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IMPACT OF COVID-19 CASES ON INFLATION IN ASEAN

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ABSTRACT

This study is aimed to examine the impact of the total cases of COVID-19, interest rates, and money supply on inflation in ASEAN-5. Using the Panel Vector Error Correction Model (PVECM), the study reveals that the number of COVID-19 cases has a negative impact on inflation in ASEAN-5 both in the short and long run. The higher the total cases, the lower the inflation in the region. This was caused by a shock from the demand aspect due to the large number of people who were not working, so that household income decreased. A decrease in income will certainly impact on a decrease in demand which will affect equilibrium inflation. In addition, some control variables such as interest rates have a negative effect on inflation in the long run. Meanwhile, the money supply has no significant effect on inflation during the pandemic.

Keywords: *Inflation, Interest Rates, Money Supply, Panel Vector Error Correction Model (PVECM)*

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Introduction

Most of countries in the world have implemented lockdown, social distancing, and travel restriction because of the COVID-19 pandemic resulting in an unprecedented global economic downturn (Coibion et al., 2020). According to Cavallo (2020), the government's policy primarily aims to avoid the spread of COVID-19. On the other hand, this policy will impact business activities and weaken the economy.

According to Jaravel & O'Connell (2020), The Great Lockdown was a combination of enormous supply and demand shocks. Therefore, a crisis can lead to higher deflation, disinflation or inflation. In general, inflation is an overall and continuous increase in the price level that causes a decrease in purchasing power (Lim & Sek, 2015). Disinflation is a situation where the price level increases at a slower growth rate. Meanwhile, deflation is a continuous decline in the price level causing in an increase in the value of money. A decrease in aggregate demand can lead to deflationary pressures due to higher uncertainties and lower income levels. Closing economic sectors during lockdown can cause shifts in demand patterns that can change the level of application of market power, so that it will affect equilibrium inflation (Jaravel & O'Connell, 2020).

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Because several components of economic growth were also affected, the implementation of large-scale social distancing rules during the pandemic had an effect on the financial system and economic defense. Household spending has declined as a result of layoffs caused by weakening economic activity (Yuniarti et al., 2021). In the ASEAN region, the COVID-19 pandemic is also quite high, especially in Singapore, the Philippines, Malaysia, Thailand and Indonesia. Figure 1 is data on the development of active cases of COVID-19 ASEAN-5. Active case data from January 2020 to December 2021 in ASEAN-5 shows that COVID-19 in ASEAN-5 is still fluctuating, but from May to August 2021 there was a significant increase in active cases, namely after the Eid holidays. The highest active cases occurred in July 2021 in Indonesia, namely 545,447 cases.

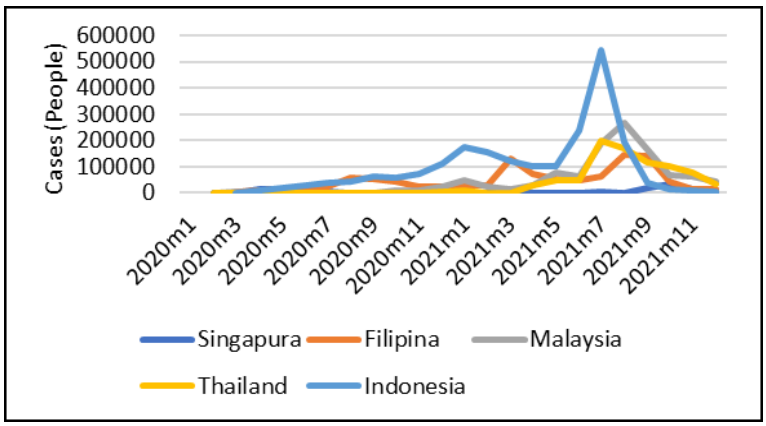

Figure 1: Development of Active Cases of COVID-19 in ASEAN-5 Period January 2020 – December 2021

Source: Worldometer (2021)

As the holder of a country's monetary policy, the central bank always tries to control the inflation rate during the pandemic (Sihotang & Nopeline, 2020). Because, one of the criteria for supporting economic growth and improving people's living standards is a low and stable inflation rate. High and unstable inflation rates, on the other hand, can trigger various economic, social, and political issues and have a negative influence on a country's economy. (Sihotang & Nopeline, 2020).

