparatively constant over the years. Population stability and stable demographic trends are frequently associated (Gu et al, 2021; Lutz, 2019).

The mean of 36.6770 and a standard deviation of 7.5684, SECON data points to a moderate degree of enrolment fluctuation in secondary education. The studied period's educational attainment appears to have been significantly uneven, as indicated by the minimum value of 22.615 and the maximum value of 46.762. This variation may be a result of changes in educational policy or regional differences (Daniele, 2021).

Table 2
Descriptive Statistics for Private Health Expenditure and Economics Growth

Variables	Observation	Mean	Median	Standard deviation	Min	Max
RGDP	31	4.3900	4.4000	0.189209	4.1000	4.6700
OOP	31	1.46626	1.4704	0.0237	1.4079	1.5031
GFCF	31	14.1461	12.5900	4.7840	8.0700	31.8200
POP2	31	4.255652	4.2600	0.07545	4.1200	4.3600
SECON	31	36.6770	33.4390	7.5684	22.6150	46.7620

Covariance Matrix
The variables in model estimation are real GDP (RGDP) growth, Private Expenditure on Hospital (OOP), Capital (GFCF), working class population (POP2) and Secondary education (Second)The correlation matrix shown in table 3.

The associations between several health and economic growth variables are displayed in the correlation matrix in Table 3, and each correlation coefficient's strength and direction. The GDP indicator with Out-of-pocket expenses (OOP) have a -0.20996 correlation with GDP. This negative figure implies a modest inverse association, meaning that out-of-pocket medical expenses may somewhat decline when GDP rises. Gross Fixed Capital Formation (GFCF) and GDP have a correlation of 0.844144. gains in GFCF are substantially correlated with gains in

GDP, according to this strong positive association, indicating that capital investment supports economic growth. The population growth rate, or POP2, has a -0.151697 correlation with GDP. A little adverse relationship between GDP and population growth is indicated by a modest negative correlation. The correlation between GDP and SECOND (secondary school enrolment) is -0.057613. There appears to be little to no correlation between GDP and secondary school attendance, based on this extremely weak negative correlation.

Out of pocket expenditure (OOP) and GFCF, -0.060480 correlation. This is essentially insignificant, suggesting that OOP and GFCF have no meaningful connection. POP2 -0.076691 is the correlation. This weak negative correlation implies that there is no substantial relationship between OOP spending and the pace of population increase. SECOND -0.172801 is the correlation. Higher secondary school attendance may be linked to somewhat reduced out-of-pocket medical costs, according to this weak inverse association.

GFCF and POP2 -0.162268 is the correlation. There appears to be little correlation between capital formation and population growth, as indicated by this weak negative correlation. SECOND A -0.158759 correlation. GFCF and secondary school attendance appear to have a minimally inverse association, as indicated by the similarly weak negative relationship.

POP2 and SECOND 0.805420 is the correlation. There may be a connection between educational enrolment and demographic parameters, as this strong positive association suggests that higher secondary school enrolment is correlated with larger population growth rates. With the exception of the positive association between POP2 and SECOND, most factors exhibit weak or no significant correlations with GDP, which generally has a substantial positive correlation with GFCF.

Table 3
Correlation Matrix Results Health Variables and Economics Growth

	GDP	OOP	GFCF	POP2	SECOND
GDP	1.000000				
OOP	-0.20996	1.000000			
GFCF	0.844144	-0.060480	1.000000		
POP2	-0.151697	-0.076691	-0.162268	1.000000	
SECOND	-0.057613	-0.172801	-0.158759	0.805420	1.000000

Note: ***, ** and * denotes significant at 1%, 5% and 10% significance level, respectively.

Unit Root Test
The regression findings are erroneous when the unit root is present. As a result, it compromises the calculated parameters' correctness. Unit root tests are used in the initial stage to determine whether the time series data is stationary. Data stationarity was tested using the Augmented Dickey-Fuller test (ADF). When compared to other tests, it is known to handle complex models. The PP test disregards any serial correlation, whereas the ADF approximates the structure of errors using parametric autoregression.

