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Abstract. The objective of the study was to analyze the consequences of interest rate on healthcare industry in selected ASEAN country for the period 2005 to 2015. Interest rate were established as the dependent variable while the independent variables were economic growth, inflation, unemployment rate, exchange rate and healthcare industry. The study sought to understand the relationship between the independent variables and dependent variable. This research will be focused on healthcare industry in five selected Asian country which is Malaysia, Singapore, Vietnam, Indonesia and Thailand because nowadays healthcare industry seem to be an important part in the economy of a country. The sample of countries selected are depended on their interest rate performance. While, the data provided in this research are based on World Bank data covers the period from 2005 to 2015. In addition, the researcher proposed to use the dynamic panel data in order to explore the relationship between interest rate and a number of independent variables: economic growth, inflation, unemployment, exchange rate and healthcare industry. These independent variable are choose as they seen to be the most key factor that affecting interest rate. Furthermore, the researcher decide to use healthcare expenditure as new measurement for this study.

Keywords: Healthcare Industry Growth, Interest Rate, Economic Growth, ASEAN country.

INTRODUCTION

A number of studies have been conducted on consumption and interest rate relationship. Some of these studies include Fazel, suggest that disposal income is a good predictor of consumer spending and consumer sentiment index has no explanatory power to predict future consumption levels (Manasseh et. al, 2018). Saad revealed changes in real interest rate, real disposal income, anticipated inflation, and wealth have a significant effect of private consumption (Manasseh et. al, 2018). On the other hand, Adedeji and Adegboye indicated that other variables such as money supply, interest rate and import were insignificant only with disposable income (Manasseh et. al, 2018). In his work, Okoro conducted a comprehensive study of how interest wealth, income and inflation affected on consumer behavior in Nigeria from 1975 to 1995 (Manasseh et. al, 2018). The scholars also found in their analysis, a debatable issue among economists was the theoretical as well as empirical relationship between interest rate and exchange rate (Okoth Michael Nduri, 2013). According to the Mundell-Fleming model, an interest rate increase is needed in order to stabilize the depreciation of the exchange rate and to curb inflationary pressure, thus helping to avoid many adverse economic consequences (Okoth Michael Nduri, 2013). A Bhole and Dash study also attempted to understand the relationship between interest rate and exchange rate (Okoth Michael Nduri, 2013).

On the other hand, Carruth et al., used an efficiency wage model for equilibrium unemployment and documented that using the Granger causality test, the impact of changes in increase in real oil price and real interest rates is consistent with the relationships suggested by that theory (i.e., unemployment increase). Dogrul and Soytas adopted the same model frameworks and demonstrated that Turkey holds the relationship between real interest rate, real oil price, and unemployment (Karlsson, Hyunjoo Kim, et al., 2018). Clark also believes that the real interest rate is fixed. In his view, nominal interest rate should be changed proportionally with inflation rate. While, Irving Fisher explained theory of inflation and interest systematically. By using co integration, Booth and Ciner studied the relationship between interest rate and inflation rate in U.S and other 9 European countries. The conclusion, except for one case, supports the long - run relationship. Brazoza and Brzezina as well as Fave and Auray confirmed a long run relationship between interest rate and inflation (Mmasi, B. S., 2013). Foozor, interest rates are expected to affect economic growth either positively or negatively. Thus, declining in interest rates as a result of expansionary monetary policy can stimulate the economy. On the other hand, slow economic growth can lead to economic growth falling which may be due to a tight monetary policy through a relatively high interest rate regime (Jelilov G., 2016). Another study by Ford and Laxton showed that GDP was a significant determinant of short-term real interest rates (Bosworth Barry P., 2014).