Based on the background above, research is required to determine how the COVID-19 pandemic affected inflation. Therefore, the purpose of this study is to examine the effect of the COVID-19 pandemic, interest rates, and the money supply on inflation in the short and long term in ASEAN-5. The PVECM method is used as a decision-making technique from the hypotheses that have been determined in this study.

Inflation is a fundamental macroeconomic indicator. Therefore, many researchers have conducted various studies on inflation. Some of them are Nguyen (2015); Amaefula (2016); Islam et al. (2017); Uddin et al. (2019); Sihotang & Nopeline (2020); Coulibaly (2021); Yuniarti et al. (2021). Among several previous studies, research by Coulibaly (2021) and Yuniarti et al. (2021) examined the effect of the COVID-19 pandemic on inflation. Nevertheless, these two studies have not shown standardized results regarding the impact of COVID-19 on inflation. Therefore, the contribution of this study is to analyze the effect of the COVID-19 pandemic on inflation in five ASEAN countries, namely Singapore, the Philippines, Malaysia, Thailand and Indonesia. Unlike the research by Coulibaly (2021) and Yuniarti et al. (2021), this study utilized the PVECM to examine the influence of the COVID-19 pandemic, interest rates, and the money supply (M2) on inflation.

Literature Review

Inflation is defined as an increase in the average price level accompanied by changes in the prices of goods and services in the economy (Mankiw, 2011). According to Smauel et al. (2019), Keynesian argued that a rise in aggregate demand raises demand-pull inflation. The difference between aggregate demand and aggregate supply causes rapid inflation. The overall price level is determined exogenously. Meanwhile, according to Structuralist Inflation Theory, the demand-supply gap causes inflation in imperfect markets with structural imbalances in various parts of the developing economy (Smauel et al., 2019)

To measure inflation, one of the indicators used is the Consumer Price Index (CPI). According to Wollie (2018), the CPI is the most widely used and appropriate measure of the general price level to measure people's welfare. This is because the CPI shows the price movement of a set of goods and services consumed by the public. The following formula is used to calculate the inflation rate:

$$Inflation = \frac{(CPI_t - CPI_{t-1})}{CPI_{t-1}} \times 100\% \quad (1)$$

Where:

CPI_t : Consumer Price Index year t

CPI_{t-1} : Consumer Price Index before year t

Inflation is classified into two forms based on its causes, namely demand-pull inflation and cost-push inflation (Samuelson & Nordhaus, 2009). Demand pull inflation is an increase in prices caused by rapid growth in aggregate demand that exceeds the supply of goods and services in an economy. Aggregate demand that is greater than the capability of the economy can cause a rise in the price level. Meanwhile, cost push inflation is a price increase caused by a rise in production costs which results in a reduction in aggregate supply. A rise in production costs can reduce the amount of output produced. This scarcity makes people willing to buy products at higher prices, so that the price level will increase.

One way to deal with inflation is through monetary policy. According to Mishkin (2010), monetary policy is implemented by the central bank with the aim of influencing variables in the economy through managing the money supply and interest rates. Toby & Peterside (2014), argued that changes in monetary policy tend to transmit changes in the projected behavior of macroeconomic variables in the future.

Changes in the money supply, according to Keynesian theory, impact total spending and output levels through changes in interest rates (Toby & Peterside, 2014). According to Mishkin (2010), the goal to be achieved in general is the formation of macroeconomic stability, one of which is to maintain price stability (inflation). According to Dornbusch et al. (2018), the money supply and interest rates can affect price levels or inflation in the economy. According to Mankiw (2011), the Fisher Effect Theory explains the relationship between inflation and interest rates. The Fisher Effect theory suggests that a one percent increase in the inflation rate will lead to a one percent increase in the nominal interest rate.

Inflation can be caused by internal economic factors or external economic factors (Islam et al., 2017). According to Vera (2010), adverse external shocks can cause inflation. The main causes of inflation problems are shocks to the terms of trade and a decline in the national currency (Coulibaly, 2021).

The COVID-19 pandemic has disrupted the global supply chains, causing shocks to trade and nominal exchange rates. This has an impact on inflation in developing countries (Coulibaly, 2021). The COVID-19 pandemic can influence inflation by affecting income and demand (Coulibaly, 2021). The government's reaction to the pandemic that includes market closures, social distancing and curfew rules will lower household incomes, affecting demand for goods and services.

