

# Revisiting the Inflation–Growth Nexus: Evidence from Malaysia Using OLS Estimation

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## ABSTRACT

This research investigates the influence of inflation on economic growth, with particular focus on developing economies. Previous studies reveal that the relationship between inflation and growth is not uniform but instead varies depending on the country context and time period under review. Evidence from developing European nations shows that inflation exerts a slight negative impact on growth, whereas research conducted in Pakistan highlights a significant adverse effect of inflation on economic growth in both the short and long run. Conversely, another study covering the period 1980–2018 in Pakistan reported no meaningful effect of inflation or unemployment on economic performance. Given these mixed and sometimes contradictory findings, this study adopts a time series approach to explore the dynamics between inflation and economic growth, with Gross Domestic Product (GDP) employed as the dependent variable. The analysis relies on the Ordinary Least Squares (OLS) estimation technique, implemented through EViews software. To capture the relationship in greater detail, a semi-log linear regression model was utilized, incorporating inflation, interest rate, government consumption, and trade openness as explanatory variables. Additionally, robustness checks and the Ramsey RESET test were conducted to validate the stability and proper specification of the model. The empirical outcomes suggest that inflation exerts a substantial positive effect on economic growth, reinforcing the ongoing debate on macroeconomic stability and balanced policy intervention. Overall, the study underscores the importance of effective inflation management as a prerequisite for sustaining long-term economic growth in developing nations.

**Keywords:** Inflation, Interest rate, Exchange rate, Investment, Trade Openness, Government spending  
**JEL Classification:** F14, F21, F43, F62

## INTRODUCTION

Inflation has long been regarded as one of the most influential macroeconomic variables, with wide-ranging implications for both short-term stability and long-run growth. Classical and neoclassical perspectives generally predict that sustained inflation undermines economic output by distorting price signals, reducing purchasing power, and discouraging investment. Yet, recent empirical findings suggest that this relationship is more nuanced, shaped by the level of inflation, its volatility, and country-specific economic structures.

Evidence from the European Union (EU) between 2000 and 2023 illustrates this complexity. Pappas and Boukas (2025) report that inflation rates alone do not directly constrain GDP growth; instead, it is inflation uncertainty reflected in volatile price expectation that exerts a persistent drag on economic performance. Moreover, their analysis shows that higher interest rates, often used to counter inflation, may harm growth by tightening financial conditions without delivering proportional gains in price stability. This aligns with broader global evidence that stabilizing expectations may matter as much as lowering inflation itself.

The experience of emerging economies adds another layer to this debate. In Indonesia, (Meliza, 2024; Ismail, N.F. & Ismail, S, 2021) finds that inflation had a significantly negative long-term effect on economic growth

between 2012 and 2021, primarily by eroding purchasing power and stalling productive activity. Crucially, her study highlights the moderating role of electronic money transactions: as digital payment adoption increased, the adverse effects of inflation were dampened, suggesting that digital finance can strengthen resilience against inflation-driven slowdowns.

A threshold effect has also been identified in inflation-targeting nations. Ekinici, Tüzün, and Ceylan (2020) show that moderate inflation, up to about 4.2 percent, may support growth marginally, but beyond this point the relationship turns negative each additional percentage point of inflation above the threshold reduces growth significantly. This nonlinear evidence underscores the importance of striking a balance between preventing runaway inflation and avoiding excessively tight monetary conditions.

Recent global research further supports the importance of managing inflation uncertainty. Haa (2024) demonstrates that rising uncertainty around inflation expectations can depress investment and slow growth, particularly in economies with volatile price environments. Similarly, a VoxEU (2024) analysis notes that even as headline inflation in advanced economies eases, lingering uncertainty continues to weigh on consumption and investment. The OECD (2025) likewise cautions that while inflation is projected to moderate, persistently high rates combined with restrictive monetary policies risk curbing growth by eroding real incomes and raising borrowing costs. Consistent with these findings, the IMF's *World Economic Outlook* (2023) emphasizes that although inflation pressures are receding, policy tightening remains a key factor restraining global growth momentum.

Taken together, this body of evidence suggests that the link between inflation and growth cannot be reduced to a simple negative correlation. Rather, it depends on the level and volatility of inflation, the credibility of policy frameworks, and the degree of financial innovation within an economy. For policymakers, the challenge lies not only in targeting low inflation but also in managing expectations, fostering resilience through digital and financial systems, and avoiding overly restrictive measures that may jeopardize long-term economic expansion.