For every variable (economic growth, GFCG, working population, secondary enrolment, tertiary enrolment, and out-of-pocket expenses), the results of the ADF and PP unit root test of the level and first difference are presented in Table 4 At the one percent significance level, all variables at the first difference of the ADF and PP unit root tests of the null hypothesis can be rejected. Both the ADF and PP unit root tests are integrated of order one process (I(1)) and stationary. All variables are stationary at the first difference, according to the results of the unit root test (significant at 1%). Every variable is stationary at the first difference and non-stationary at level.

Table 4
Unit Root Test Results

	Augmented Dickey Fuller (ADF)		Philip Perron (PP)	
	Constant Without Trend	Constant With Trend	Constant Without Trend	Constant With Trend
	Level			
GDP	-5.4068***	-5.3276***	-6.4893***	-6.2095***
OOP	-3.4195**	-3.3836	-3.4388***	-3.4012*
GFCF	-4.6201***	-4.5464***	-4.9810***	-4.7605**
POP2	-4.0695****	1.5049	-9.7991***	1.3562
SECOND	-1.7086	-4.9990***	-1.7216	-2.5801*
	First Difference			
GDP	-7.4191***	-7.3935***	-19.3744***	-23.1933***
OOP	-6.6609***	-6.5362***	-7.9348***	-7.7694***
GFCF	-7.0923***	-6.9906	-16.6746***	-18.5260***
POP2	-0.3339	-6.3504***	-4.4999***	-11.1130***
SECOND	-4.1448***	-3.8632**	-5.3059***	-5.2224***

ARDL Bound Test

Table 5 provides the ARDL bounds test results for integration. At the 1% level of significance, the F-statistics GDP (OOP, GFCF, POP2, SECOND) equals 8.965432, which is higher than the upper bound's critical value of (4.37). The findings show that, for Malaysia from 1993 to 2023, the cointegrating link between economic growth, capital (GFCF), working population, secondary, tertiary, and out-of-pocket expenses is confirmed by the bound test. The study will estimate the long-run coefficients once the cointegration relationship between the variables has been confirmed.

Table 5
Results of ARDL Bound Test

Model for estimation	F-Statistics	Significance level	Critical bound F-Statistics	
			I(0)LCB	I(1)UCB
GDP (OOP, GFCF, POP2, SECOND)	8.5623	1%	3.29	4.37
		5%	2.56	3.49
		10%	2.2	3.09

Note: ***, ** and * denotes significant at 1%, 5% and 10% significance level, respectively

Coefficient Estimation

The estimated the ARDL model's long-run coefficient reports in table 6. The ARDL (2,0,2,1,2) model indicates that two of its own lags were used to model the independent variables. The GDP variable has a first and second lag, which is indicated by the dependent variable (lag 2). This suggests that the present value of the dependent variable is influenced by the values from the prior two periods. The dependent variable is directly impacted by its present value within the same time frame since the OOP, the first independent variable (lag 0), enters the model without any lag. The present and lag values of this variable (up to two periods) have an impact on the GFCF, the second independent variable (lag 2). It suggests that the importance of both immediate and delayed impacts is present. The working-class population (lag 1), means that this variable has a one-period lag, meaning that it takes a period for its effects to become apparent on the GDP. Finally, secondary enrolment, affects the GDP both instantly and up to two periods later, much like the second independent variable.

Lastly, the out-of-pocket portion of private spending, which serves as a proxy, exhibits statistically significant growth-promoting effects. Economic growth and out-of-pocket spending have a positive long-term correlation, meaning that a 1% rise in OOP will result in a 1.0661% increase in economic growth. The amount of money needed to sustain health as a guarantee of human capital drives up healthcare spending. According to this research, despite the expenses that OOP may place on households, it can actually stimulate economic growth by promoting expenditure on health care, which in turn increases demand for healthcare services and related industries. The significant impact of OOP is in line with past studies that demonstrate that, in some situations, paying for healthcare out of pocket might stimulate the economy (Kumara & Samaratunge, 2019; Said & Ismail, 2020). This finding supports the theory that higher household healthcare spending might promote economic activity by, possibly, increasing worker health, which raises productivity (Grossman, 2022).

