Determinants of Inflation Rate Fluctuations in Five ASEAN Nations

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Abstract: This paper examines the key relationships between independent variables and inflation fluctuations in the ASEAN-5 countries, which include Malaysia, Indonesia, Singapore, Thailand, and the Philippines. Using annual data from 2001 to 2020, a static panel data regression model is employed. The empirical results reveal that at least two independent variables significantly impact inflation rates in these five ASEAN nations. Specifically, the unemployment rate has a significant negative correlation with inflation fluctuations, while economic growth shows a significant positive correlation. Overall, this study provides valuable insights into how exchange rate determinants influence inflation fluctuations, highlighting the importance of balanced policies to address the interactions between unemployment, economic growth, and inflation.

Keywords: *Inflation Fluctuations, ASEAN-5 Countries, Unemployment Rate, Economic Growth, Exchange Rate Determinants*

1. Introduction and Background

Inflation remains a persistent challenge for the global economy, impacting both developed and developing countries. In recent years, factors such as supply chain disruptions, volatile energy prices, geopolitical instability, and unconventional monetary policy responses to crises like the COVID-19 pandemic have intensified global inflationary pressures (Hernández et al., 2024). It's important to recognize that different regions are affected at varying rates due to disparities in economic development and global market volatility. Rising inflation can lead to lower savings rates, a particular concern for individuals who rely on their savings to sustain their current lifestyle without a minimum return on investment. Conversely, those with limited savings and low incomes may increasingly turn to debt to cover their expenses (Dany-Knedlik & Garcia, 2018; Yusuf et al., 2021). Ultimately, inflation impacts everyone.

In response to rising inflation, advanced economies have implemented stricter monetary policies (Hernández et al., 2024). As a result, a short- to medium-term tightening of monetary policy is anticipated in these regions, driven by high inflation rates and surging commodity prices. This implies that developing economies may resort to additional borrowing to manage their inflationary pressures. Nonetheless, despite difficult local and global macroeconomic conditions, monetary authorities in emerging market economies have also introduced their own policy measures.

Table 1: Inflation Rate in ASEAN-5 Countries from 2014 to 2023

Years	Countries				
	Malaysia	**Indonesia**	**Philippines**	**Thailand**	**Singapore**
2014	3.14	6.39	3.60	1.90	1.03
2015	2.10	6.36	0.67	-0.90	-0.21
2016	2.09	3.53	1.25	0.19	-0.53
2017	3.87	3.81	2.85	0.67	0.58
2018	0.88	3.20	5.31	1.06	0.44
2019	0.66	3.03	2.39	0.71	0.57
2020	-1.14	1.92	2.39	-0.85	-0.18
2021	2.48	1.56	3.93	1.23	2.30

| 2022 | 3.38 | 4.21 | 5.82 | 6.08 | 6.12 |
| 2023 | 2.49 | 3.67 | 5.98 | 1.23 | 4.82 |

Source: World Bank

This study focuses on the ASEAN-5 nations—Indonesia, Malaysia, the Philippines, Thailand, and Vietnam emphasizing the significant impact of both domestic and external factors on their inflation dynamics. Inflation poses a particularly complex challenge for these countries, given their varying levels of trade dependence, economic development, and policy frameworks. While inflation trends in these nations reflect global patterns, they also exhibit distinct regional characteristics. Over the past two decades, the ASEAN-5 has undergone significant changes in inflation dynamics, marked by peaks, volatility, and the adoption of inflation-targeting policies, a common practice in emerging economies.

Since the early 2000s, persistent inflationary pressures have impeded the economic growth of these nations. Although the Global Financial Crisis (GFC) was expected to exert strong deflationary forces, monetary adjustments became more challenging after the sharp drop in oil prices in 2014. This is particularly crucial for ASEAN countries, as inflation diminishes purchasing power and drives up general price levels (Yusof et al., 2021). The economic prospects of each ASEAN nation will depend on the impact of national inflation, which can have both positive and negative effects. However, a moderate inflation rate is generally a sign of a healthy economy.

A country's inflation rate is measured by the annual percentage change in the Consumer Price Index (CPI), making it a critical indicator for guiding national economic policy (Dany-Knedlik & Garcia, 2018). In the ASEAN region, all countries experience fluctuations in inflation, impacting the cost of living, economic growth, national spending, and monetary policy decisions. Research consistently highlights that maintaining inflation at manageable levels is key to promoting economic progress, with the primary fiscal goal being to control inflation (Yusof et al., 2021). Furthermore, currency depreciation plays a significant role, as it undermines investor confidence and discourages investment when inflation increases.

Yusof et al. (2021) note that while inflation presents challenges to ASEAN's economic growth, policymakers believe that maintaining a low inflation rate can support the region's economic objectives. When a low inflation rate and stable purchasing power are achieved, economic growth is not adversely affected in the long term. Additionally, the strong two-way relationship between inflation and economic growth helps keep inflation low and stable (Abraham & Camba, 2021). This study, therefore, aims to examine the relationship between inflation fluctuations, indicated by rising overall price levels, and various economic indicators in several Asian countries, including Malaysia, India, Indonesia, Singapore, the Philippines, and Vietnam. Specifically, the study will assess the impact of the unemployment rate, exchange rate, economic growth, money supply growth, and government expenditure on inflation fluctuations.

This paper offers several contributions to the existing literature. First, it expands research on the determinants of inflation by focusing on the ASEAN region. Second, while much of the previous research has been country-specific, such as studies on the Middle East and North Africa (Ghanayem, Downing, & Sawalha, 2023), developing countries (Ghosh, 2023), South Asia (Zakaria, Khiam & Mahmood, 2021) and GCC countries (Kandil & Morsy, 2011), this paper takes a regional approach. Third, past studies have primarily examined the effects of inflation on variables such as GDP (Adaramola & Dada, 2020), FDI (FoEh, Suryani & Silpama, 2020) and exchange rates (Ha, Stocker & Yilmazkuday, 2020), with limited focus on its determinants (Chong, Tang & Yap, 2023). This study builds on these findings by exploring the factors driving inflation fluctuations in the ASEAN region. Notably, there is limited knowledge about the extent to which macroeconomic variables influence inflation determinants. Thus, this paper provides new empirical evidence, highlighting how key internal macroeconomic variables impact inflation rates in ASEAN countries.