Previous studies on the factors that influence inflation have been carried out by many researchers. One of the external factors affecting inflation is the COVID-19 pandemic (Amaefula, 2016; Coulibaly, 2021; Sihotang & Nopeline, 2020; Umoru & Oseme, 2013; Yuniarti et al., 2021). By using panel data regression, research by Yuniarti et al. (2021) show that an increase in the number of COVID-19 cases affects Indonesia's inflation, where each additional case will reduce the inflation rate by 5.14×10-5. Coulibaly (2021) used robustness checks, ordinary least squares (OLS), and instrumental variable regression to observe the influence of COVID-19 on inflation. The study's findings indicate that the number of COVID-19 cases has a positive impact on the CPI, but the government's policy response to the pandemic has a negative impact.

Studies on the relationship between interest rates and inflation have been carried out by Sihotang & Nopeline (2020); Amaefula (2016); and Umoru & Oseme (2013). Sihotang & Nopeline (2020), using multiple regression method, discovered that interest rate, exchange rate, private household consumption, and total imports simultaneously affect inflation in Indonesia. Meanwhile, partially only the SBI interest rate and Indonesia's total imports have a significant effect on inflation in Indonesia. These results indicate that increases in SBI interest rates and Indonesian imports could have an impact on the inflation rate in Indonesia.

Amaefula (2016), discovered a long-term equilibrium correlation between interest rates and inflation. Based on the estimation results, the interest rate influences the inflation rate in the long run. Meanwhile, Umoru & Oseme (2013) concluded that the interest rates had a negative impact on inflation expectations in Nigeria using the Generalized Method of Moments (GMM).

Another factor that affects inflation is the money supply. Research about to the correlation between the money supply and inflation was conducted by Islam et al. (2017); Nguyen (2015); and Uddin et al. (2019). Islam et al. (2017) discovered a positive correlation between inflation and the money supply. Nguyen (2015) also concluded that the money supply has a positive influence on inflation only when estimated using the PMG estimation method. Furthermore, Uddin et al. (2019) also discovered a long-term positive correlation between M2 and CPI. Therefore, this study seeks to examine the impact of the COVID-19 pandemic, interest rates, and the money supply on inflation in ASEAN-5. In addition, the hypothesis of this study is that the variables COVID-19, interest rates, and money supply (M2) have an impact on inflation rates in the short and long term in ASEAN-5.

Data and Research Methods

This study used a quantitative research approach with a stochastic model. The stochastic model is a mathematical model in which symptoms can be measured using an unstable degree of certainty. Stochastic models are also often referred to as models that contain uncertainty (Dyanasari et al., 2018). The estimation method used in this study is PVECM used to analyze the effect of the COVID-19 pandemic, interest rates, and the money supply on inflation in the short and long term by utilizing panel data in ASEAN-5, i.e., Singapore, Philippines, Malaysia, Thailand and Indonesia from January 2020 to December 2021. Specifically, the variables are tabulated in Table 1.

Table 1: The definition of Variables

Variable	Definition	Source
Consumer Price Index	The consumer price index (CPI) represents inflation. Where P_n is current price and P_0 is prices in the base year.	International Financial Statistics
COVID-19	The COVID-19 data used in this study is total cases with units of people transformed into natural logarithms.	Worldometer
Interest Rate	This study uses reference interest rate data in percent units.	International Financial Statistics
Total Money Supply (M2)	The broad money supply (M2) is including transaction money (M1), savings at banks, and similar goods which are substitutes for transaction money. The money supply used in this study is ASEAN-5 M2 data with units of USD converted to Natural Logarithms.	CEIC Data

We used PVECM to estimate the impact of the number of COVID-19 cases to inflation. The model is as follows:

$$\Delta IHK_{it} = \delta_0 + \delta_{1j}\sum_{j=1}^{k}\Delta IHK_{it-j} + \delta_{2j}\sum_{j=1}^{k}\Delta \ln COVID-19_{it-j} + \delta_{3j}\sum_{j=1}^{k}\Delta INTEREST_{it-j} + \delta_{4j}\sum_{j=1}^{k}\Delta \ln M2_{it-j} + \delta_{5j}\sum_{j=1}^{k}u_{it-j} + e_{it} \quad (1)$$

