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DETERMINANT OF INFLATION OF 5 ASEAN COUNTRIES

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Abstract---*This study is about five ASEAN countries, which are Malaysia, Indonesia, Singapore, Vietnam, and Thailand. The last three decades have been a great year for East Asia and South-East Asia because they have been growing rapidly in the sense of economic growth. According to (Lim & McAleer, 2004). The three newly industrializing countries (Malaysia, Indonesia, and Thailand) of South-East Asia have a growth rate of higher than double the rate by which the rest of East Asia since 1960. Singapore, on the other hand, is part of the Four Asian Tigers which is a high performing Asian economy and according to (McCarty, 2001), since the mid-1980s due to the Doi Moi reform period, the status of Vietnam changed from an economy of highly centralized command to a mixed economy by applying 5 years plan of directive and indicative planning. Vietnam is in the phase of integration the global economy and most of the companies in the country are small and medium enterprises. A major cause of inflation is the one when a government of the country focuses on producing unlimited money without central bank's supervision. When there is lot of money in the market then it leads to increase the inflation. Thus, It is important that country should ensure a certain level of money supply which is according to the availability of the goods and services in the local market of a country. The production of the money needs to be controlled by the central bank. Moreover, some imported inflation is also present. This study aims to focus on the decline in the exchange rate of inflation.*

Keywords---*Inflation, ASEAN, Money Supply, CPI.*

I. Introduction

During the change process to become a high-income country, developing countries might face certain economic problems. Among those economic issues, inflation is the major one. Inflation is the increase in commodities prices from time to time.

Trading economics explains that during the last 8 years, the inflation rate of Malaysia was highest. It is observed that the consumer prices in Malaysia increase by more than 5 percent as of March 2017, while in February 2017, this increase was 4.5 percent and lower than the market expectation of 5.3 percent. As the prices of the beverages and food, houses, and utilities rose, since November 2008 the inflation rate reached highest. On the other hand, the consumer prices in Indonesia rose by only 3.4 percent year on year as of March 2018, while in February it was only 3.2 percent and beat the market

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expectations of 3.32 percent. While these prices in Singapore rose by only 0.2 percent in March 2018. A little acceleration is observed in the consumer prices of Vietnam from 2.67 percent to 2.75 percent in April 2018 which is gained from the prior month. Lastly, in Thailand 14-months high inflation rate is attained to 1.08 percent year-on-year from 0.8 percent in the prior month which was to higher than the market expectations of 0.87 percent.

In ASEAN countries, inflation is not a new phenomenon, and in these countries, this problem exists for centuries. This issue has been highlighted by many bankers, economists, researchers work on some studies to determine the association between economic growth (GDP) and inflation. Usually, researchers focus on analyzing the impact of inflation on the country's economy. Inflation is a mechanism that observes the increase in prices of goods and this has happened with most of the products in the market.

There are a number of factors which cause the currency depreciation in a country. If the prices of only one or two of the products are increased, it cannot be considered inflation. Not only products but inflation can also happen when the supply of products is increased. Almost every country in the globe experience inflation and it is highest in the countries which have higher growth rate. Khai (2011) explains that the inflation level in Malaysia is much lower than the average rate of 2.9% per annum in the past.

Malaysia has usually experienced a lower inflation rate during the last 50 years. Mostly, in Asian economies, the prices remain stable (Basu, 2011). In the 1970s, South Korea experienced high inflation which was astonishing and was much higher than Latin American countries such as Brazil. In 1970s the average rate of inflation in South Korea was in double digits and in 1980 it was at the peak.

The demand-pull factor is the major cause of inflation, which means that inflation is increased when the demand for the products is higher than the supply of the products or services. Inflation could be caused due to a sudden high demand for some products. To cope with the demand, there is a need to offer more by the producer. This means producer needs to increase their workforce or machinery. Higher production facilities increase production cost which again causes inflation.

Kanwar, (2014), on the other hand, look at the inflation by focusing on the monetary terms. He explained that inflation also increases when there is too much money in the country which chases to buy a small number of goods. This cause of inflation is due to the growth rate of money, which is contrary to the goods and services availability.