The long run coefficient of capital (GFCF) has positive impact at 1% significant level on the economic growth, which indicate that 1 percent increase in GFCF boost the economic growth by 0.0123%. The outcome of study suggests that capital (GFCF) play significant role in the economic growth. The result is consistent with Ridha & Parwanto (2020) impact of GFCF on economic growth in Indonesia.

Besides that, the long run coefficient of labour (POP2) has negative impact at 1% significant level on the economic growth, which indicate that 1 percent increase in labour decrease the economic growth. This significant adverse impact suggests that if resources are not managed well, rapid population growth may eventually put a strain on them, lower per capita income, and possibly raise unemployment. This research emphasizes the difficulties population expansion might have for economic sustainability, particularly in emerging nations with constrained resource allocation (Nguyen & Nguyen, 2018; Weber & Sciubba, 2019).

Secondary education shows positive but only marginally significant effect on economic growth in the long run. The coefficient of 0.2624 suggest increase in secondary education will increase the GDP by 0.2624%. The long run coefficient for human capital (educations) shows interesting outcome, this suggests that although secondary education is crucial for economic growth, its effects might not be felt right away. Long-term economic performance is influenced by the more inventive and productive workforce that comes with higher education (Zhou & Lou, 2018).

Table 6
Estimated Long Run Coefficients from ARDL Model (2,0,2,1,2) Selected based Akaike info criterion (AIC)

Variables	Coefficient	Standard error	t-Statistics	Probability
OOP	1.0661	0.3412	3.1248 ***	0.0062
GFCF	0.2028	0.0578	3.5087***	0.0027
POP2	-169.2360	79.5619	-2.1271**	0.0483
SECOND	0.2624	0.1515	1.7327*	0.1000
C	36.3694	24.0075	1.5150	0.1482

Where, CE = GDP-(0.4773*OOP+0.2892*GFCF-12.1426*POP2 +0.3045*SECOND+16.2849)

R-Squared	0.8846	S.D. of Dependent Variable	3.7788
Adjusted R-Squared	0.8100	Equation Log-likelihood	-47.8791
S.E. of Regression	0.011566	Akaike Info. Criterion	4.1260
F-stat.	11.8497 (0.0000)	Hannan-Quinn Criterion	4.3068
DW-statistics	2.1186		
Mean of Dep. Variable	2.7318		

Note: ***, ** and * denotes significant at 1%, 5% and 10% significance level, respectively

Error Correction Model (ECM)
The short run dynamic coefficients using ECM using ARDL model estimated results are reported in table 7. The estimated short run coefficient of capital has a positive impact on economic growth and statistically significant at 1%. The estimated coefficient of the labour has a positive impact on economic growth in Malaysia over the study period from 1993 to 2023. The OOP estimated in short run coefficient is statistically significant at 1% and has an impact on economic growth. In contrast, the estimated short-run coefficient of the secondary enrolment is negatively but not statistically significant, the tertiary enrolment is positive but not statistically significant during the study period.

Moreover, in Table 7, ECM_{t-1} coefficient (-2.23314) is negative and highly significant (1%) which corroborate the anticipated concourse process in the long run. The, ECM_{t-1}support the long run cointegration relationship between economic growth and the independent variables (capital (GFCF), labour (POP2), education and OOP).