METHODOLGY

Table 1. Descriptive Analysis

	Observations	Mean	Std. Dev.
Interest Rate	330	3.93	1.60
Economic Growth	330	1.35	1.55
Inflation Rate	330	3.50	2.07
Unemployment rate	330	2.42	4.17
Exchange rate	330	1.34	0.82
Health Industry	330	1.29	1.85

Table 1 shows the summary statistics on the variables used in the study. The data ranged from 2005 – 2015. The interest rate had 330 observations with a mean of 3.93% and a standard deviation of 1.60%. While, for economic growth, the results shows there are 330 observations with a mean rate of 1.35% and a standard deviation of 1.55%. Inflation rate also had 330 observations with a mean of 3.50% and a standard deviation of 2.07%. In addition, unemployment rate had 330 observations with a mean of 2.42% and a standard deviation of 4.17%. Furthermore, the results show that exchange rate had 330 observations with a mean rate of 1.34% and a standard deviation of 0.82%. Lastly, healthcare industry had 330 observations with a mean of 1.29% and a standard deviation of 1.85%.

Unit Root Test Analysis

TABLE 2. Levin-Lin-Chu Test (LLC)

Variable	Constant & trend	Constant, but no trend
Interest Rate	3.70	7.14
Economic Growth	7.18	4.33
Inflation	3.95	2.92
Unemployment	9.36	9.26
Exchange rate	10.92	10.35
Healthcare Industry	233.61	158.96

Note: (*), (**) and (***) indicate significance at 1%, 5% and 10% level of significance respectively.

Panel unit root test was conducted in order to measure whether this study can used panel data or time series. If the probability is acceptable, then this study could use panel data. Based on the Table 2, the result for both Levin, Lin & Chu (LLC) shows that economic growth, inflation, exchange rate, unemployment and healthcare industry are significant at 1%. It means that, this study could use panel data. For LLC, the variable which is interest rate, economic growth, inflation, unemployment, exchange rate and healthcare industry are constant & trend at 3.70, 7.18, 3.95, 9.36, 10.92 and 233.61 respectively. While, the variable are constant but no trend at 7.14, 4.33, 2.92, 2.92, 9.26, 10.35 and 158.96 respectively.

Dynamic Panel Data System GMM Estimation

TABLE 3. Dynamic Panel Data System GMM Estimation

	Malaysia	Singapore	Vietnam	Thailand	Indonesia
Economic Growth	2.5480*	3.4687*	5.8392*	1.3987*	6.4139*
	0.0005	0.0000	0.0037	0.0081	0.0000
Inflation Rate	0.6369**	2.2546***	3.1784*	6.1932**	3.4002*
	0.0262	0.0987	0.0081	0.0423	0.0000
Unemployment rate	1.0410**	2.4679*	2.7086*	1.2842*	4.5871*
	0.0148	0.0000	0.0024	0.0099	0.0000
Exchange rate	1.7051*	1.8141*	1.7596*	1.1183**	3.9529*
	0.0044	0.0043	0.0043	0.0131	0.0000
Healthcare Industry	2.8929**	3.4803**	3.1866**	2.8468**	3.2097*
	0.0186	0.0305	0.0245	0.0198	0.0000

Note: (*), (**) and (***) indicate significance at 1%, 5% and 10% level of significance respectively.

Based on the Table 3, the result shows economic growth for Malaysia, Singapore, Vietnam, Thailand and Indonesia are significant at 1% thus increase 1% in economic growth will lead to a 2.5480, 3.4687, 5.8392, 1.3987 and 6.4139 increase in interest rate of the countries respectively. In addition, inflation rate for Vietnam and Indonesia are significant at 1%. It means that any slight increase in inflation rate will increase the interest rate of the countries by 3.1784 and 3.4002 respectively. While, inflation rate for Malaysia and Thailand are significant at 5% thus increase 5% in inflation rate will lead to a 0.6369 and 6.1932 increase in interest rate of the countries respectively.