An increase in the price of one product and a decrease in the price of other products do not fall in the inflation category. In the same way if the price of the product rises due to rumors then it will not be considered as inflation.

The explanation of inflation does not end here. Pressure from the suppliers' side also causes inflation. This is called cost-push inflation. Cost-push inflation occurs due to the increase in the production cost, such as increase in raw material price and wages. When the production cost is increased then this pressure is transferred to the consumers so that the producer maximizes his profit. When the price of the products is increased then the consumers will ask his employer to increase the pay so that he can afford to buy the things he wants. Resultantly, price of the goods is increased by the producer and the chain of increase in price is developed. This cycle of increase in price keeps on going until it reaches stability but after some time it starts again. This is the reason that why problem of inflation is faced by all the countries and this rate is higher in countries where the growth rate is higher.

According to Bertocco (2011), inflation changed with product cost. It is also explained in the study that inflation does not exclude the effects of demand-side determinants; it also adds that the supply-side push factor also has an influence on inflation. An increase in money supply leads to inflation. When a country offers a lot of money than it increases the total demand in the country; if country is unable to control the money supply, then overall economy has high level of liquidity and the demand in the country will be increased. Inflation will be present when too much money is looking to buy specific number of goods and services. This type of inflation occurs when supply of goods is lower than the supply of the money in the market.

II. Literature Review

INFLATION (CPI)

Kanwar (2014) explained that inflation in India is explained by the Consumer price index (CPI). CPI is a statistical measure that is developed by using the prices of the sample items, which is obtained periodically.

There are several small categories of Consumer Price Index, which are subcategories of goods and subcategories of services, which made the overall index. This is a price index that is used by the national statistics agency of the country. To measure the inflation rate, percentage change from year by year is recorded. The values of pensions, salaries and wages which citizens receive are used for regulating the prices and deflate the magnitude of money, which is used by CPI to observe the real value change.

Furthermore, Basu (2008), in his study explained that income is a significant contributing factor in inflation. In April 2010 the income factor reached a peak when the WPI inflation was recorded at 7.16%, and this increase nearly reached 11% at the start of December 2010. Afterward it goes down by making a downward trajectory. In December 2011, small rise in inflation was observed. It is added that in 12-year time period, very little inflation was observed in India. Occasionally it happens that in some months, the rate goes above 88%. Whyte (2011) used a percentage change in CPI for observing the inflation rate in both the US and Jamaica

Gross domestic product (GDP) is used to see the economic growth of the country, and CPI is an indicator of inflation, and these two indicators are used to analyze the relationship between inflation and growth. To avoid the problem of heteroscedasticity which occur, therefore all the structure of the variables is changed to logarithmic form which is denoted as LCPI and LGDP (Hossain, Ghosh, & Islam, 2012).

Ahmed & Mortaza (2010), for testing the relationship between CPI and GDP, used four popular techniques which are Kwiatkowski-Phillips-Schmidt-Shin test, Pearson test, Augmented Dickey-Fuller and Dicky-Fuller test. In their study they used logarithm values and denoted the variables as CPI* and GDP* for inflation and GDP variables.

ECONOMIC GROWTH (GDP)

Chaudhry, Ayyoub, & Imran (2013) reported the relationship between CPI inflation (CINF) and GDPG. The findings of the study show's that there is a negative and weak relationship between the two variables. It is also explained that both GDP and CPI variables are associated with each other in a negative direction. An increase in CPI inflation will affect in opposite direction on the growth of GDP. Therefore, when there is increase in CPI inflation then it will inversely affect the

GDP growth which is in accordance with the theories. This significant relationship explains that persistent inflation in the Pakistan economy will badly affect GDP growth. Thus, economic growth will be hurt due to the general increase in the price level. Results also state that a feasible level of inflation reduces the GDP growth of the country. Findings also indicate that this feasible level of inflation is 7%. There is also a positive impact of inflation if its rate is even lower than 7%. If rate of inflation goes beyond 7% then the economic growth of Pakistan will be hurt.