The rest of the paper is structured as follows. The next section presents a review of prior research on inflation within the ASEAN region. Following this, the theoretical framework underlying the analysis is discussed, along with the related hypotheses. The third section details the research methodology, including sampling and data analysis procedures. The fourth section presents and discusses the key findings along with additional analyses.

Finally, the sixth section concludes with the study's conclusions, implications, and limitations, and proposes directions for future research.

2. Literature Review

Keynesian Theory of Inflation

According to the Post Keynesian perspective, inflation is driven more by cost factors than by fluctuations in demand. These cost factors include commodity prices, import prices, mark-ups, and wages, which can account for inflation (Bloch, Dockery & Sapsford, 2004). Wage money refers to the compensation a person receives for their work. This theory posits that inflation results from a decrease in aggregate supply. Additionally, four main causes of inflation are identified: diminishing returns, rising profit margins, and an increase in money wages that outpace both productivity and import prices. Diminishing returns lead to higher output costs for firms, arising from the hiring of less skilled and less efficient capital equipment operators. This trend has become a notable phenomenon, significantly contributing to the rise in supply prices before employment (Bloch, Dockery & Sapsford, 2004).

This inflationary trend cannot be halted or altered in the short term if output continues to rise under conditions of diminishing returns. However, it may be mitigated in the long run through improvements in training programs, enhanced capital utilization per worker, and advancements in technology. Profit inflation, on the other hand, focuses on the rise in gross profit margins. It is linked to the overall monopolization of the economy and is not necessarily connected to changes in aggregate demand. Nevertheless, a diminishing price elasticity of demand can lead to increased profit margins alongside output growth (Bloch et al., 2004). Additionally, price-push inflation, also known as administered price inflation, arises from the need to raise the prices of goods to compensate for rising production and labor costs, ultimately aiming for higher profits (Totonchi, 2011).

Wage inflation refers to an increase in wage rates that does not align with productivity gains, while profit margins remain stable. A decrease in unemployment gives workers the leverage to negotiate higher wages than before. In the Post Keynesian perspective, this type of inflation is not linked to changes in the level of aggregate output; instead, the overall wage dynamics within the economy play a significant role in driving inflation. According to Post Keynesian theory, wage inflation is viewed as a primary contributor to overall inflation. Additionally, import inflation can impact the inflation rate within an economy. For instance, if a country's currency depreciates, it can lead to higher import prices, consequently raising the inflation rate. Conversely, an appreciation of the currency may lower import prices and alleviate inflationary pressures. The post-Keynesian theory is often overlooked but deserves more attention for its insights into these dynamics.

Demand-Pull Theory of Inflation

According to John Maynard Keynes, the primary cause of demand-pull inflation is an increase in aggregate demand, which comprises government spending, consumption, and investment. Demand-pull inflation arises when aggregate demand surpasses aggregate supply at full employment. This situation, where full resources are utilized alongside rising prices, is referred to as an inflationary gap. The larger the gap between aggregate demand and aggregate supply, the more rapidly inflation tends to rise. Additionally, a decline in the purchasing power of assets such as money and wages contributes to heightened inflation. Keynes suggests that reducing inflation and demand pressures is an effective policy approach to managing aggregate demand. This can be achieved through measures such as controlling the money supply and increasing taxes on government spending to decrease demand and help control inflation.

Monetary Theory of Inflation

The founders of the monetarist school of thought asserted that "only money matters" and believed that monetary policy is more effective than fiscal policy in stabilizing the economy. According to the theory of monetary inflation, the general price level in an economy is influenced not by the price of goods or the money supply but rather by employment levels and the unemployment rate, especially when the economy has not yet achieved full employment. In the short term, prices can affect output, whereas, in the long term, they do not have the same effect on the money supply. The quantity theory states that "inflation is always and everywhere a monetary phenomenon." Najihah Yusof (2021) analyzed data and concluded that the money supply is the primary driver of inflation in the short term, while the relationship between money growth and inflation is

positively correlated in the long term, aligning with monetarist principles.

This research examined the unemployment rate, exchange rate, economic growth, money supply, and government expenditure as independent variables. The selection of these explanatory variables is based on findings from previous studies.

Unemployment Rate (UNE) and Inflation
Maximova (2015) argued that unemployment and inflation are critical elements of a market economy. Their research examined the relationship between unemployment and inflation in Russia from 1999 to 2007, reflecting the country's economic situation. The results indicated an inverse relationship between unemployment and inflation in Russia, suggesting that these two factors have historically been interconnected. Most economists believe there is a significant negative correlation between inflation and unemployment, meaning that an increase in the unemployment rate tends to result in a decrease in inflation. Similarly, Wulandri et al. (2019) noted that a rising unemployment rate could lead to a reduction in inflation levels and potentially result in a recession.

This research examines the relationship between the unemployment rate and inflation in Indonesia from 1986 to 2018, utilizing a causality method to investigate this connection. The findings reveal a significant negative relationship between the unemployment rate and inflation, indicating that an increase in the unemployment rate leads to a decrease in inflation. In contrast, Tenzin (2019) noted that various studies across different economies have explored the interplay between unemployment, economic growth, and inflation. Their research focused on the relationship between the unemployment rate and inflation from 1998 to 2016, demonstrating a significant positive relationship. Consequently, an increase in the unemployment rate is associated with a rise in inflation.