## LITERATURE REVIEW

Inflation has long been recognized as a critical macroeconomic variable influencing economic growth, with much of the debate centring on its threshold effects. According to Anochiwa and Maduka (2015), the ability of monetary authorities to maintain single-digit inflation enhances growth. However, the Nigerian experience contradicts this assertion. Statistics from the Central Bank of Nigeria (2018) reveal that between 1980 and 2018, Nigeria experienced single-digit inflation in only 14 out of 38 years. This persistent double-digit inflation reflects a failure of both monetary and fiscal policy, often aggravated by repeated fuel price hikes such as the increase to ₦97 per litre in 2012 and ₦145 per litre in 2016—that amplified inflationary pressures and escalated the cost of living (Idris & Suleiman, 2019).

The relationship between inflation and growth has been widely studied across regions. Fischer (1993), as highlighted by Bick (2010), was among the first to show that the relationship is non-linear: while moderate inflation can stimulate growth, high inflation undermines it. Fischer identified an 8 percent inflation threshold, below which inflation enhances growth and above which it becomes harmful, a result reaffirmed by Dammak and Helali (2017) across 87 countries (1970–1990).

Subsequent research has produced varying thresholds depending on income level and regional context. Ndoricimpa (2017), analyzing 47 African countries (1970–2013), reported thresholds of 9 percent for low-income and 6.5 percent for middle-income countries, with a combined cut-off at 6.7 percent. Thanh (2015), using the Panel Smooth Transition Regression (PSTR) model on five Asian countries (1980–2011), estimated a threshold of 7.84 percent. Similarly, Eggoh and Khan (2014), employing PSTR and GMM, confirmed the non-linear nexus. Espinoza, Leon, and Prasad (2010), through Logistic Smooth Transition Regression (LSTR) across 165 countries, suggested a global threshold near 10 percent, while the Reserve Bank of India (2014) estimated narrower bands of 4.6–6.7 percent, later underpinning India's flexible inflation-targeting framework.

Recent evidence continues to refine these findings. Chu, Sek, and Ismail (2022) applied a PSTR model to EU, ASEAN, and African countries and found distinct thresholds: about 4.17 percent for EU economies, 6.02 percent

for ASEAN, and between 0.94 and 14.5 percent for African countries, highlighting strong regional heterogeneity. In Vietnam, Tung and Thanh (2015) estimated a 7 percent threshold, while in Indonesia, Kusumatriana, Sugema, and Pasaribu (2023) found nonlinear effects with thresholds of 9.59 percent under normal conditions and 5.22 percent when excluding structural breaks. This suggests that stability and structural context shape the tolerable level of inflation.

Beyond threshold levels, the uncertainty of inflation has emerged as a critical determinant of growth outcomes. Mandeya et al. (2022) argue that inflation volatility disrupts long-run growth trajectories, while a South African study (1961–2019) confirms that inflation uncertainty exerts short-run negative effects on output even when inflation is relatively stable. On a global scale, the Federal Reserve (2025) warns that heightened inflation uncertainty transmitted across borders complicates investment planning and undermines growth prospects. Likewise, Aslam (2023) shows that emerging economies are more vulnerable to inflationary impacts of uncertainty shocks than advanced economies, reflecting structural differences in resilience.

Monetary factors further complicate the inflation–growth nexus. Aslam (2016), studying Sri Lanka (1959–2013), found money supply to positively influence growth, while Gatawa, Abdulgafar, and Olarinde (2017) reported that in Nigeria (1973–2013), money supply, interest rates, and inflation jointly exert negative effects on output. These contrasting findings underscore country-specific institutional and structural conditions.

Taken together, the literature consistently establishes that the inflation–growth nexus is non-linear, with thresholds typically ranging from 4 to 10 percent depending on region, income status, and institutional context. Moderate inflation may stimulate consumption and investment, but persistent inflation beyond the threshold reduces purchasing power, heightens uncertainty, and hinders growth. Nigeria’s experience exemplifies this latter case, where prolonged double-digit inflation, driven by structural weaknesses and policy failures, has constrained economic performance (Anochiwa & Maduka, 2015; Idris & Suleiman, 2019). Consistent with prior evidence, this study applying the OLS model for Nigeria (1970–2023), finds that inflation exerts a negative impact on growth, particularly when it exceeds the identified threshold levels.