Additionally, a negative relationship between GDP and inflation has been proved by empirical studies. Based on the results of this study, it is found that inflation does not have an impact on the GDP because both has negative relationship. F-test results show's that the results are below the standard values of 4.0. Meanwhile, variation is observed by using the value of R square which 0.70 suggesting that 70% variation in the dependent variable is due to the change in independent variable while rest of 30% is due to other factors. Therefore, inflation play role in the GDP of the country. The inflation phenomenon is constant in all the countries which are either developed or developing countries. Inflation has significant impact on the country where it positively impacts the price level, the cost and discount rate (Roncaglia de Carvalho, Ribeiro, & Marques, 2018). Moreover, Osuala, Osuala, & Onyeike (2013) in their study found that inflation has an impact on the economic growth of Nigeria but at the same time inflation is also affected due to economic growth. On the basis of results it is found that an increase of 1% in the economic growth increased the inflation of Nigeria by 0.01.

Hussain & Malik (2011) attempted to analyze the relationship between economic growth and inflation. Inflation has positive association with economic growth. For both GDP and inflation, the observed coefficients are significant. Moreover, during the year 1960-2006 the level of Gross domestic product (GDP) increase by 0.3% annually. An increase of 1% in the GDP leads to an increase in inflation by 0.5 units in Pakistan. It is also stated that during the sample period, the rate of inflation was similar to the economic growth rate of Pakistan. This explains that inflation has important role in generating the economic growth of the country. It is also observed that there is unidirectional causality between the two variables. Simply, it is said that no reverse causation from GDP growth to inflation.

According to Ahmed & Mortaza (2010), in the case of Bangladesh the causation between real GDP and CPI is linear. Both real GDP and CPI has opposite relationship. The findings of the study explain that the coefficients are negative and highly significant shows that for economic growth of Bangladesh inflation is harmful and economic growth causes to reduce the level of inflation.

EXCHANGE RATE

It has been explained by Edwards (2006) that the exchange rate is an important determinant of inflation in both developed as well as developing countries. It is because the exchange rate impacts different factors such as exports, inflation, economic growth, and imports.

The findings of Inyiama & Ekwe (2014) explain that the rate of inflation has a positive coefficient with the exchange rate in Nigeria. The results of the study explain that relationship exists among exchange rate and inflation. In Nigeria, the inflation will be increased by 9.50% if there is 1% increase in exchange rate. The measure of least square provides a true picture which states that inflation has positive significant impact on the exchange rate. This test was then added with the cointegration test and three co-integration equations are developed by using inflation, exchange rate and interest rate to see their impact on the GDP. It is found that there is sustainable short-run association between inflation and exchange rate. The relationship among exchange rate and macroeconomic variables used in the study shows that there is no causal relationship present between the variables.

McFarlane (2002) stated that prior to 1996, fluctuations in the exchange rate has significant influence on the CPI variance. The results of the study found that fluctuations in the CPI are explained by the exchange rate fluctuations by about 36% on average. It is recorded in 1995 that this relationship was significantly reduced. This provides a picture that 10.5% of the variation in CPI is explained by the exchange rate. The results thus show's that in Jamaica inflation process has significant inertia. A study by Nchor & Darkwah (2015) shows that there will increase in rate of inflation by 0.2% if there is 1% change in depreciation in Ghana in the short-run. Yet, in the long run there is no effect of inflation on exchange rate. An unrestricted error correction model is used in the study for estimating the short-run relationship.

POPULATION GROWTH

Overpopulation has a significant influence on inflation. Researchers suggest that the level of inflation should be lower than 9%. Between population growth and output, there is insignificant relationship. A significant negative association is present among population growth and rate of inflation if the inflation level is lower than 9%. Finding also shows that the residual sum of squares (RSS) is reduced due to inflation when it moves beyond 9%. The aim of this section is to analyse relationship between population and inflation. In this regard Fischer, (1983) found that there is negative contemporaneous relationship among rate of inflation and population growth, and a positive lagged relationship exists. This study uses data of two-time periods for 54 countries. The results explain that among the two time-periods the relationship between rate of inflation and population growth shows no-positive association. The regression results of the study show that there is predominantly negative relationship between inflation and population growth.