Where,

IHK : Consumer price index

lnCOVID-19 : Natural Logarithm of the COVID-19 cases

INTEREST : Policy interest rate (%)

$\ln M_2$: Natural logarithm of the money supply (M_2)

$\delta_1, \delta_2, \delta_3, \delta_4, \delta_5$: Independent variable coefficient

i : Cross section, namely ASEAN-5

t : Time series, namely January 2020 – December 2021

e_{it} : Error term

After conducting the stationery test and selecting the optimal lag, we did the Johansen cointegration test to determine the long-term correlation between variables. Afterward, we analyze PVECM if the data were cointegrated. The PVECM specification itself limits the long-term relationships of the endogenous variables to coalesce into cointegrating relationships, but still allows for short-term dynamics. In addition, we also evaluate the causal relationship between variables using Granger causality test. In this test, we identified the correlation among variables whether there are unidirectional, bilateral, or independence. Lastly, we analyzed the impulse response function (IRF) and the variance decomposition. The IRF is to determine the level of shock of one variable against another in a certain period. Thus, we can see how long the shock of one variable affects other variables until the effect disappears or returns to the balance point. Moreover, variance decomposition is to measure how much shock a variable affects different variables and measures the estimated variance of the variable error determined by the variable itself.

Finding and Discussion

All variables were stationer in the first difference according to the Augmented Dickey Fuller (ADF) test.

Table 2: The Results of Stationarity

Variable	Level		First Difference	
	ADF	Prob.	ADF	Prob.
CPI	3.51697	0.9665	35.9792	0.0001
lnCOVID-19	23.6689	0.0085	88.9562	0.0000
INTEREST	89.6410	0.0000	42.9140	0.0000
lnM_2	10.3515	0.9987	56.2687	0.0000

In addition, the recommended optimal lag was 8 according to LR and AIC methods.

Table 3: Optimal Lag Selection

Lag	LR	FPE	AIC	SC	HQ
0		1.74e-07	-4.212586	-4.076514*	-4.159069
1	57.59858	1.07e-07	-4.697729	-4.017369	-4.430140*
2	31.17174	1.01e-07*	-4.767047	-3.542398	-4.285386
3	17.88777	1.19e-07	-4.616866	-2.847929	-3.921134
4	16.52649	1.42e-07	-4.468201	-2.154976	-3.558398
5	12.42487	1.85e-07	-4.256094	-1.398581	-3.132221
6	9.706772	2.58e-07	-4.003599	-0.601798	-2.665654
7	23.30678	2.42e-07	-4.181156	-0.235067	-2.629140
8	42.20030*	1.16e-07	-5.079896*	-0.589519	-3.313809

Furthermore, the model also complies with the cointegration test revealing that all variables in the study were cointegrated over the long term.

Table 4: Johansen Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0,05 Critical Value	Prob.**
0	0.525455	159.7052	47.85613	0.0000
1	0.377896	94.11009	29.79707	0.0000
2	0.313032	52.34101	15.49471	0.0000
3	0.196932	19.29981	3.841466	0.0000

From Granger causality test, it can be asserted that there is unidirectional causality between the CPI variables and COVID-19, where only COVID-19 has a significant influence on CPI. The benchmark interest rate and CPI variables have unidirectional causality, where the CPI affects the benchmark interest rate. In addition, the money supply (M2) and CPI variables also have a unidirectional relationship, where the money supply affects the consumer price index. Meanwhile, COVID-19 and the benchmark interest rate have a two-way causal relationship.

Table 5: Granger Causality Test

Null Hypothesis:	Obs.	F-Statistic	Prob.
COV does not Granger Cause IHK	103	19.7353	6.E-08
IHK does not Granger Cause COV		1.55690	0.2160
SBA does not Granger Cause IHK	105	1.03206	0.3600
IHK does not Granger Cause SBA		15.5957	1.E-06
LNM2 does not Granger Cause IHK	110	3.14228	0.0473
IHK does not Granger Cause LNM2		0.41681	0.6602
SBA does not Granger Cause COV	98	4.02244	0.0211
COV does not Granger Cause SBA		4.41110	0.0148
LNM2 does not Granger Cause COV	103	0.55219	0.5775
COV does not Granger Cause LNM2		1.54877	0.2177
LNM2 does not Granger Cause SBA	105	0.02224	0.9780
SBA does not Granger Cause LNM2		1.74966	0.1791

The PVECM estimation is utilized to examine the effects of COVID-19, the policy interest rate, and M2 on the CPI. Short-term estimation can be seen through the value of ECT or CointEq1. The cointegration or CointEq1 value must be negative and significant when estimating the PVECM model, because a negative CointEq1 value shows that the estimated model is valid (Jumhur, 2020). Table 7 shows that the CointEq1 value is negative, which means that if there is an error in the short term, the model will be corrected and find its balance towards the long term at a pace of 0.268960 percent per month.