Table 7
ECM Results

Variables	Coefficient	Standard error	t-Statistics	Probability
ΔOOP	1.0661	0.3148	3.1248***	0.0000
ΔGFCF	0.5485	0.1635	3.3547***	0.0028
ΔPOP2	-169.2360	30.38818	-5.569138***	0.0000
ΔSECON	0.275668	0.116017	2.376099**	0.0295
ECM_{t-1}	-2.23314	0.273901	-8.153739***	0.0000

R-Squared	0.945130	S.D. of Dependent Variable	-47.87908
Adjusted R-Squared	0.930165	Equation Log likelihood	3.784764
S.E. of Regression	1.448011	Akaike Info. Criterion	3.88127
F-stat.	8.965432(0.0000)	Hannan-Quinn Criterion	4.114801
DW-statistics	2.461161		
Mean of Dep. Variable	-0.124138		

Note: ***, ** and * denotes significant at 1%, 5% and 10% significance level, respectively

Stability of the Model
The stability of the model is also examined for the long term and the short term in the model to confirmed the robustness of the models in the long run and short run have the stability coefficients. The stability is tested using the CUSUM and CUSUMSQ considering both the conditional and unconditional models. See figures 1 and 2.

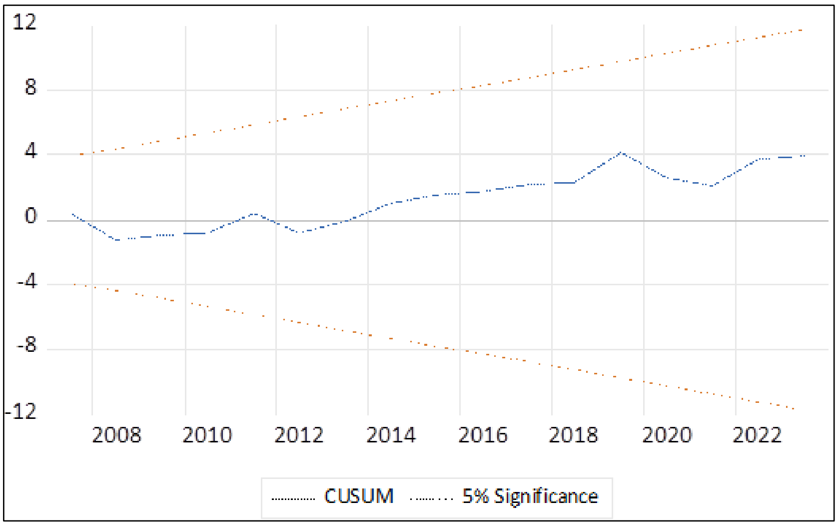

Figure 1 Plot of Cumulative Sum of Recursive Residuals

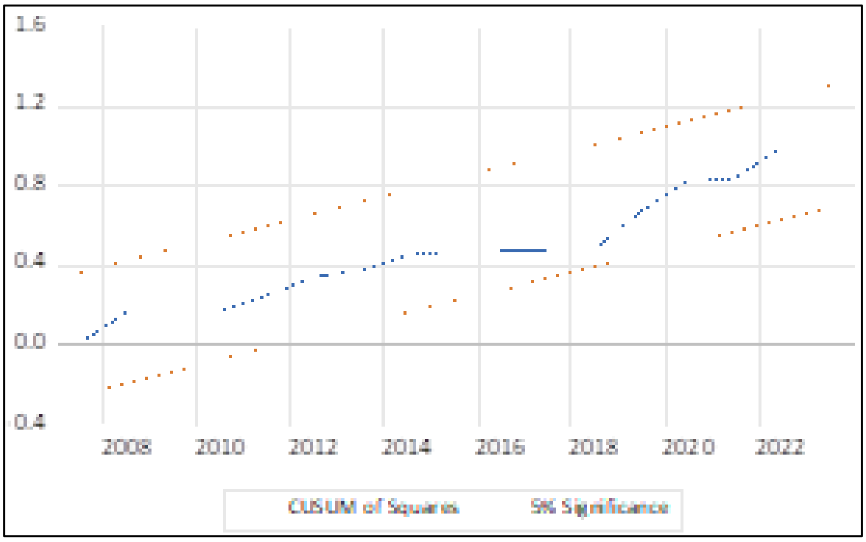

Figure 2 Plot of Cumulative Sum of Squares of Recursive Residuals

The result of the stability test, all the specified models are stable because all the test lines fall within the 5 percent significance level.