Buhaug & Urdal (2013), in their study, use four indicators of population growth which make this research more interesting. The people who live in urban areas are indicated by percentage of urban population. After that urban population's annual growth rate is observed from 1990 to 2008. Besides that, Generation Y is indicated by using a percentage of young people in a society. Other than that, population of old people is also used which is 17% of the working-age population. In the end fertility rate and mortality rate are used. The results of the study explain that there is little evidence that increasing urban population pressure increases social disorder more. Moreover, it is found that the relationship in all the models does not show any association.

INTEREST RATE

Besides that, the interest rate also will affect inflation in the country. Basically, the interest rate is a percentage of we paid from a principal of a certain number of times for all periods during the total term of the credit or loan. Interest rates were normally known as a percentage of the principal that we paid for a period of one year; sometimes, they were expressed in different periods, such as a day or a month.

If the interest rate is lower in a country, it means that there will be more money that is available for the consumer to borrow, and the buying power has been increased. When there are more consumers spend, then the economy will grow faster and will make the demand for commodities increase and no change in supply. Meanwhile, when the interest rate is higher, it will make people borrow less from financial institutions and make them save more. So, it means that there is no circulating of money. With less money, people tend to save more and spend less. The demand will decrease and supply increases. It will make the price tends to go down.

According to Leibowitz, Sorensen, Arnott, & Hanson (1989), when the assumption of future cashflow and independent interest rate is relaxed, the interest rate sensitivity of equities can be changed, then the duration of equity which is measured by using the average maturity of equity cash-flow.

The analysis of inflation, fractional-reverse banking, and interest rates explains that there is an inverse relationship. One of the contemporary monetary policy explains the relationship among the said variable such as short-term interest rate is manipulated by the central bank will impact on the market's inflation rate. To understand how such relationship can work, it is necessary to understand what role interest rate play and understand quantity theory of money and the banking system of the country.

III. Methodology

The research aimed to analyze the inflation in Malaysia; there are five main indicators discussed in those studies, which are Interest rate (IR), economic growth (GDP), Population growth rate. In this relationship, inflation is used as an independent variable, while the exchange rate (EXCHR), Economic growth (GDP), Interest Rate (IR) and Population growth rate are used for independent variables. Time series data is used in this study which covers a period of 20 years (1996 to 2016). The data used in this research is collected from World Bank, Index Mundi, and National Statistics Department. Data is used to add the information provided by the theories.

MULTIPLE REGRESSION EQUATION

This study used a method of multiple regression analysis after developing the hypothesis. After identifying the relationship between the dependent and independent variables, a multiple regression analysis is defined and used to check the exact relationship.

In accordance with the empirical research, the inflation equation is shown as a function of the Exchange rate (EXCHR), Economic growth (GDP), Population, and Interest Rate (IR). To examine the impact of exchange rate, economic growth and population and interest rate on the inflation following equation is used. To capture the effect of unknown variable model used an error term.

$$INFL = \beta_0 + \beta_1 GDP + \beta_2\ EXCHR + \beta_3\ POPU + \beta 4\ IR + \dot{\varepsilon}$$

Where,

INFL = Inflation in 5 ASEAN countries (Consumer Price Index)

B_0 = Intercept of the relationship in the model/constant

B_1 = GDP = Gross Domestic Product (Economic growth), (GDP per capita)

B_2 = EXCHR = Exchange rate (Country's exchange rate in terms of USD)

B3 = POPU = Population of 5 ASEAN countries (Total fertility rate)

B4 = IR = Interest Rate (Real of Interest Rate of GDP)

RESEARCH HYPOTHESIS

The relationship between dependent and independent variables is explained by developing the hypothesis. This study used four hypotheses for defining the relationship between inflation and other independent variables (exchange rate, economic growth, Population growth rate, and interest rate).

