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The Role of Economic Growth in Containing Inflationary Spiral in Selected ASEAN Countries – Panel Data Evidence from Malaysia, Indonesia, Thailand, and Singapore

Ahmad Ridwan Ahmad Radzi and Abdul Razak Abdul Hadi

ABSTRACT This paper aims to investigate the effect of the gross domestic product growth rate on inflation in these four selected ASEAN countries. This study is worthy as there is a need to understand the variance of national inflation for these ASEAN countries, particularly when Singapore's inflation rate is the lowest among them. The Keynesian Theory and Static Panel Data analysis are put to the test in this empirical study. The investigation is carried out on yearly balanced panel data involving four ASEAN member countries. The secondary data is extracted from the World Bank database over a study period of sixty years from 1961 to 2020. The methodology is based on static panel data analysis involving both Fixed Effect and Random Effect models. The empirical results show that there is a negative significant relationship between economic growth and inflation within the four countries sampled. As such, the policy implication from this study may suggest that it is important for ASEAN-4 governments to continue beefing up their economic growth in order to curb inflationary pressure.

KEY WORDS: inflation, ASEAN, fixed effect, random effect, static panel data.

JEL Classification: G15, F10.

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1. Introduction

Economists have long grappled with understanding the intricate economic interplay between inflation and Gross Domestic Product (GDP) growth. While the broader theoretical framework for this relationship is often viewed through the lens of Keynesian economic theory, empirical studies yield varied insights, emphasizing the complex nature of these dynamics. This research paper seeks to delve deeper into this important economic puzzle, specifically focusing on the relationship between inflation and GDP growth as it unfolds in the context of the ASEAN member countries - Malaysia, Indonesia, Thailand, and Singapore.

According to the Keynesian economic theory developed by John Maynard Keynes (1936), aggregate demand, or the total demand for goods and services, drives economic output and consequently influences inflation. This perspective posits a link between GDP growth and inflation, suggesting that measures to stimulate the economy, such as government spending, can lead to increases in both GDP growth and inflation - a phenomenon known as demand-pull inflation. However, empirical evidence presents a more nuanced picture, with some studies

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indicating a positive correlation, and others suggesting a more intricate relationship influenced by factors such as the stage of economic development and the time period considered (Barro, 1995; Khan & Senhadji, 2001).

The chosen method for this investigation is static panel data analysis, a robust tool that offers the advantages of both time series and cross-sectional analyses (Baltagi, 2008; Hsiao, 2003). Through this approach, we can explore variables that change over time and those that differ across entities, providing a more comprehensive understanding of the inflation-GDP growth nexus.

This study aims to contribute to the ongoing discourse by examining the impact of GDP growth on inflation within the ASEAN quartet, employing static panel data analysis to determine whether there is a fixed effect or random effect in this relationship. By investigating these dynamics within the distinct context of ASEAN, this research seeks to add a layer of depth and specificity to the broader understanding of the interplay between GDP growth and inflation.

There are five sections in this paper. Section 2 provides the literature review on the effect of GDP on inflation. Section 3 describes the estimation method and the tested variables. Section 4 explains the empirical results and section 5 concludes the entire paper.

2. Literature Review

The intricate economic relationship between inflation and Gross Domestic Product (GDP) growth has been a pivotal point of contention among economists for many years. This literature review provides a deep dive into the theoretical framework of this relationship, primarily from a Keynesian economic theory perspective, and also elucidates the use of static panel data analysis in this field of study.

Central to this discourse is the Keynesian economic theory, championed by John Maynard Keynes (1936), which forms the foundation of contemporary macroeconomic theory and policy. This theory calls for government intervention in national economies to manage cyclical economic fluctuations. Keynes (1936) proposes that aggregate demand, representing the total demand for goods and services in an economy, is the principal catalyst of economic output and, consequentially, inflation.