Additionally, Edvin (2020) identified a correlation between the unemployment rate and inflation in Sweden from 1996 to 2019, using data from the SCB database. The research employed regression tests for analysis. The results indicated a negative relationship between unemployment and inflation during this period, aligning with Phillips's theory. This suggests that low unemployment is associated with high inflation, while high unemployment corresponds to low inflation.

Finally, Omran and Bilan (2021) conducted a comprehensive study on the relationship between unemployment and inflation in Egypt from 1980 to 2019. Their findings revealed a significant negative correlation between Egypt's unemployment rate and inflation, which also supports the classic Phillips curve. This implies that an increase in the unemployment rate may lead to lower inflation rates. Overall, this research indicates a notable negative relationship between the two variables.

Based on the various studies mentioned, it can be concluded that most past research has reported a negative relationship between the unemployment rate and inflation: as the unemployment rate decreases, the inflation rate tends to increase. Thus, the following hypotheses are proposed:

Null Hypothesis (H0): There is no relationship between the unemployment rate and fluctuations in the inflation rate.
Alternative Hypothesis (H1): There is a relationship between the unemployment rate and fluctuations in the inflation rate.

Exchange Rate (EXR) and Inflation
Madesha et al (2013) noted that in a floating exchange rate system, fluctuations in the exchange rate can significantly impact price levels. On the aggregate supply side, a depreciation of the domestic currency can affect the price level directly through the cost of imported goods that domestic consumers purchase. A depreciated exchange rate increases input costs, which in turn raises manufacturing expenses. Consequently, manufacturers are likely to increase the prices of goods that consumers pay. Numerous studies have investigated the relationship between exchange rates and inflation.

Furthermore, Sanam and Fetullah (2017) assessed the critical relationship between exchange rates and

inflation, particularly in emerging economies. Their research found a positive relationship and strong correlation between the two variables, indicating that an increase in the exchange rate can lead to higher prices for imported goods. Similarly, Setiartiti and Hapsari (2019) conducted an empirical study on the relationship between exchange rates and inflation in Indonesia. Their findings demonstrated a positive correlation, suggesting that an increased likelihood of currency depreciation contributes to inflationary pressures. Conversely, a depreciation of the domestic currency could result in lower inflation.

In another study, Charles and Chilaka (2019) analyzed the impact of exchange rates on inflation in Nigeria from 1981 to 2015. They found a positive relationship between the exchange rate and inflation, which contributed to the country's persistent inflation. Therefore, a rising currency value ultimately leads to import inflation and higher prices for imported goods. A recent study by Alieu (2019) examined the relationship between inflation and the exchange rate in Gambia from 1978 to 2016. This research revealed a negative relationship, as fluctuations in Gambia's currency directly influenced import and export pricing. Thus, a decline in the nominal exchange rate tends to result in higher inflation.

Meanwhile, Kayamo (2021) investigated the relationship between inflation and the exchange rate in Ethiopia from 1982 to 2019. The study found a significant negative relationship, indicating that an increase in the exchange rate leads to a decrease in the inflation rate. Based on the various studies mentioned, it can be concluded that most past research has reported a positive relationship between exchange rates and inflation: as the exchange rate rises, inflation tends to increase. Therefore, the following hypotheses are proposed:

Null Hypothesis (H0): There is no significant relationship between the exchange rate and fluctuations in the inflation rate.
Alternative Hypothesis (H1): There is a significant relationship between the exchange rate and fluctuations in the inflation rate.

Economic Growth (GDP) and Inflation
Gokal and Hanif (2004) conducted a study on Fiji, revealing both positive and negative correlations between economic growth and inflation. The authors analyzed time series data from 1970 to 2003 using the Vector Auto-regression Model (VAR). Their findings indicated that, in the short term, inflation negatively impacts economic growth, while in the long term, economic growth positively influences inflation. Stagflation, in economic terms, refers to a scenario where inflation rises while output remains stable or declines.

Next, Khattak, Muhammad and Iqbal (2014) emphasized the need to reassess the key factors contributing to Pakistan's high inflation rate, which adversely affects the overall welfare of its citizens. Their research covered the period from 1980 to 2002, using Johnson's Co-integration model to analyze the data. The results demonstrated a significant positive relationship between income distribution and inflation concerning economic growth. They noted that unequal wealth distribution negatively affects income development and is contingent on per capita economic growth rates.

Furthermore, Dinh (2019) analyzed the relationship between nominal inflation and economic downturns, referencing the theory of monetary quantity. The study examined time series data from 2012 to 2016 and found that most researchers indicated a positive relationship between money supply and inflation in relation to economic growth. However, this relationship is interactive rather than one-dimensional; to achieve high economic growth, some inflation must be accepted. Galloping inflation or hyperinflation can severely hinder economic growth. While inflation often has a significant positive impact on a country's economy, some economies have faced downturns due to inflationary pressures.

Additionally, Panigrahi et al. (2020) investigated the relationship between economic growth and inflation in five ASEAN countries (Malaysia, Indonesia, Thailand, Singapore, and the Philippines) from 1995 to 2018. They employed the Johansen Cointegration Test and Granger's test of causality, concluding that inflation rates are related to economic growth. Specifically, low inflation rates are positively correlated with economic growth, with minimal inflationary effects on growth. The research also suggested that economic growth could be enhanced by lowering interest and inflation rates, prompting economists and policymakers to implement appropriate micro- and macroeconomic measures to influence economic output.

Lastly, Louangrath (2022) examined the challenges posed by inflation on ASEAN economies and its impact on economic growth. This research utilized an autoregressive model to predict inflation and its effects, considering ERPT and Prospect Theory. The findings indicated a negative relationship between the economic growth rate and the inflation rate, based on a time series analysis of ten countries from 2011 to 2022. The study concluded that following the COVID-19 pandemic, inflation does not pose a significant threat to economic growth because the influence of international trade, denominated in US dollars, may not directly affect local economies due to varying currencies and exchange rates.