The structure of the paper is as follows: the first section provides a review of existing literature, highlighting empirical studies on the link between inflation and economic growth. The second section describes the research materials and methodology applied. The third section presents the theoretical framework, the dataset, and the econometric methods adopted. This is followed by the presentation of empirical results, while the final section concludes with key insights and policy recommendations drawn from the study.

## DATA AND METHODOLOGY

This study employs annual time series data for Malaysia covering the period 1970 to 2023. Malaysia serves as an appropriate case study given its sustained record of economic growth and the availability of reliable macroeconomic data. The dependent variable is the real GDP growth rate (GDPG), measured as the annual percentage change in real Gross Domestic Product. The primary independent variable of interest is the inflation rate (INF), expressed as the annual percentage change in the consumer price index (CPI).

To capture a more robust macroeconomic environment and control for confounding effects, three additional explanatory variables are incorporated into the model:

- Interest rates (IR): representing the cost of borrowing and a proxy for monetary policy stance.
- Gross fixed capital formation as a percentage of GDP (GFCFA): reflecting the level of capital investment in the economy.
- Total reserves (TRO): capturing external buffer capacity and stability in international markets.

Data were obtained from authoritative sources, including the World Bank, Bank Negara Malaysia, and other reputable global macroeconomic databases. The dataset was downloaded in CSV format, cleaned, arranged chronologically, and imported into EViews 12 for econometric analysis. To address issues of heteroscedasticity and non-normal distributions, all independent variables (INF, IR, GFCFA, and TRO) were transformed into their

natural logarithmic forms ( $\ln INF$ ,  $\ln IR$ ,  $\ln GFCA$ ,  $\ln TRO$ ). This transformation also facilitates interpretation of the estimated coefficients in terms of elasticities, ensures linearity in parameters, and often improves forecasting accuracy. The dependent variable ( $GDPG$ ) was retained in its original percentage form, as it is already scaled and interpretable.

The empirical model is specified in a semi-logarithmic functional form:

$$GDPG_t = \beta_0 + \beta_1 \ln INF_t + \beta_2 \ln IR_t + \beta_3 \ln GFCA_t + \beta_4 \ln TRO_t + u_t \quad (1)$$

where  $GDPG_t$  is the real GDP growth rate,  $\ln INF_t$ ,  $\ln IR_t$ ,  $\ln GFCA_t$ , and  $\ln TRO_t$  are the natural logarithms of the respective explanatory variables,  $\beta_0$  is the intercept,  $\beta_1 \dots \beta_4$  are the coefficients, and  $u_t$  represents the error term assumed to follow the classical linear regression assumptions.

The estimation technique employed is Ordinary Least Squares (OLS) regression, chosen for its effectiveness in modeling linear relationships in time series data. Prior to estimation, the series were subjected to unit root tests to ensure stationarity, and data plots were used for visual inspection of trends. After estimation, a series of diagnostic tests were performed to validate the robustness of the model, including:

1. Linearity: Verified using residual plots.
2. Normality: The Jarque–Bera test, with a p-value above 0.05 indicating normally distributed errors.
3. Homoscedasticity: Assessed using the Breusch–Pagan and White tests.
4. Multicollinearity: Examined through Variance Inflation Factors (VIF), with values below 5 considered acceptable.
5. Autocorrelation: Tested with the Durbin–Watson statistic, where a value close to 2 indicates no serial correlation.
6. Model Specification: Evaluated using the Ramsey RESET test to ensure no omitted variables or neglected non-linearities.

The hypotheses for each explanatory coefficient are specified as follows:

$H_0: \beta_i = 0$  (no significant effect)

$H_1: \beta_i \neq 0$  (significant effect)

From an economic perspective, the expected signs of the coefficients are:

1.  $\beta_1 < 0$ : Higher inflation is anticipated to hinder economic growth by reducing purchasing power, discouraging investment, and creating uncertainty.
2.  $\beta_2 < 0$ : Higher interest rates are expected to dampen growth through higher borrowing costs.
3.  $\beta_3 > 0$ : Greater capital formation should enhance productivity and stimulate growth.
4.  $\beta_4 > 0$ : Larger reserves are associated with stronger external stability and increased investor confidence.