Keynes (1936) further postulates that during economic recessions, a lack of demand could precipitate unemployment. To mitigate this, Keynes endorses fiscal and monetary policy measures which are geared towards stimulating aggregate demand. The same scenario could be seen during the COVID-19 pandemic in Europe that started in early 2020 (Pilinkienė et al, 2021). Khan et al.(2021), Estrada et al. (2021), Rybaczewska et al. (2021) and Liu et al. (2022) point out that the economic impact of Covid-19 on the global financial, commodity, and consumer markets is so devastating that many countries adopt Keynes's approach and even some have resorted to IMF for financial assistance. As Blanchard (2017) expounds, the expansionary fiscal theory inherently suggests a strong correlation between GDP growth and changes in the price level. A spike in government spending aimed at bolstering the economy could cause both GDP growth and the overall price level to escalate. This concept, known as demand-pull inflation, posits that when demand for goods and services outpaces supply, it engenders a rise in prices. Lazarević et al. (2022) provide a viewpoint that excessive credit expansion in emerging market economies during an economic crisis could jeopardize financial stability, which in turn could trigger inflationary pressure in the long run.

Yet, empirical investigations into the link between GDP growth and inflation have yielded mixed results. Some studies such as Bullard and Keating (1995), Barro (1995), and Barro (1997) reveal that there is a positive relationship between these two variables. Others, like the work by Khan and Senhadji (2001), have proposed that the relationship may be more complicated, influenced by variables such as the stage of economic development and the time period considered. There are studies supporting the Keynesian viewpoint, like Sarel (1996) and Krkošková (2021), which find that periods of rapid economic growth can lead to inflation due to either demand pressures or cost-push inflation.

Conversely, Andres and Hernando (1997) together with Bruno and Easterly (1998) suggest a non-linear relationship between inflation and GDP growth, with low levels of inflation accompanying

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increased GDP growth, while high levels of inflation can impede growth. Ghosh and Phillips (1998) produced similar findings in their study of 145 countries. They reveal that a high inflation rate (above 2.5 percent) negatively affects GDP growth. Simply put, the hyperinflation phenomenon could trigger a real decline in GDP growth.

Static panel data analysis, as described by Baltagi (2008), has emerged as a robust and flexible method for investigating the relationship between GDP growth and inflation. This approach combines the strengths of both time series and cross-sectional analyses, enabling researchers to scrutinize variables that change over time and those that differ across entities. Hsiao (2003) emphasizes the benefits of this econometric approach, which include the ability to study individual-specific effects, control unobservable variables, reduce potential bias, and enhance data availability, variability, and efficiency.

Numerous studies investigating the link between GDP growth and inflation have employed static panel data analysis. For instance, Ahortor and Adenutsi (2009) employ this method to explore the inflation-growth nexus in Sub-Saharan African countries, revealing that inflation typically has a significant negative impact on growth.

Based on the past literature, it is evident that the issue of causality between inflation and GDP growth remains unsolved. Most of the literature suggests national inflation has a significant influence on GDP growth. As such, this study takes a different approach by developing the following hypothesis to examine the degree of impact of GDP growth on the inflation rate in the ASEAN-4 countries.

H1: Sustainable economic growth wards off the inflationary spiral in ASEAN-4 countries.

To summarize, while Keynesian economic theory (Keynes, 1936) suggests a positive relationship between GDP growth and inflation, empirical studies in the past offer a variety of perspectives and controversial findings (Barro, 1995; Khan & Senhadji, 2001). Static panel data analysis, a celebrated tool for analyzing theoretical relationships, is considered ideal to beef up our understanding of this economic issue as proposed by Baltagi (2008) and Hsiao (2003).

3. Methodology

This study involves a total of four countries from the ASEAN member countries, namely Malaysia, Indonesia, Thailand, and Singapore. Our focus is on investigating the impact of GDP growth on inflation over a 60-year period starting from 1961 till 2020. The secondary data are extracted from the World Bank database. This study employs two-way static panel data analysis (involving Pooled OLS and Fixed Effect together with Random Effect models) as an estimation tool for the given datasets. This method is chosen because it involves a larger data set with more variability and hence it reduces the problem of multicollinearity in our estimated model.