Based on the various studies mentioned, it can be concluded that most past research has reported a positive relationship between economic growth and inflation, suggesting that if the exchange rate increases, inflation will also rise. The following hypotheses are proposed:

Null Hypothesis (H0): There is no relationship between economic growth and fluctuations in the inflation rate.
Alternative Hypothesis (H1): There is a relationship between economic growth and fluctuations in the inflation rate.

Money Supply (MS) and Inflation
Ovamba and Ouma (2018) assert that monetarists believe the growth rate of the money supply is the main driver of inflation, and a rapid increase in the money supply can lead to a significant rise in inflation. The findings indicate that there is a substantial positive correlation between Kenya's money supply and inflation, with the money supply identified as a key determinant of inflation in the country. Consequently, this research adds to the existing literature by supporting monetarist theory and recommends that the Kenyan government maintain strict monetary policies focused on broad money to control inflation.

Additionally, James, Felican and Robert (2014) identify the primary causes of inflation, according to basic economic principles, as increases in credit and excess money supply. Typically, the implementation of fiscal and monetary policies leads to rising inflation. Thus, the money supply has a direct and significant effect on inflation; a one percent increase in inflation will increase the money supply. Based on their findings, the central bank should avoid manipulating the money supply to create artificially low interest rates in the economy.

Furthermore, Ditimi, Keji and Emma (2018) note that economic theory attributes inflation to growth in the money supply. As the money supply increases, so do the prices of goods and services, particularly when output growth approaches its maximum potential, which tends to create inflationary pressures. Although the money supply in Nigeria showed a negative but insignificant relationship with inflation, the government should consider implementing additional measures that contribute to inflation, such as raising interest rates and domestic fuel prices, to achieve lower inflation rates.

Meanwhile, Md. Nezum, Mohammed and Monir (2019) suggest that excessive money printing and circulation often lead to increased production costs and a decline in currency value. Their research indicates that the money supply does not affect inflation, but rather that there is a significant positive relationship between the two; an increase in money supply will consequently lead to an increase in inflation.

Atif (2021) highlights that numerous theories have been proposed in economic literature to explain inflation. According to Friedman & Schwartz (1963), some scholars advocate the view that "inflation is a purely monetary phenomenon," suggesting that inflation arises from an increase in the money supply. As a result, there is a significant correlation between money supply and inflation, indicating that the money supply drives inflation in Jordan.

Based on the above review, it can be concluded that most past studies have reported a significant positive relationship between money supply and inflation. This supports the notion that an increase in the money supply leads to an increase in inflation. The following hypotheses are proposed:

Null Hypothesis (H0): There is no significant relationship between the money supply and fluctuations in the inflation rate.
Alternative Hypothesis (H1): There is a significant relationship between the money supply and fluctuations in

the inflation rate.

Government Expenditure (GOV) and Inflation
Hasnul (2015) suggests that inflation has a minimal impact on government expenditure. This study analyzes disaggregated government spending in Malaysia, differentiating between operating and development expenditures across various sectors over a 45-year period from 1970 to 2014. Using the Ordinary Least Squares (OLS) technique, the researchers examine the fixed effects of government expenditure on economic growth. The findings indicate a negative correlation between overall government expenditure and inflation in Malaysia during this extensive timeframe. Consequently, an increase in government expenditure may lead to lower inflation rates, demonstrating a significant negative relationship between inflation and government spending.

Similarly, Mehraraa et al. (2016) found that government expenditure did not directly contribute to inflation from 1990 to 2013. Using a Smooth Transition Regression Model, this research investigated the relationship between inflation and government spending. The results revealed a significant negative relationship, indicating that increases in government expenditure have a limited impact on inflation.

In addition, Senawi & Che Sulaiman (2020) stated that government spending significantly contributes to national development across various sectors. This research examined the effects of government expenditure on Malaysia's inflation from 1980 to 2017, employing Descriptive Analysis and the Autoregressive Distributed Lag (ARDL) Model. The findings indicate a significant relationship between the inflation rate and government spending in health, education, transportation, and defense, suggesting that increases in government expenditure in these sectors can lead to higher inflation rates.

Shifaniya (2022) noted that inflationary pressures on the economy stem from rising government expenditure. This research examined the relationship between government spending and inflation in Sri Lanka and India from 1977 to 2019, utilizing the ARDL Co-integration, Bounds test, Error Correction version of the ARDL model, and the Granger Causality test. The findings highlighted a statistically significant positive relationship between government expenditure and inflation in both countries, suggesting that an increase in government spending leads to higher inflation rates, indicating an adjustment toward equilibrium.

Based on the various studies reviewed, it can be concluded that the majority of past research indicates a positive relationship between inflation and government expenditure; as government spending increases, inflation tends to rise as well. The following hypotheses are proposed:

Null Hypothesis (H0): There is no significant relationship between government expenditure and fluctuations in the inflation rate.
Alternate Hypothesis (H1): There is a significant relationship between government expenditure and fluctuations in the inflation rate.

3. Research Methodology

The sample used in this study included inflation rate data spanning 20 years, from 2001 to 2020. This paper employed panel data analysis and incorporated secondary data, which consisted of independent variables such as the unemployment rate, exchange rate, economic growth, money supply, and government expenditure. The study focused on the ASEAN-5 countries, namely Malaysia, Singapore, Thailand, the Philippines, and Indonesia. The data was sourced from the World Bank database, as detailed in Table 2.