Based on the t-table calculation that has been done, the t-table values obtained at a significance level of 1%, 5%, and 10% respectively are 2.62, 1.98, and 1.66. Table 6 shows that the COVID-19 variable (lag 1) has significant impact on the CPI in the short run. This is shown by a t-statistic value greater than the t-table value, indicating that H0 is rejected. The COVID-19 variable has a significant negative effect on the CPI in lag 1, so that it can be interpreted that every 1 percent increase in active cases in the previous 1 month will reduce the CPI by 0.17 percent assuming other factors are constant. Meanwhile, the interest rate and M2 variables have no significant effect on the CPI in the short term.

Table 6: Short Term PVECM Estimation Results

Variable	Coef.	t-statistic
CointEq1	-0.268960***	-4.89474
D(IHK(-1))	-0.142154*	-1.85738
D(LNCOV(-1))	-0.507754***	-4.52040
D(SBA(-1))	0.259756	1.05299
D(LNM2(-1))	1.736167	0.62550
C	0.010577	0.16113
R-squared	0.496454	
Adj. R-squared	0.467515	
F-statistic	17.15497	

Note: *** significant at α 1%; ** significant at α 5%; * significant at α 10%

Table 7 displays the long-term PVECM estimation results which show that COVID-19 and interest rates (at lag 1) have a negative impact on CPI in the long term. Meanwhile, in the long run, M2 has no significant impact on the CPI.

Table 7: Long Term PVECM Estimation Results

Variable	Coef.	t-statistic
LNCOV(-1)	-0.902642***	-3.13263
SBA(-1)	-6.004447***	-6.59125
LNM2(-1)	-9.048595	-1.14903

Note: *** significant at α 1%; ** significant at α 5%; * significant at α 10%

The level of shock of one variable to another variable within a certain time period is determined using the impulse response function (IRF). Figure 2 shows that when there is a shock to the CPI, the CPI will respond positively from the first period to the tenth period. However, in the first to third periods, the CPI showed a declining response. Shocks in the COVID-19 variable will result in a negative response to the CPI. The response decreased from the first to the second period, then increased in the third to fourth period, and stabilized in the next period. On the other hand, the CPI responded positively to shocks in the benchmark interest rate and M2.