The deployment of static panel data estimation must be strongly supported by a sound economic theory (Karim et al, 2018). More importantly, this methodological approach can identify and correctly estimate the effects (fixed or random effect) that are not noticeable in both time series and cross-sectional analysis. Since our variable of interest is inflation, we develop a bivariate model to test the relationship between inflation rate and GDP growth. Following the work of Gokal and Hanif (2004) together with Yen and Siok (2015), we present a model that can capture the relationship between the two. Empirically, our research model is reduced to a linear function and expressed as follows:

$$Inflation_{it} = \alpha + \beta 1 GDPgrowth_{it} + \mu_{it} \ldots \quad (1)$$

Where:
α=the intercept of the regression model.
it=i and t are individual and time specific effects respectively
$Inflation_{it}$ = the annual inflation rate
$GDPgrowth_{it}$=the Gross Domestic Product growth rate
β1=the coefficient
μ_{it} : the error term,assumed to be normally distributed.

4. Empirical Findings and Discussion

Looking at Figure 1 below, the inflation rate over the 60-year period in Malaysia is considered quite volatile. Cheng and Tan (2002) assert that the Malaysian economy has experienced episodes of high and low tides of inflation. The highest point was recorded in 1974 at 17.33 percent and it is intrigu-

ing to point out that deflation was detected in 2020 at -1.1387 percent. We can clearly see the declining trend from 2017 through 2020 and deflation in 2020 was associated with the COVID-19 pandemic. It is evident that the inflationary pressure has well managed below 5 percent since 1983.

The inflation landscape in Indonesia is rather extraordinary. As shown in Figure 2 below, the inflation rate over the 60-year period is seen as extremely volatile. The highest inflation rate was recorded in 1966 at 1136.25 percent during civil unrest that took place between 1965 and 1966. It is clear to us that Indonesia has experienced long periods of high inflation and Mankiw et al. (2003) assert that some developing countries have been adapting to this high expectation of inflation over the long haul. There is no period of deflation throughout the 60-year period and the lowest inflation rate was registered in 2020 at 1.92 percent.

From Figure 3 below, the inflation rate over the full sample period in Thailand is considered more volatile than in Malaysia. The highest point was recorded in 1974 at 24.31 percent and the highest deflation rate was detected in 2015 at -0.9004 percent. We can clearly see the inflation rates have been hovering between 0,28 percent and 10 percent since 1982. It is also clear that the inflationary pressure is well managed below 4 percent since 2010.

Similar to Thailand, Singapore's inflation rate over the 60-year period is deemed more volatile than Malaysia's. As shown in Figure 4, the highest point was recorded in 1974 at 22.37 percent and it is interesting to note that deflation was detected two years later in 1976 at -1.84 percent. The pe-

Figure 1
Inflation Rates in Malaysia

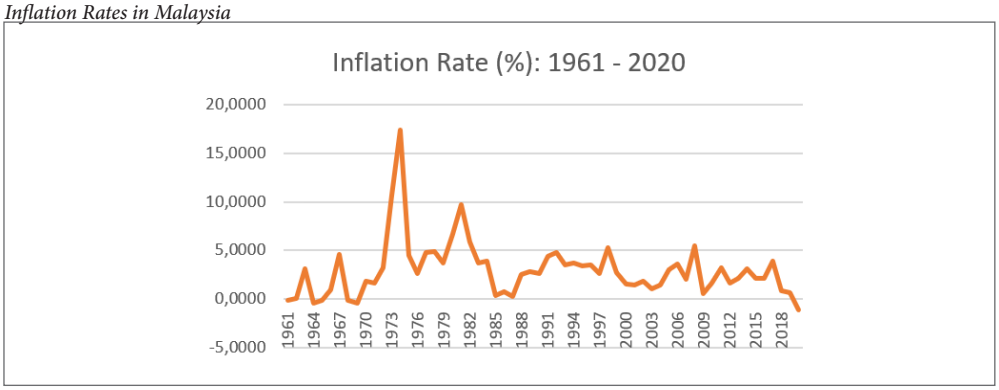
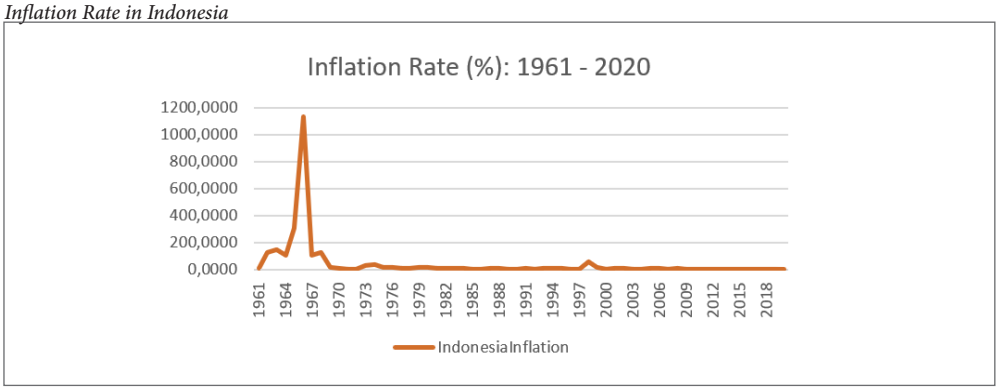