Table 2: The Summary of Measurement for Variables

Variables	Proxies	Notations	Measurements	Sources of Measurement
1. Inflation Rate	Customer Price Index (%)	CPI	$\frac{Ct}{C0} \times 100$	The World Bank
2. Unemployment Rate	Unemployment rate (%)	UNE	$\frac{Number\ of\ Unemployed}{Labour\ Force} \times 100$	The World Bank
3. Exchange Rate	Exchange Rate (RM)	EXR	$\frac{Home\ Currency}{Foreign\ Currency}$	The World Bank
4. Economic Growth	Gross Domestic Product (%)	GDP	Y= C+ I + G+ (X-M)	The World Bank
5. Money Supply	Broad Money (M2)	MS	(M2) = M1 +Savings Deposits +Time Deposits +Other Nears - Money Assets	The World Bank
6. Government Expenditure	General government final consumption expenditure (RM)	GOV	G = Y - C - I - (X -M)	The World Bank

4. Results

This section presents the descriptive statistics of the variables related to the inflation rate, based on 20 observations from 2001 to 2020. The descriptive analysis covers inflation (CPI), unemployment rate (UNE), exchange rate (EXR), economic growth (GDP), money supply (MS), and government expenditure (GOV). In addition to the descriptive analysis, Correlation Coefficient Analysis and Static Panel Regression are utilized to examine the relationships between the inflation rate and the independent variables.

Table 3: Descriptive Statistics

	CPI (%)	UNE (%)	EXR (RM)	GDP (RM)	MS (RM)	GOV (RM)
Mean	3.137900	3.571700	2195.803	1.56E+15	6.27E+14	1.43E+14
Maximum	13.11000	8.060000	14582.20	1.58E+16	6.91E+15	1.49E+15
Minimum	-1.140000	0.250000	1.250000	1.61E+11	1.80E+11	1.87E+10
Std. Dev.	2.820221	1.711883	4467.428	3.80E+15	1.52E+15	3.52E+14

Note: CPI= Inflation, UNE= Unemployment Rate, EXR= Exchange Rate, GDP= Economic Growth, MS= Money Supply and GOV= Government Expenditure

As shown in Table 3, the Money Supply (MS) reached its maximum value of RM69,059,400 billion in Indonesia in 2020. According to Bank Indonesia, this peak was largely influenced by the Christmas and New Year celebrations. Overall, the data reflects a significant increase in Indonesia's money supply during December 2020, driven by seasonal factors. In contrast, the Consumer Price Index (CPI) recorded its minimum value of -1.14% in Malaysia for the same year. This low CPI in Malaysia can be attributed to various factors, particularly the effects of the COVID-19 pandemic. 2020 marked a peak year for COVID-19, leading to reduced demand as

movement restrictions and lockdowns curtailed consumer spending, especially in areas like travel, dining, and entertainment. Additionally, the global oil price crash in 2020 significantly lowered fuel costs, which in turn affected transportation and energy-related expenses, contributing to the overall decline in inflation.

The raw data reveals that the highest standard deviation is associated with GDP, which stands at 3.80E+15, with a mean of 1.56E+15. This indicates that the GDP per capita data is widely dispersed across a range of values. The significant difference between the mean, maximum, and minimum GDP per capita values illustrates this variability. Year-to-year fluctuations are substantial, resulting in a high standard deviation. GDP serves as a comprehensive measure of economic activity, encompassing numerous sectors and industries, each with its dynamics and contributions to inflation. This can lead to considerable variations in overall GDP growth, thereby contributing to the elevated standard deviation. Such fluctuations may be influenced by various external factors, including natural disasters or the impact of the COVID-19 pandemic.

In contrast, the unemployment rate variable (UNE) exhibits the lowest standard deviation at 1.711883, with a mean of 3.571700. This suggests that the unemployment rate is closely clustered around the mean, indicating greater reliability of the data. The year-to-year changes are minimal, leading to a smaller standard deviation. This clustering is reflected in the mean, minimum, and maximum values, which demonstrate less variability and fewer extreme values. These findings can be further elucidated by examining the raw data collected for this study.

Table 3: Correlation Coefficient Analysis

VARIABLES	CPI	UNE	EXR	GDP	MS	GOV
CPI	1	0.4747	0.5278	0.2735	0.2763	0.2585
UNE		1	0.5214	0.2970	0.2999	0.2828
EXR			1	0.9094	0.9125	0.9008
GDP				1	0.9980	0.9990
MS					1	0.9979
GOV						1

CPI= Inflation, UNE= Unemployment Rate, EXR= Exchange Rate, GDP= Economic Growth, MS= Money Supply M2 and GOV= Government Expenditure

The correlations among the variables are presented in Table 3, with a cut-off point established at 0.8 for this study. As indicated in the table, most correlation values fall below this threshold, except for those between the exchange rate (EXR) and GDP, EXR and money supply (MS), and EXR and government expenditure (GOV). Specifically, EXR shows a strong correlation with GDP, MS, and GOV, with values of 0.9094, 0.9125, and 0.9008, respectively. Additionally, the correlations between GDP and MS, as well as GDP and GOV, exceed the cut-off point, suggesting a significant relationship with correlation values of 0.9980 and 0.9990. Furthermore, the correlation between MS and GOV is also above the cut-off point, reflecting a strong correlation of 0.9979 between these two variables.