Through this structure, the study seeks to empirically evaluate the impact of inflation on Malaysia's economic growth while accounting for key macroeconomic variables. The results are expected to provide evidence-based insights for macroeconomic policy formulation.

## RESULTS AND DISCUSSION

The research focuses on detecting the correlation between inflation and economic growth in Malaysia. This can be further explained where the case is about the impact of inflation on economic growth and on how it relates to



the application of the Ordinary Least Squares (OLS) regression method under semi-logarithmic functional form. In this case, the dependent variable is the GDP growth rate, and the independent variables include inflation, interest rate, gross fixed capital formation (investment) and trade openness. Table 1 shows the empirical results of the regression equation over the period 1970-2023.

Table 1: OLS regression, dependent variable is the annual GDP growth rate,  $GDPG_t$

Variable	Coefficient	Std. Error	t-statistic	P-value
Constant	-7.837745	6.819884	-1.149249	0.2560
$\ln INF_t$	2.968822	0.747637	3.970941	0.0002***
$\ln IR_t$	-0.979162	0.623978	-1.569224	0.1230
$\ln GFCA_t$	4.395105	0.556855	7.892731	0.0000***
$\ln TRO_t$	0.570866	1.089359	0.524038	0.6026
$R^2$	0.666337			
F-statistic	24.46365			
Prop(f-statistic)	0.000000			
Durbin-Watson stat	1.513500			

Note. Data labeled with \*\*\*, \*\*, \* are significant at 1%, 5%, and 10% respectively.

The regression equation as specified in table 1 can be written as:

$$GDPG_t = -7.837745 + 2.968822 \ln INF_t - 0.979162 \ln IR_t + 4.395105 \ln GFCA_t + 0.570866 \ln TRO_t$$

The specification of the model above indicates that GDP growth in Malaysia is influenced by four main independent variables, which is inflation (INF), interest rate (IR), gross fixed capital formation (GFCA), and trade openness (TRO). This shows that each coefficient represents the elasticity of GDP growth with respect to its corresponding variable, as the model uses a semi- log form (INX). This means that a 1% change in an independent variable leads to a  $\beta$  % change in GDP growth, holding other variables constant.

The results produced in the table 1 significantly support our assumption where INF significantly increases the GDP growth rate in Malaysia. This can be proven by starting with  $\beta_1$ , inflation. As inflation ( $\ln INF_t$ ) has a positive and statistically significant impact on GDP growth. The coefficient for inflation is 2.968822, and it is statistically significant with a p-value of 0.0002. This means that if inflation increases by 1%, holding other variables constant, economic growth is expected to increase by approximately 2.97%. While this positive relationship may appear contrary to traditional expectations, it suggests that inflation during the study period may have reflected healthy demand or been managed within a productive economic environment, potentially stimulating output and growth.

Furthermore, the coefficient for  $\beta_2$ , interest rate ( $\ln IR_t$ ) is -0.979162. This shows that it is not statistically significant at the 5% level (p-value = 0.1230). This implies that although a 1% increase in interest rates is associated with a 0.98% decrease in economic growth, the relationship is not strong enough statistically to confirm a definitive impact in this model.

Meanwhile, the coefficient for  $\beta_3$ , gross fixed capital formation ( $\ln GFCA_t$ ) is 4.395105. Thus, it shows statistically significant (p-value = 0.0000). This indicates that a 1% increase in investment is associated with a 4.40% increase in economic growth, assuming other factors remain constant. This strong positive impact reinforces the importance of investment in physical capital such as infrastructure, equipment and technology in driving Malaysia's long- term economic performance.

Similarly,  $\beta_4$  trade openness ( $\ln TRO_t$ ) has a coefficient of 0.570866, indicating that a 1% increase in trade openness may lead to a 0.57% increase in GDP growth, when other variables are held constant. However, with a p-value of 0.6026, this effect is also not statistically significant. Although the direction of the relationship aligns with economic theory that openness supports growth, the result suggests that trade may not have had a consistent or strong direct influence on growth during the years observed.

Finally, the estimated model shows an R-squared value of 0.6663, indicating that about 66.63% of the variation in GDP growth can be explained by inflation, interest rate, gross fixed capital formation, and trade openness. The F-statistic of 24.46 with a p-value of 0.0000 confirms that the overall model is statistically significant.