H1: There is a relationship between Economic Growth (GDP) and Inflation in 5 ASEAN countries

H2: There is a relationship between the Malaysian exchange rate and Inflation in 5 ASEAN countries

H3: There is a relationship between Population growth rate and Inflation in 5 ASEAN countries

H4: There is a relationship between Interest Rate and Inflation in 5 ASEAN countries

IV. RESEARCH HYPOTHESIS

DESCRIPTIVE STATISTIC

Variables	Mean	Standard Deviation	N
Inflation	87.49	26.002	105
GDP	237.49	208.71	105
Exchange rate	5202.18	7070.26	105
Population growth	1.97	0.50	105
Interest rate	4.30	3.79	105

Table 4.1 – Descriptive statistics

The basic features of the data are explained by using a descriptive statistic, and it also explains what the data shows. The quantitative values of the data are explained by descriptive statistics in a manageable form. In an empirical study measures are available to explain large number of people or data, in this regard descriptive statistics helps to explain the data which is in large amount and explained in a simple and sensible way.

REGRESSION MODEL

$INF = B_1 + B_2\,GDP + B_3\,EXCHR - B_4\,POPU - B_5\,IR +$

$= 114.350 + 0.7\,GDP + 0.00\,EXCHR – 20.749\,POPU – 0.8781\,IR + \dot{\varepsilon}$

R^2	0.42
Adjusted R^2	0.396

Table 4.2- Regression Table

The above relationship between the variables explains that the results are in line with the economic theory. It is proved from the results of R-square. Based on the calculation, it is observed that there is a moderate direct relationship between independent and dependent variables. The strength of the relationship is observed from the value of R squared which shows 42%. The reason why R-squared can be too high is that R-squared is a biased estimator. A regression analysis estimator explains that the optimization process takes advantage of chance correlation in the data and it inflates the value of the R-square.

DURBIN-WATSON

The result of the Durbin-Watson shows statistics of 0.410, and it means that there is positive autocorrelation, which approaches 0. The value of Durbin-Watson is always between 0-4. The value of 2 for Durbin-Watson test explains that autocorrelation in the sample is almost zero. While the 0 zero value shows that autocorrelation is present among the variables while the value of 4 show's a negative autocorrelation. The findings of this study suggest that there is no autocorrelation present in the sample.

Some researchers use adjusted R-square value instead of R-square because the value of adjusted R-square compares the sample size with the number of terms in the model of regression. If there are many samples per term in regression models, it will provide better estimates of R-square.

T-TEST

Independent Variables	T-Statistic	Probability	Result
Economic Growth (GDP)	7.28	0.000	Accepted
Exchange Rate	0.79	0.43	Rejected
Population (Total fertility rate)	-5.005	0.000	Accepted
Interest Rate	-1.66	0.10	Rejected

Table 4.3 Summary of Hypothesis

Table 4.2 show the summary of the hypothesis by showing the t-test results for GDP which is 7.28 (p=0.00). As the value of probability for GDP is less than 0.05, we fail reject the null hypothesis, therefore the relationship between inflation and GDP is statistically significant. Thus, change in value of GDP will affect the inflation. For exchange the t-stats value is very small (0.79) having a probability of 0.

43 suggest that there is no significant relationship between inflation and exchange rate; thus we reject the null hypothesis; thus variable is insignificant. Third we have Population growth variable which has t-stats of -5.005 having a probability of 0.00 suggesting that there is significant negative relationship between inflation and population growth. Thus increase in population in five ASEAN countries impact inflation negatively. At last the relationship between interest rate and inflation is defined; the t-statistic results with value of -1.66 and a probability of 0.10 show there is no significant relationship between the two variables; thus we reject the null hypothesis.

F-TEST

F-statistic	18.079
Probability (F-statistic)	0.00
Result	Accepted

Table 4.5 F-test

The findings in table 4.5 explain that f-test results show a positive association of the model. The probability of F-test is 0.000 which is 0.05. This indicates that the overall regression model is strong and significant. If the P-value for the F-test of overall significance test is less than the significance level, the null hypothesis can be rejected.