Table 4: Static Panel Regression

DEPENDENT VARIABLE: INFLATION						
	POLS			FEM		
Independent Variables	Coefficient	T-stat	Prob	Coefficient	T-stat	Prob
UNE	-0.807732	-1.762620	0.0818	-0.540131	-1.145203	0.2554
EXR	0.000944	1.248507	0.2155	0.000462	0.659723	0.5112
GDP	24.36059	2.763976	0.0071	27.05872	2.722502	0.0079
MS	7.998627	0.642830	0.5222	6.806860	0.632853	0.5285
GOV	-0.273471	-0.028501	0.9773	2.693719	0.285396	0.7760

R-squared	0.165460	0.142842
Adjusted R-squared	0.071574	0.091821
F-statistic	1.762352	2.799662
Prob (F-statistic)	0.088587	0.021803
Durbin-Watson stat	2.892472	2.743535
Prob (Wald F-statistic)	0.0337	
Wald F-statistic	2.411202	
Redundant Fixed Effect	0.1620	

Note: CPI= Inflation, UNE= Unemployment Rate, EXR= Exchange Rate, GDP= Economic Growth, MS= Money Supply and GOV= Government Expenditure, POLS= Pooled Ordinary Least Square, FEM= Fixed Effect Model, T-stat= T-statistic, Prob= Probability

As shown in the Table above, POLS and FEM reported an adjusted R2 of 7.16% and 9.62% respectively. The adjusted R2 in POLS and FEM indicates that only 7.16% and only 9.62% of the variation in dependent variables can be explained by the independent variable in this study. The remaining 92.84% in POLS and 90.38% in FEM are explained by other independent variables which are omitted from the regression models. The F-statistic of 1.76 and 2.89 for POLS and FEM, respectively indicate that the models are fit as the F-statistics are significant at 10% and 1% respectively level. Both models are also free from autocorrelation and multicollinearity.

Referring to the Redundant Fixed Effect, the likelihood result which explains whether POLS or FEM is the appropriate model indicates that POLS is the best model due to the p-value being 0.1620. Therefore, the Pooled Ordinary Least Square Model is a valid model to explain the "Factors That Influence the Fluctuation of Inflation Rate in Five ASEAN Countries". In conclusion, the estimation of static panel data can be expanded problems arise. In this study, F-statistics has been used to test the null hypothesis which is composed of multiple hypotheses. It shows that the F-statistic is 1.762352 respectively, which indicates that the regression model's fit as the F-statistic is significant at level 0.1 (1%). The table shows that approximately an adjusted r-square is 7.15% of the variation in the model could be explained by the significant variables used in this research. The remaining 92.85% of the variation in the dependent variable was explained by other variables that are not included in this research and omitted from the regression model.

Referring to the p-value (Prob.) at 0.0071, it shows that GDP has a highly significant influence on inflation provided that the threshold value is at 0.01, and the GDP has a confidence level of 99%. Therefore, UNE shows the p-value (Prob.) at 0.0818 also has a high significant influence on inflation value is at 0.1, the UNE has a confidence level of 90%. This can be seen from the regression table, the outcomes show that only $H0_2$, $H0_4$ and $H0_5$ are not supported and will be rejected while $H0_1$ and $H0_3$ are supported. The Wald test is being used to test the null hypothesis that the coefficients of the six regressors in the POL'S equation are all equal to zero. The prob value for the test is 0.0337 and the F-statistic for the Wald test is 2.411202. It shows the null hypothesis was rejected at the 5% significant level. The VIF scores for all five independent variables are less than 5, it is evidence that there is no severe multicollinearity, and they can remain in the panel-data model.

Discussion
Based on the findings, it shows that the p-value (Prob.) for the unemployment rate (UNE) is 0.0818. It significantly supports the proposition of this research that UNE is more influential on inflation at a 10% level making UNE have a confidence level of 90%. Therefore, unemployment rate and inflation are proven to be negatively related with each 1 unit of change on the unemployment rate, inflation will have an inverse effect at 0.807732. Hence, the hypothesis statement (H0) is not to be accepted. From the past study of Maximova (2015), bringing inflation under control is becoming a prior goal. Indicating high unemployment results in low inflation and conversely, low unemployment leads to high inflation and will have an impact on determining the rising price of basic commodities and fuel. However, the significantly high confidence level shows that with policies to bring inflation under control, the demand for goods and services in the economy decreases. As the aggregate demand for goods and services in the economy decreases, the demand for the workforce decreases as well. Using the demand-pull theory inflation can occur when aggregate demand exceeds aggregate supply at full employment.

Next, the economic growth (GDP) is 0.0071 for the p-value (Prob.) significantly which supports the proposition of this research that ECO is more influential on inflation at 1% level that makes UNE have a confidence level of 99%. Therefore, economic growth and inflation are proven to be positively related with each 1 unit of change on the economic growth, inflation will have an effect at 24.36059. This can be seen from the coefficient section in the regression table. Hence, the hypothesis statement (H0) is not to be accepted. Louangrath (2022) shows that an increase in the rate of economic growth means more goods for money to "chase," which puts downward pressure on the inflation rate that influences micro- and macroeconomics. However, based on monetary theory, the unequal income distribution of wealth will affect the development of income and it will depend on the rates of per capita economic growth that can affect inflation.

The exchange rate result for p-value (Prob.) is 0.2155 which is higher than 0.05 and it indicates insignificant with the dependent variable. Therefore, exchange rate and inflation are proven to be positively related with each 1 unit of change on the exchange rate, inflation will have an inverse effect at 0.000944. This can be seen from the coefficient section in the regression table. Hence, the null hypothesis (H0) is accepted. This can be supported by the research by Setiartiti & Hapsari (2019), indicating that the exchange rate has an insignificant effect on inflation. The insignificance also can be caused by a condition when economic pass-through complexities even though the short-term interest rate may encounter significant performance difficulties in monetary policy.

The money supply results for p-value (Prob.) is 0.5222 which is higher than 0.05 and it indicates insignificant with the dependent variable. Therefore, money supply and inflation are proven to be positively related with each 1 unit of change on the money supply, inflation will have an inverse effect at 7.998627. This can be seen from the coefficient section in the regression table. Hence, the null hypothesis (H0) is accepted. According to Ditimi, Keji and Emma (2018), the result shows the money supply's insignificant relationship with inflation in Nigeria. This is because, in Nigeria, the cause of high inflation is raising interest rates and the price of domestic fuel. The positive coefficient can be supported from the demand-pull theory of inflation stating that measures to restrict the money supply and raise taxes on government expenditure can lower demand and control inflation, while reducing inflation and demand pressure is an effective way to lower the aggregate demand component.