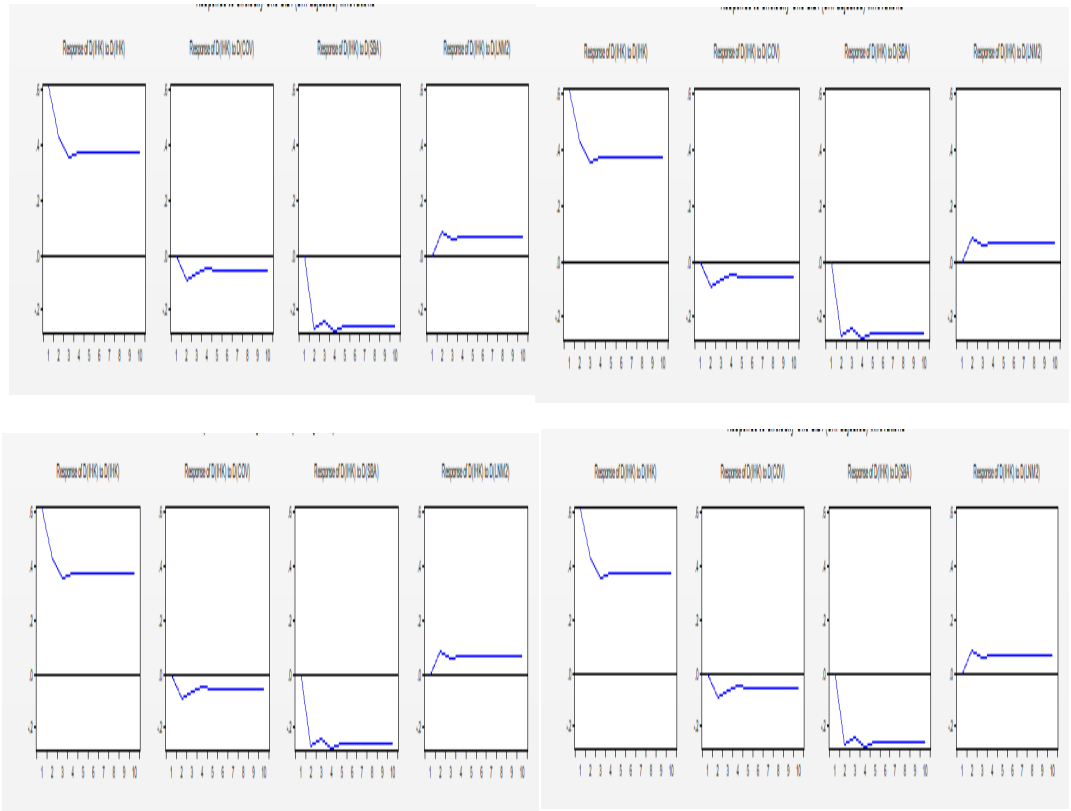

Figure 2: Impulse Response Function

Table 9 displays the findings of variance decomposition analysis for the inflation rate of each variable's shocks, including the variable itself. Based on the table, in the first period, the CPI was affected by the CPI shock itself by 100 percent. From period 1 to period 10, the proportion of CPI shocks is still large. Meanwhile, the COVID-19 variables, interest rates, and money supply (M2) had no effect on the first period CPI.

Table 9: Variance Decomposition

Period	SBA	S.E.	IHK	LNCOV	LNM2
1	0.611864	100.0000	0.000000	0.000000	0.000000
2	0.800392	86.94294	1.190579	10.71698	1.149498
3	0.913149	82.14470	1.419863	15.13684	1.298597
4	1.027215	78.30223	1.332504	18.89815	1.467118
5	1.124440	76.14273	1.359446	20.93489	1.562929
6	1.215181	74.66234	1.354276	22.35882	1.624561
7	1.299733	73.51140	1.356176	23.45704	1.675389
8	1.378864	72.63113	1.358052	24.29753	1.713291
9	1.453826	71.92256	1.358459	24.97503	1.743950
10	1.525058	71.34406	1.359346	25.52756	1.769030

Discussion

The short-term estimation results indicate that the COVID-19 cases have a negative effect on inflation (CPI). This means that every increase in COVID-19 cases per day in ASEAN-5 will reduce inflation (CPI). The COVID-19 variable also has a negative impact on CPI in the long term, meaning that an increase in active cases of COVID-19 in ASEAN-5 over a long period of time will reduce inflation. The findings in the short and long term are in accordance with the research by Yuniarti et al. (2021) which stated that COVID-19 has a negative impact on inflation. This was due to a shock from the demand aspect because many people were not working so that household income fell. A decrease in income will have an impact on a decrease in demand which will affect equilibrium inflation (Jaravel & O'Connell, 2020).

A shift in the demand aspect that exceeds the supply aspect will cause a decrease in the equilibrium price. Therefore, one strategy that the government can use to overcome the economic slowdown caused by the pandemic is to provide fiscal stimulus by increasing social transfers to households and delivering financial support to companies to encourage company production in order to increase people's purchasing power and restore the economy (Coulibaly, 2021).

The long-term PVECM estimation results indicate that the benchmark interest rate variable has a negative impact on CPI. This means that a reference interest rate that continues to decline over a long period of time will increase CPI. Thus, it can be interpreted that every 1 percent increase in the benchmark interest rate will reduce the CPI by 6 percent assuming other factors are constant. The findings of this estimate are consistent with the findings of Amaefula (2016), who discovered a long-term equilibrium relationship between interest rates and inflation. These findings show that the low cost of borrowing money is likely to drive inflation in the long run.

The research findings of Umoru & Oseme (2013) also show that interest rates have a negative effect in the long term. According to Umoru & Oseme (2013), the central bank needs to implement policies to reduce inflation which can be detrimental to the economy. Efforts to reduce inflation can be done by increasing the cost of borrowing commercial banks to limit the ability of commercial banks to expand credit. By increasing the cost of borrowing from commercial banks, the prime interest rate on loans to the public also increases. This will cause the cash position of these banks to be minimal, so that inflation expectations in the country are reduced (Umoru & Oseme, 2013).