Figure 2
Inflation Rate in Indonesia



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riod between 1970 and 1980 has been a real test for Singapore in fine-tuning its economic policies. It is also evident that Singapore has been successful in containing its inflation rate below the 5 percent level since 1982.

Looking at descriptive statistics of the four ASEAN countries as presented in Table 1, the lowest mean inflation rate among them is Singapore, followed by Malaysia. In terms of variability, the lowest standard deviation in inflation rates goes to Malaysia while Indonesia has the most volatile inflation rate over the full sample period. The Singaporean economy grows at a pace of 7.02 percent on average and this is the highest among the four ASEAN countries over the observed period. It is worth noting that Indonesian economic growth is catching up fast as depicted by its low standard deviation. As suggested by Yen and Siok (2015), GDP growth is one of the key determinants of the inflation rate as it imposes a long-run impact on inflation, particularly in high-inflation countries like Indonesia.

In understanding the degree of association between the two tested variables, the study employs Pearson correlation analysis. The results show a weak negative correlation between the two and the magnitude of the association is rather weak at -0.1037. Also, this correlation coefficient is not significant at the 5 percent level. This result is in line with Gokal and Hanif's (2004) on their study on Fiji's economy.

The static panel data analysis is carried out in phases in which the process involves a number of significance tests. Then, the test results are presented and carefully evaluated. The first investiga-

Figure 3
Inflation Rate in Thailand

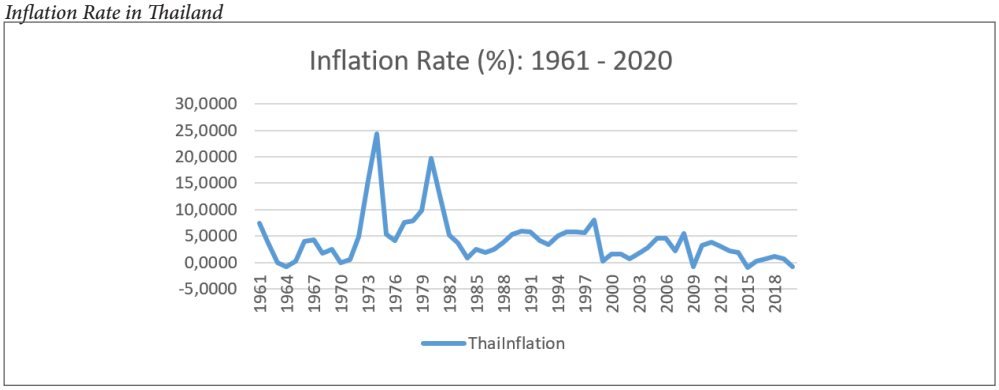
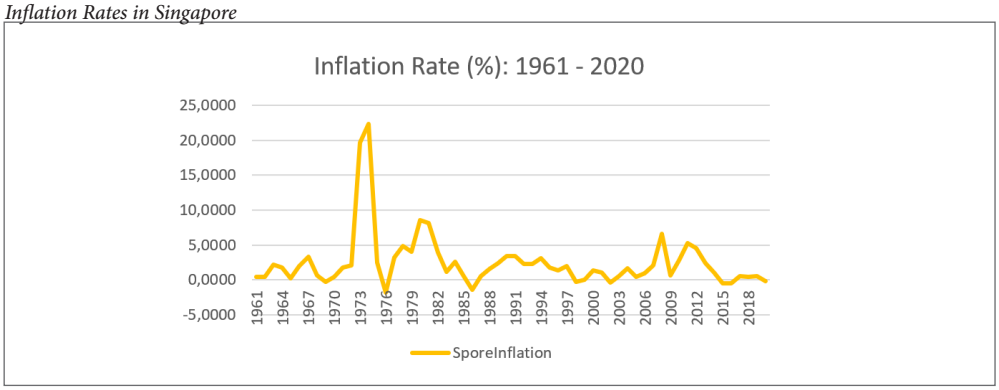