The government expenditure results for p-value (Prob.) is 0.9773 which is higher than 0.05 and it indicates insignificant with the dependent variable. Therefore, government expenditure and inflation are proven to be negatively related with each 1 unit of change on the government expenditure, inflation will have an inverse effect at 0.273471. This can be seen from the coefficient section in the regression table. Hence, the null hypothesis (H0) is accepted. This can be supported by the research by Hasnul (2015), revealing a negative correlation between overall government expenditure in Malaysia during this extensive timeframe for the last 45 years. Hence an increase in government expenditure may be resulting in low-rate inflation.

5. Managerial Implications and Recommendations

This research contributed to policymakers' insight into how or what determinants of exchange rate significantly affect the fluctuation of inflation rate in the five chosen countries. This research provides essential insights into the relationship between the significant variables and the dependent variables. For example, there is also a significant and positive relationship between economic growth and inflation. Economic growth has been increasing consistently in Malaysia. The positive relationship indicates that as the economy grows, inflation tends to rise. Policymakers need to be cautious about stimulating economic growth excessively, as it might lead to higher inflation.

This research also serves as a guideline and becomes of significant relevance to investors and financial decision-makers. This information may guide prospective direct investors or companies from Europe or the Middle East seeking to invest in ASEAN countries. Besides that, the positive relationship between the unemployment rate and inflation could have a significant influence on investors. When unemployment rates increase, inflation will rise as well. Investors should consider the economic environment when making investment decisions.

Furthermore, the positive and significant relationship between economic growth and inflation could also contribute to investors' decision-making. When economic growth accelerates, inflation will rise. Investors may interpret a positive relationship between economic growth and inflation as an opportunity for investment. However, they should be mindful of the potential risks associated with higher inflation, such as interest rate hikes.

This research also holds significant relevance in the field of economics because it sheds light on several critical aspects of economics and theory. This is because it allows economists to go through the underlying causes and mechanisms that drive economic growth and inflationary pressures within an economy. For example, if there is a positive relationship between economic growth and inflation, economists can analyze the implications of the positive relationship between economic growth and inflation for long-term economic sustainability. This can inform discussions on the appropriate level of economic stimulus.

Apart from the significance of this research to policymakers, potential investors and economists, this research also contributes to the consumers. This can be explained as the unemployment rate influenced the inflation. There is a significant and positive relationship between the unemployment rate and inflation. Consumers may need to be aware that it can lead to reduced purchasing power. Understanding these economic dynamics can help consumers make informed financial decisions. There is also a positive and significant relationship between economic growth and inflation. Consumers may benefit from economic growth, but they should also be prepared for potential increases in prices. It underscores the importance of financial planning and being aware of inflationary pressures.

As for recommendations, it would be advisable for future researchers to expand their samples of studies to other broader regions such as Southeast Asia to obtain more holistic views of findings, or maybe conduct the study by comparing developed and developing countries. It is also recommended for future research to include other superior panel estimation methods such as the panel generalized method of moments (GMM) method to obtain more robust results and to investigate the variables that might react differently to the fluctuation of the Inflation rate in the ASEAN region.

Conclusion
The objective of this study the factors that influence the fluctuation of the inflation rate in five ASEAN Countries from the year 2001 until 2020. Using the static panel regression model, it found that the unemployment rate and economic growth are significant in the fluctuation of the inflation rate. Independent variables have a positive influence on the CPI, which shows that an increase in the unemployment rate and economic growth will increase the inflation rate. On the other hand, exchange rate, money supply and government expenditure do not have a significant relationship with the inflation rate.

Overall, the results highlight the significance of monetary policy in developing economies when it comes to achieving the goal of stabilizing consumer price inflation. This finding suggests that supply chain pressures create an additional obstacle for central banks in meeting their inflation targets. As a result, it may take longer and potentially require more stringent monetary policy measures to impact consumer prices.

References

Abraham, C. J. C., & Camba, A. L. (2021). The mean-reverting behavior of inflation in the Philippines. *Journal of Asian Finance, Economics and Business*, *8*(10), 239-247.

Adaramola, A. O., & Dada, O. (2020). Impact of inflation on economic growth: evidence from Nigeria. *Investment Management & Financial Innovations*, *17*(2), 1.

Alieu, B. L. (n.d.). The impact of exchange rate on inflation: a case study of the Gambia (1978-2016). *International University College of Turin (IUC), Italy*, *15*(10), 261.

Atif, B. (2021). The nature of the relationship between the money supply and inflation in the Jordanian economy (1980-2019). *Business Perspectives*, *16*(2), 38-46.

Bloch, H., Dockery, A. M., & Sapsford, D. (2004). Commodity Prices, Wages, and Growth in the Periphery: What Can Africa Learn from the Asian Experience? Journal of African Economies, 13(4), 602-635. https://doi.org/10.1093/jae/ejh041

Charles, O. N., & Chilaka, E. N. (2019). The impact of exchange rates on inflation in Nigeria (1981-2015). *Management Studies and Economic Systems (MSES)*, *4*(3), 171-195.

Dany-Knedlik, G., & Garcia, J. A. (2018). Monetary Policy and Inflation Dynamics in ASEAN Economies. IMF Working Papers, WP/18/147. International Monetary Fund. Available at: https://www.imf.org.

Dinh, D., (2019). Analyzed Money Supply and Inflation: Evidence from Vietnam Economy. Advances and Applications in Statistics, 56(2).

Ditimi, A., Keji, S., & Emma-Ebere, O. (2018). The influence of money supply on inflation in Nigeria. *Journal of Economics Management*, *31*(1), 6-23.

Edvin, S., & Kaleb, T. (2020). The relationship between inflation and unemployment in Sweden. *Malardalens Universitet*.