Meanwhile, in the short term, the benchmark interest rate does not have a significant effect on CPI in ASEAN-5. Amaefula (2016) also stated that there is no short-term relationship between interest rates and inflation. These results indicate the weak relationship between interest rates and inflation in the short term. In addition, in the short term, the response of the benchmark interest rate to inflation is not yet visible because the monetary policy transmission mechanism requires time (time lag) (Bank Indonesia, 2022). Changes in the benchmark interest rate will first impact deposit rates and bank lending rates. Therefore, the response of the benchmark interest rate to inflation is already visible in the long term.

Inflation is described as an increase in the price of goods and services that leads to a decrease in the purchasing power of the domestic currency. Moderate to high inflation rates can distort investment and consumption decisions, which will then hinder economic growth. Issuance of money is one of the most important factors affecting the price level. Excessive spending and circulation of money tends to increase production costs, depress exchange rates, reduce the availability of resources such as food and fuel, increase demand, and increase the cost of storing commodities. This is the primary source of inflation. An increase in the money supply can boost consumer spending (Uddin et al., 2019).

The short-term and long-term PVECM estimation results show that the money supply variable (M2) has no significant positive effect on the CPI. These findings imply that the data utilized in this study does not prove that the growth of the money supply affects the inflation rate. The estimation results are in line with the research by Smauel et al. (2019) which shows that the money supply does not cause inflation.

This finding implies that an increase in the money supply does not always result in inflation. Interest rates tend to decline when the money supply increases. A decrease in the interest rate can increase investment and output. In this case, the money supply does not cause inflation (Nguyen, 2015).

Conclusion

Based on the research background, research objectives, estimation results, and discussion in the previous chapter, several conclusions can be derived. First, short-term estimation findings show that COVID-19 variables have a negative and significant impact on inflation (CPI), so that every increase in COVID-19 cases per day in ASEAN-5 will reduce inflation (CPI). COVID-19 will also have a significant negative effect on the Consumer Price Index (CPI) in the long term. These results mean that an increase in active cases of COVID-19 in ASEAN-5 over a long period of time will reduce inflation (CPI). Furthermore, the outcomes of the long-term PVECM estimation indicate that the benchmark interest rate variable has a negative and significant effect on the CPI, meaning that a reduction in the benchmark interest rate over a long period of time will increase inflation (CPI). Meanwhile, in the short term, the benchmark interest rate does not have a significant effect on CPI in ASEAN-5. Finally, the money supply (M2) has no significant effect on the CPI in the short or long term. These findings indicate that the data used in this study does not prove that the money supply affects the inflation rate.

Based on the research results and conclusions obtained, there are several suggestions that can be used. The government is expected to continue to pay attention to controlling the inflation rate during the pandemic so that it is in accordance with the target. The inflation control strategy does not only focus on controlling prices, but also maintaining people's purchasing power. Furthermore, the central bank is expected to adopt monetary policy through interest rates that can control the growth of the money supply (M2) to overcome inflation. When interest rates increase, the money supply will decrease, so that inflation can be suppressed.

In addition, the policy of raising interest rates must still be considered considering the risk of policy increases in interest rates. Where, one of the risks is the difficulty for entrepreneurs to raise the selling price of their products and services so that profits are reduced.

This research still has some limitations. Due to data limitations, the research period is only until December 2021. Future research is expected to use a longer and more recent period, so that it can reflect inflation after the spike in COVID-19 cases to date. In addition, future research can also use other COVID-19 indicators (such as death cases) with different methods so that the results obtained are more comprehensive.

Declaration

In this section, I declare that this research: (1) does not conflict with anyone's interests (2) Availability of data and materials, (3) there are the author's contributions, (4) there is a source of funding and (5) and acknowledgments.

Conflict of Interest

We certify that there are no significant financial, professional, or personal competing interests that might affect performance as a result of this research.

Availability of Data and Materials

Data and research materials can be provided upon request. Data Sharing does not apply to this article as no new data was generated or analyzed in this study.

Authors' Contribution

The contribution of the first author was writing, data collecting, estimating, and analyzing, whilst the second author was writing and analyzing.

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