Furthermore, unemployment rate for the five selected ASEAN countries are significant at 1% except for Malaysia which significant at 5%. It means that 1% economic growth rise in Singapore, Vietnam, Thailand and Indonesia will lead to a 2.4679, 2.7086, 1.2842 and 4.5871 increase in interest rate of the countries respectively. Other than that, the result shows exchange rate for the five selected ASEAN countries are significant at 1% except for Thailand which significant at 5%. It means that 1% exchange rate increase in Malaysia, Singapore, Vietnam, and Indonesia will lead to a 1.7051, 1.8141, 1.7596 and 3.9529 rise in interest rate of the countries respectively.

Last but not least, healthcare industry for the five selected ASEAN countries are significant at 5% except for Indonesia which significant at 1%. It means that 5% exchange rate increase in Malaysia, Singapore, Vietnam, and Thailand will lead to a 2.8929, 3.1866 and 2.8468 rise in interest rate of the countries respectively. However, in Indonesia, any slight increase in healthcare industry will increase the interest rate of the countries by 3.2097.

Wald Test, Sargen Test, AR (1) & AR (2) Test

TABLE 4. Wald Test, Sargan Test, AR (1) & AR (2) test

	Malaysia	Singapore	Vietnam	Thailand	Indonesia
Wald test	1217.5859* (0.0000)	156.6902* (0.0000)	1214.6038* (0.0000)	2429.8782* (0.0000)	3648.5881* (0.0000)
Sargan test	2.1098 (0.2270)	8.9639 (0.0108)	12.0705 (0.1660)	11.3966 (0.4467)	8.1828 (0.1830)
Arrelano-Bond test for AR(1)	3.0062* (0.0060)	5.8923* (0.0087)	6.0765* (0.0062)	2.0414** (0.0163)	2.3052* (0.0059)
Arrelano-Bond test for AR(2)	2.2034 (0.6560)	5.5269 (0.1019)	2.5809 (0.1070)	1.9514 (0.1202)	1.3117 (0.0002)
N	55	55	55	55	55

Note: (*), (**) and (***) indicate significance at 1%, 5% and 10% level of significance respectively.

Wald Test, Sargan Test, AR (1) & AR (2) test are part of Diagnostic test. This test is conducted in order to see whether Dynamic Panel Data System GMM Estimation is acceptable or not. If Wald test is significant, it means that the Independent Variable is valid toward Dependent Variable. Then, for Sargan test, if Sargan test is insignificant, it means that the Independent Variable is significant toward Dependent Variable. In addition, for AR1 and AR2, the study use no auto correlation because it is less bias and better than auto correlation. If AR1 is significant, it means that there are no auto correlation between Independent variable and Dependent Variable. While, for AR2, if AR2 is insignificant, it means that there are no auto correlation between Independent variable and Dependent Variable.

Based on Table 4, the result for Wald test shows that Malaysia, Singapore, Vietnam, Thailand and Indonesia are significant at 1% thus shows that Independent variable and Dependent Variable are valid. Furthermore, Sargan test shows that none of the five selected ASEAN country are significant at 1%, 5% and 10% level of significance thus shows that Independent variable and Dependent Variable are significant. While, for AR(1), the five selected ASEAN countries are significant at 1% thus shows that there are no auto correlation between Independent variable and Dependent Variable. Last but not least, result for AR(2) shows that none of the five selected ASEAN country also are significant at 1%, 5% and 10% level of significance. It means that there are no auto correlation between Independent variable and Dependent Variable. Therefore, Dynamic Panel Data System GMM Estimation is acceptable.

CONCLUSION

As a conclusion, the study conclude that economic growth, inflation rate, unemployment rate, exchange rate and healthcare industry have a positive effect on interest rate in selected ASEAN countries. This indicates that any slight in former variable will result in increase of interest rate of the countries. However, the result of the study could also resulted to be statistically insignificant. It means that an increasing in interest rate have been affected not only from change in economic growth, inflation rate, unemployment rate, exchange rate and healthcare industry, but even from other factors too such as poverty crisis, currency fluctuation and others.

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