Figure 4
Inflation Rates in Singapore



tion is on the F test and its null hypothesis stipulates that Pooled OLS is a credible model. Based on Table 3, the F Test for no Fixed Effect is used to determine the credible choice between Pooled OLS and Fixed Effect model. The hypothesis testing in Table 3 clearly indicates that the p-value is greater than the 10 percent level. This implies that the null hypothesis can be rejected and therefore the presence of the Fixed Effect model is confirmed in this analysis.

Table 4 provides information on the parameter estimates from the Fixed Effect model. We can see here that the GDP growth rate significantly influences the inflation rate within the four ASEAN member countries. Any increase in GDP growth could potentially curtail inflation pressure in those countries. The p-value for the independent variable is exceptionally low at 0.0012 and hence the negative relationship between GDP growth and inflation rate is statistically significant. This finding is consistent with the work of Khan and Senhadji (2001) on industrial and developing countries, as well as Aurangzeb and Haq (2012). Their results imply that there is a significant negative relationship between inflation rate and GDP growth. On the contrary, Abu (2019) argues that there is a trade-

Table 1
Descriptive Statistics of Inflation Rates and GDP Growth (1961-2020)

Country	Variable	Mean	Maximum	Minimum	Median	Std Dev
Malaysia	Annual Inflation Rate (%)	2.96	17.33	-1.14	2.65	2.92
	Annual GDP Growth (%)	6.12	11.70	-7.36	6.36	3.62
Indonesia	Annual Inflation Rate (%)	43.97	1136.25	1.92	9.42	151.74
	Annual GDP Growth (%)	5.13	10.92	-13.13	5.72	3.43
Thailand	Annual Inflation Rate (%)	4.17	24.31	-0.90	3.50	4.63
	Annual GDP Growth (%)	5.73	13.29	-7.63	5.62	3.89
Singapore	Annual Inflation Rate (%)	2.47	22.37	-1.84	1.69	4.03
	Annual GDP Growth (%)	7.02	14.53	-5.39	7.51	4.46

Table 2
Pearson Cross-Correlation Matrix

Variables (N=240)	Annual Inflation Rate	Annual GDP Growth
Annual Inflation Rate	1.00	-0.1037
P-value		(0.1088)
Annual GDP Growth	-0.1037	1.00
P-value	(0.1088)	

Table 3
F Test for no Fixed Effect

F Test for No Fixed Effect H_0: No fixed effect and pooled OLS is accepted H_1: The presence of fixed effect			
Num DF	Den DF	F Value	Pr > F
62	176	1.35	0.0668*

Note: *significant at 10%

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off between inflation and economic activities in Nigeria. His study indicates that higher unemployment rates (i.e. lower economic growth) would worsen inflationary expectation in the long run.

Table 5 reports the result of the Breusch Pagan test and this test is performed to examine the presence of either Pooled Effect or Random Effect in the static panel data model. Obviously, the low p-value suggests acceptance of alternative hypothesis and it is now clear to us that the Random Effect becomes the preferred choice. Moving ahead, our empirical model is further estimated using Wallace and Hussain Variance Components methodology, and their results are shown in Table 6.

Table 6 summarizes the test statistics from Wallace and Hussain estimation method, and it is quite a surprise to see low R^2 of 0.0082 on the model. Technically, the low R^2 may not warrant a desirable goodness of fit for this estimated model. In fact, the R^2 in this model is expected to take a high value as the panel data is more time-series dominant. As we can see in Table 6, the p-value from the Hausman test is 0.0023 which is less than the 5 percent level. This strongly suggests that the null hypothesis is rejected and therefore the presence of Fixed Effect is confirmed once again.