Diagnostic Test

Normality Test (p-value = 0.547084), the residuals' normal distribution is examined using this test. The null hypothesis that the residuals are normally distributed cannot be rejected because the p-value of 0.547084 is higher than the typical significance levels 5 percent. This suggests that a normal distribution appears to be followed by the residuals.

The LM test looks for serial correlation, or autocorrelation, in the residuals. We are unable to rule out the null hypothesis that there is no serial association because the p-value of 0.1834 is higher than 0.05. This indicates that there is no discernible autocorrelation in the residuals, suggesting that serial correlation problems are not present in the model.

Heteroscedasticity, which happens when the residuals' variance varies over time, is checked for by the ARCH test. With a p-value of 0.3656, the null hypothesis of homoscedasticity (constant variance) cannot be ruled out. This implies that this model does not have heteroscedasticity as an issue.

This test uses a different approach to check for heteroscedasticity. Since the p-value of 0.4343 is higher than 0.05, the null hypothesis of homoscedasticity cannot be rejected once more. This provides more evidence that non-constant variance in the residuals is not a problem for the model.

The model passes the fundamental presumptions of normality, serial correlation, and heteroscedasticity, according to the diagnostic tests. These findings imply that the residuals satisfy the necessary assumptions for accuracy and dependability in regression analysis and that the model is well-specified.

Table 8
Diagnostic Tests Results

Diagnostic Test (p-value)	
Normality	1.206307 (0.547084)
LM test (Serial Correlation)	0.674662 (0.1834)
ARCH test (Heteroscedasticity)	0.768122 (0.3656)
Breusch-Pagan-Godfrey	0.918650 (0.4343)

Conclusions
Information asymmetry is the most significant sign that a new industry is highly regulated or has many hurdles, aside from the fact that healthcare supply and demand are also distinct. In this instance, service providers in this sector are knowledgeable about their offerings and share their knowledge with patients or customers. Grossman (2022).

According to Grossman (2022), people are eager to invest in their health in order to ensure longevity and a higher quality of life because of the distinctive demand features and the significance of health. Due to demographic changes brought about by the improving economy, health investments are becoming more and more crucial. The hospitals will be able to charge more as a result.

The connection between economic growth and health grows more significant and intriguing as education and technology advance. Just having a high literacy rate is insufficient. To remain relevant in this era, nations especially require technological expertise (Kong et. al, 2023; Laupichler, 2022). Although government spending accounts for the majority of medical expenses in Malaysia, private spending has recently increased more quickly than it has in the past. The study examines economic growth, hospital human capital (education costs), and household expenditure.

According to this analysis, the factors that influence Malaysia's economic growth between 1993 and 2023 are the population, secondary and tertiary education levels, public spending on health, and hospital out-of-pocket expenses. Compared to state spending, private spending is less readily available in Malaysia. Secondary education (SECON), out-of-pocket health expenditures (PE), the labor force participation rate (GFCF), and the control variables.

Policy Recommendation
As healthcare is a unique demand with asymmetric information favoring physicians, dealing with human health and life required governance that protects the consumer (patients) and regulation to ensure that the healthcare supplier follows the regulations while delivering the services to consumers and charging them. The Ministry of Health Malaysia is in charge of overseeing the governance and policies pertaining to private hospitals, including supply and demand.

In addition, one of the regulatory organizations that keeps an eye on the nation's harmful competition is the Malaysia Competition Commission (MyCC). These rivalries may result in price control and market monopolization in the absence of MyCC. Customers will therefore have to pay the hefty price.

Private hospitals in many countries, particularly those with emerging economies, rely heavily on out-of-pocket (OOP) payments. This is a crucial factor to take into account when examining the relationship between growth and financial performance. Hospitals must carefully balance patient affordability and profitability because they heavily rely on out-of-pocket payments. Hospitals may face challenges if patients cannot afford the costly technologies or service expansions they are pursuing. The anticipated returns on investment may not materialize in such circumstances.

Additionally, it may be more difficult for hospitals with larger debt loads to raise healthcare costs without going out of business. This highlights how important it is to establish long-term growth plans that consider patient affordability and financial results.

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