In summary, the regression results show that inflation and investment have a statistically significant and positive effect on Malaysia's economic growth, while interest rates and trade openness do not exhibit statistically significant effects within this model. These findings highlight the dominant role of capital investment in driving growth and suggest that inflation, under certain conditions, may coincide with periods of economic expansion.

Table 2: Normality test for the disturbance term

Null Hypothesis: $GDPG_t$ is normally distributed	
Alternative Hypothesis: $GDPG_t$ is not normally distribute	
Mean	3.78e-15
St. Dev	2.202297
Jarqu-Bera	0.514704
p-value	0.773096

As can be seen from table 2, the results show a mean of 3.78e-15, which is extremely close to zero. This is ideal, as a mean near zero indicates that the residuals are centred properly around the regression line. The standard deviation is 2.2023, which measures how spread out the residuals are from the mean. A moderate standard deviation such as this suggests that while some variation exists, it is within a reasonable range and does not indicate abnormal dispersion.

The Jarque-Bera statistic is 0.5147, a very small value, indicating that the skewness and kurtosis of the residuals do not differ much from a normal distribution. Most importantly, the p-value is 0.7731, which is well above the 5% significance level ( $\alpha = 0.05$ ). As a result, we fail to reject the null hypothesis, meaning there is no statistical evidence that the residuals deviate from normality.

In summary, the residuals from the regression model can be considered normally distributed, as supported by the low JB statistic, the high p-value, and supporting summary statistics. This finding confirms that the normality assumption for OLS is met, making the model suitable for reliable inference and hypothesis testing.

Table 3: Breusch-Godfrey serial correlation LM test

Null Hypothesis: No serial correlation up to 2 lags			
F-statistic	1.536646	Prob. F (2,47)	0.2257
Obs*R-squared	3.314298	Prob. Chi-Square (2)	0.1907

Breusch-Godfrey, Serial Correlation LM test was conducted to check for autocorrelation in the model residuals at up to 2 lags. Both an F-statistic, 1.5366, p-value is 0.2257 and an Obs\*R-squared statistic, 3.3143 and p-value Chi-Square is 0.1907 were employed to check the null hypothesis of no serial correlation. Both p-values are greater than the usual 0.05 significance level, we fail to reject the null hypothesis, indicating no serial correlation between residuals at lag 1 or lag 2. Such a low R-squared level of 0.0614 in this auxiliary regression clearly demonstrates that the lagged residuals do not account for much of the variation in current residuals. While the Durbin-Watson statistic of 4.8326 might at first reading suggest potential autocorrelation problems, the more powerful Breusch-Godfrey test overpowers this indication. The results our group has collectively demonstrate that the model's residuals are not autocorrelated, validating that ordinary least squares estimation for this regression is valid. The absence of serial correlation suggests the OLS estimators remain efficient and standard errors are unbiased, requiring no adjustment through adding lagged variables or heteroskedasticity-autocorrelation consistent standard errors.

Robust test procedures were conducted to confirm reliability and accuracy of the regression model, namely, the absence of autocorrelation in residuals. Autocorrelation happens when error components within a regression model are related over time, and this does not comply with the fundamental assumptions of the Ordinary Least

Squares (OLS) model. Even though OLS estimators are unbiased when there is autocorrelation, the standard errors might not be consistent thus, giving inappropriate statistical inferences. The Breusch-Godfrey Serial Correlation LM Test was necessary to cover this issue as it is far more flexible than the Durbin - Watson test and it enables the presence of serial correlation to be detected at higher-order lags.

Both p-values are larger than 0.05, thus we shall not reject the null hypothesis. With that, there is no evidence of serial correlation among model residuals. Further, the regression output had Durbin-Watson statistic of 1.5135, that is nearer ideal of 2. This leads to another finding that autocorrelation concern is not a problem in this model.