FoEh, J., Suryani, N. K., & Silpama, S. (2020). The influence of inflation level, exchange rate and Gross Domestic Product on foreign direct investment in the ASEAN countries from 2007-2018. European Journal of Business and Management Research, 5(3).

Friedman, M., & Schwartz, A. J., (1963). Money and Business Cycles. Money in Historical Perspective. https://doi.org/10.7208/9780226742298-007.

Ghanayem, A., Downing, G., & Sawalha, M. (2023). The impact of political instability on inflation volatility: The case of the Middle East and North Africa region. *Cogent Economics & Finance*, *11*(1), 2213016.

Ghosh, J. (2023). The social consequences of inflation in developing countries. The Economic and Labour Relations Review, 34(2), 203-211.

Gokal, V., & Hanif, S. (2004). Relationship Between Inflation and Economic Growth. Working Paper. Economic Department Reserve Bank of Fiji.

Hasnul, A. G. (2015). The effects of government expenditure on economic growth: the case of Malaysia. MPRA Paper No. 71254, posted 22 May 2016 14:44 UTC.

Ha, J., Stocker, M. M., & Yilmazkuday, H. (2020). Inflation and exchange rate pass-through. Journal of International Money and Finance, 105, 102187.

Hernández, J. R., Ventosa-Santaulària, D., & Valencia, J. E. (2024). Global supply chain inflationary pressures and monetary policy in Mexico. Emerging Markets Review, 58. https://doi.org/10.1016/j.ememar.2023.101089.

James, E. M., Felican, M., & Robert, E. M. (2014). The effects of money supply on inflation in Tanzania. *Science Publishing Group*, *3*(2), 19-26.

Kandil, M., & Morsy, H. (2011). Determinants of Inflation in GCC. Middle East Development Journal, 3(02), 141-158.

Kayamo, S. E. (2021). Asymmetric impact of real exchange rate on inflation in Ethiopia: a non-linear ARDL approach. *Cogent Economics & Finance*, *9*(1).

Khattak, D., Muhammad, A., & Iqbal, K., (2014). Determining the Relationship between Income Inequality, Economic Growth & Inflation. Journal of Social Economics. 1(3), 104-114.

Louangrath, I., (2022). INFLATION: Challenges and Threats to Economic Growth in ASEAN. The Liberal Arts Journal Faculty of Liberal Arts, Mahidol University. Vol. 5 No. 2 July - December 2022. https://so02.tci-thaijo.org/index.php/lajournal.

Madesha, W., Chidoko, C. and Zivanomoyo, J. (2013) Empirical Test of the Relationship between Exchange Rate and Inflation in Zimbabwe. Journal of Economics and Sustainable Development, 4, 52-58.

Maximova, A. (2015). The relationship between inflation and unemployment: a theoretical discussion about the Philips Curve. *Journal of International Business and Economics*, *3*(2), 89-97.

Md. Nezum, U., Mohammed, J. U., & Monir, A. (2019). Money and inflation nexus in Bangladesh. *Asian Economics and Financial Review*, *9*(6), 702-711.

Mehraraa, M., Behzadi, M. & Rezaei, S. (2016). The Impact of Government Spending on Inflation through the Inflationary Environment, STR approach. *World Scientific News,* 37, 153-167.

Omran, E. A. M., & Bilan, Y. (2021). The impact of inflation on the unemployment rate in Egypt: a VAR approach. SHS Web of Conferences 107, 06009. https://doi.org/10.1051/shsconf/202110706009.

Ovamba, K. E., & Ouma, D., (2018). Effect Of Trade Taxes on Trade Deficit in Kenya. International Journal of Economics, Business and Management Research, 2(5).

Panigrahi, K. S., Azizan, A. N., Sorooshian, S. and Thoudam, P. (2020). Effects of Inflation, Interest, and Unemployment Rates on Economic Growth: Evidence from ASEAN Countries. *ABAC Journal Assumption University*, 40(2).

Sanam, S. M., & Fetullah, A. (2017). The relationship between exchange rate and inflation: the case of Iran.

European Journal of Sustainable Development, *6*(4), 329-340.

Senawi, N. F., & Che Sulaiman, N. F. (2020). The Relationship Between Government Expenditure on Selected Sectors Towards Economic Growth In Malaysia. UMT Journal of Undergraduate Research. 2(3).

Setiartiti, L., & Hapsari, Y. (2019). The determinants of inflation rate in Indonesia. *Jurnal Ekonomi & Studi Pembangunan*, *20*(1), 112-123.

Shifaniya, A. J. F., Hettiarachchi K. H. I. S., Weeraddana, M. N. and Parmila N. S. (2022). The Impact of Government Expenditure on Inflation: Evidence from Sri Lanka and India. Sri Lankan Journal of Banking and Finance. 5.

Tenzin, U., (2019). The Nexus Among Economic Growth, Inflation and Unemployment in Bhutan. *South Asia Economic Journal.* Volume 20, Issue 1. https://doi.org/10.1177/1391561418822204.

Totonchi, J. (2011). Macroeconomic Theories of Inflation. In 2011 International Conference on Economics and Finance Research (pp. 459-462). IACSIT Press.

Wulandari, D., Utomo, H. S., Narmaditya, S. B. and Kamaludin, M. (2019). Nexus between Inflation and Unemployment: Evidence from Indonesia. *Journal of Asian Finance, Economics and Business*, 6(2), 269-275.

Yusof, N., Liya, F. N., Haida, K. M. K., Jamilyn, R. A. T., & Amir, I. Z. (2021). Factors that influence the inflation rate in Malaysia. *International Journal of Academic Research in Business and Social Sciences*, 11(9), 626-637.

Zakaria, M., Khiam, S., & Mahmood, H. (2021). Influence of oil prices on inflation in South Asia: Some new evidence. *Resources Policy*, *71*, 102014.