MULTICOLLINEARITY TEST

Independent Variables	Variance Inflation Factor (VIF)
Economic Growth (GDP)	1.026
Exchange Rate (Official exchange rate USD)	1.089
Population (Total fertility rate)	1.092
Interest Rate (Real of Interest Rate of GDP)	1.022

Table 4.6 : Multicollinearity Test

The variance inflation factor (VIF) is used to check either the model has a problem of multicollinearity. When the value of VIF is higher than 5, then it explains that the model has an issue of multicollinearity. According to rule of thumb if VIF value is more than 10 then has serious multicollinearity problem. The findings of Table 4.6 shows that all the values are lower than 2; thus, there is no issue of multicollinearity in the model. Secondly, to minimize the correlation among the independent variables, we can increase the sample size.

V. Conclusion

Inflation in 5 ASEAN countries is increasing year by year. Based on the data collected, we can assume the factor that influencing inflation. By looking at the data collected, we can identify the relationship between the variables. After all the test is carried out, we also can determine which factor give the most impact on inflation.

There is a positive relationship between two of the variables. For gross domestic products, it has a positive relationship with inflation. Increase RM1 million in GDP will lead to increase 0.7 in inflation. The exchange rate also has positive relationship with inflation. If exchange rate depreciates by RM1, inflation will increase by 0.00. Besides that, population in 5 ASEAN have negative relationship with inflation. If population increase by 1 %, inflation will decrease by -20.749. The interest rate has a negative relationship with inflation as the interest rate increase by 1%, inflation decrease by –0.8781.

Based on the p-values, we find that the results are not the same as the regression model. We found that there are two variables that have a significant relationship with inflation. Economic growth has significant relationship with the inflation due to the p-value is less than 0.05. For exchange rate, it has significant relationship with inflation because the p-values are below 0.05. Lastly, the population has significant relationships with inflation because the p-value is lower than 0.05.

Based on both results found, it can be concluded that the result was not accurate. So to be more accurate, this is because all the 5 ASEAN country has a big difference in economic growth. So that results to be more accurate, it must consist of 5 countries that have almost the same economic growth.

RECOMMENDATION

Inflation in 5 ASEAN countries is a serious issue and frequently made headlines. Citizen also has been talked about inflation and complains how difficult life nowadays compares before this. Based on the result, there are several recommendations in order to control inflation. First of all, mass media has played a big role in order to overcome inflation. Serve as a channel of information; mass media should expose the issue to the public. Information or news about inflation can be delivered through television, advertising, newspapers, magazines or the internet, and so on. With it, people can make early preparation to face the crisis. The government also should disclose price of controlled items to the public. For example, items that are listed as controlled items as meat, sugar, eggs, flour and so on. The implication, society will become more knowledgeable and able to be a smart consumer and do not easily mislead by dealer. In case of changes or amendments to the list of controlled items, then the information should be published so that consumer rights are not compromised.

Effective campaigns also cannot be ruled out; for example, the mass media can intensify and move the austerity drive, agriculture campaign as a business, and so on. It will be able to train people to be happy and do not panic when the problem of rising prices occurs.

In addition, the government can set up a Commission of Price Hikes, which serves to control and monitor these issues systematically. The existence of this commission can reduce the problem of inflation, especially when the festive season around the corner. The price of goods must be monitored and supervised at all times by the commission. Members of this commission should be independent, and they are able to perform their duties with dignity and transparency. Therefore, the establishment of such a commission led producer cannot simply raise the price of goods without restrictions. In fact, the government can draft an act that can charge appropriate penalties for offenders in this issue. This Act shall have clear information, and heavy punishment aspects of effective prevention to tackle the problem of rising prices of goods in our country. Harsher penalties and practical cause producers do not dare to take action to deceive consumers as they please, especially in terms of price.

Indeed, the existence of an effective law prompted traders no longer dare to make mistakes because of worry and fear of the consequences. Not only did act drawn up, but the government, through the Ministry of Trade and Consumer Affairs, must enforce the rules. The government should direct all ministry staff conduct frequent patrols and arrested businessmen who made a mistake. Strict and transparent action has caused traders no longer dare to deceive and raise prices or offer bribes to ensure their escape arrest. Clearly, enforcement is also important to resolve the inflation issue.

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