Table 4: Breusch-Godfrey test

Test Statistic	Value	P-Value	Decision
<b>F- statistics</b>	1.5366	0.2257	Fail to reject the null ( $H_0$ )
<b>Obs*R-squared</b>	3.3143	0.1907	Fail to reject the null ( $H_0$ )

$H_0$ : (Null Hypothesis): There is no serial correlation in 2 lags

$H_1$ : (Alternative Hypothesis): There is serial correlation

Both p-values are above 0.05 and hence we do not reject the null hypothesis thus there is no evidence of presence of serial correlation in the model residuals. Also, the result of the Durbin- Watson statistics in the regression output was 1.5135, almost near to the perfect value of 2. This also justifies the conclusion that there is no issue of autocorrelation in this model. The lack of autocorrelation proves that the assumption of independent error terms holds, which increases the reliability of standard errors and statistical estimates in the model. This was because there were no indications of autocorrelation and, therefore, there was no need to apply robust standard errors like the Newey-West standard errors which are usually applied in cases where heteroscedasticity or autocorrelation exists. Moreover, other models' specifications have also been considered during the creation of the regression framework to provide consistency and strength of the results.

In general, the diagnostic checks indicate that the main assumptions of the regression model have been satisfied. Along with the autocorrelation test, one can perform tests for multicollinearity (by checking the values of the Variance Inflation Factor or VIF of 2 or less) and heteroscedasticity (checking the Breusch-Pagan test result with p value > 0.05) to ensure that other typical estimation problems are not present in the model. The model has an Adjusted R<sup>2</sup> of 0.6391, implying that the model explains approximately 64% of the variance in economic growth. A combination of these diagnostic checks as well as the important predictors found in the regression presents sufficient firsthand evidence that the model can be valid and that inflation and government expenditures are important players in the growth of GDP in the context of a developing economy.

Table 5: Ramsey Reset Test

	Value	DF	Probability
<b>T - Statistic</b>	0.640159	48	0.5251
<b>F- Statistic</b>	0.409804	(1, 48)	0.5251
<b>Likelihood Ratio</b>	0.459072	1	0.4981

The Ramsey Regression Equation Specification Error Test (RESET) was used to test the correct specification of the regression model. The test is a valuable process of diagnosis that is applied in identifying possible errors of model specification, including a possible omission of variable of interest, weaknesses in functional form or incorrect transformations to the variables. Conversely put, the test verifies whether the model grasps the actual relationship between the independent variables and the dependent variable, which in this case is GDP growth.

This result generated a t-statistic and F-statistic of 0.6402 and 0.4098 respectively that had a correlated p-value of 0.5251. Moreover, the likelihood ratio statistic was 0.4591, and p-value was 0.4981. At 0.05, the standard significance level, all p-values are above the critical value and thus we do not reject the null claim that the null hypothesis that the model is correctly specified. This implies that there is no definite evidence that the model is

prone to a specification error. This result implies that the form of a functional regression model seems to be adequate, and no severe trace of omitted variable bias and structural challenges have been identified. As such, we are satisfied that the model is well-formulated and statistically appropriate. The estimated slopes of inflation, interest rate, government consumption and openness to trade are valid to explain the effect in the economy growth.

Summing up, the results of the Ramsey RESET test support the validity of the regression model. This test, together with others including the autocorrelation test (Breusch-Godfrey test), the multicollinearity and heteroscedasticity tests, makes the model credible. Consequently, the regression analysis has given a sound framework that can be used to explain the impact of key macroeconomic variables on economic growth with a view to developing economies.

## CONCLUSION AND IMPLICATION

The regression equation shows that inflation and economic growth relate significantly and positively implying that in the environment of the study period, inflation has been a factor that has helped in the economic growth. Nonetheless, the interest rate coefficient of negativity and its marginal irrelevance depicts that the positive impact of interest rates on growth is mildly inhibited, but it is not fixed statistically. The most significant of the growth drivers is the gross fixed capital formation, and it is possible to appreciate fully the role of investment in enhancing economic growth. On the contrary, trade openness does not affect growth statistically.

The model is very fit, which can be proven by diagnostic tests. All the tests of serial correlation, heteroskedasticity and normality of residuals suggest that there is no autocorrelation and homoskedasticity of residuals, and there is a normal distribution of residuals. Moreover, the test of omitted variable bias implies that the functional form of the model is not wrong.

To conclude, the discussion fetches out inflation and investment as the major factors that determine the economic growth, as the model aptly passes core diagnostic test. These findings are insightful, but additional research, which would include more variables or consider nonlinear relationships could improve the knowledge. Meanwhile, the analysis Favors specific policies, which exploit the inflation control and capital development to stimulate sustainable economic growth.

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