Table 7 above presents the results from our panel data econometric model. Once again we specify that the outcome variable is the inflation rate while the predictor is the GDP growth rate. The p-value for the predictor is moderately high at 0.1607 and this is much higher than α of 5 percent. Although there is a negative relationship between GDP growth and the inflation rate, the test of hypothesis points out that the GDP growth is not a significant determinant of the inflation rate within the four countries sampled. These findings are not in line with those reported by Khan and Senhadji (2001) as well as Baharumshah et al. (2016); they suggest that GDP growth is a significant determinant of the inflation rate in most of the developing countries.

Table 4

Parameter Estimates from Two-Way Fixed Effect Analysis

The Panel Procedure
Fixed Two-Way Estimates
Dependent Variable: Inflation (Annual Inflation in %)

Parameter Estimates
Dependent Variable: Inflation Rate (Annual Inflation in %)

Variable	DF	Estimate	Standard Error	t Value	Pr > |t|	Label
Intercept	1	-47.3058	39.6011	-1.19	0.2339	Intercept
GDPGrowth	1	-7.4979	2.2693	-3.30	0.0012**	Annual GDP Growth in %

Note: **Significant at 5%

Table 5

Breusch Pagan Test

Breusch Pagan Test for Random Effect (Two-Way)
H_0: Accept Pooled OLS
H_1: Accept Random Effect

DF	m Value	Pr > m
2	6.61	0.0367**

Note: **significant at 5%

Table 6

Wallace and Hussain Random Two Effects

The Panel Procedure
Wallace and Hussain Variance Components (Two-Way)
Dependent Variable: Inflation (Annual Inflation in %)

Model Description	
Estimation Method	Random Two
Number of Cross Sections	4
Time Series Length	60
Fit Statistic:	
SSE	1338733.898
MSE	5624.9323
R-Square	0.0082
Variance Component Estimates	
Variance Component for Cross Sections	281.4213
Variance Component for Time Series	136.5861
Variance Component for Error	5624.235

Hausman Test for Random Effects

H_0: Random Effect Exist

H_1: Presence of Fixed Effect

Coefficients	DF	m Value	Pr > m
1	1	9.28	0.0023**

Note: **significant at 5%

Table 7

Parameter Estimates from Wallace and Hussain Model

The Panel Procedure
Wallace and Hussain Variance Components (Two-Way)
Dependent Variable: Inflation (Annual Inflation in %)

Parameter Estimates
Dependent Variable: Inflation Rate (Annual Inflation in %)

Variable	DF	Estimate	Standard Error	t Value	Pr > |t|	Label
Intercept	1	24.3431	12.5154	1.95	0.0529	Intercept
GDPGrowth	1	-1.82443	1.2967	-1.41	0.1607	Annual GDP Growth in %

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5. Conclusion

This paper is motivated by the need to look into the question as to whether GDP growth could exert some significant influence on inflationary pressure in the ASEAN-4 countries over the past 60 years. Using the Keynesian Income model as underpinning theory together with yearly balanced panel data from 1961 till 2020, our empirical results show that there is a significant negative relationship between economic growth and inflation within the four countries sampled. In particular, an increase in economic growth could reduce the expectation of inflation over time and this result is consistent with the work of Khan and Senhadji (2001) on industrial and developing countries. Our study also has considerable policy relevance. It is imperative for ASEAN-4 governments to understand the importance of GDP growth and stay focused on supporting the growth momentum in order to curb inflationary pressure. It is also commendable for each government to consider inflation targeting as a primary goal of policies planning and implementation so as to achieve sustainable GDP growth over time (Hussain, 2007; Iyke & Ho, 2019; Banelienė, 2022).

Our empirical findings are in line with the previous studies for developing countries. However, the two tested variables here may not be satisfactory to test their empirical relationship. Hence, this study can be extended by incorporating more variables of interest in the model, such as foreign exchange rates and unemployment rate. From the panel procedure, we can see the coefficients of determination is too low and it should be higher due to the number of time series length is greater than cross-sectional series. Further research should also consider other estimation methods like the Generalized Method of Moments (GMM) for measuring parameter estimates. Finally, it is also worthwhile for future researchers to include more ASEAN member countries in the sample, particularly the Philippines and Vietnam.

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