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Original Article

The relationship between inflation and economic growth: Empirical evidence from Vietnam in 1996-2023

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Abstract: Together with the impact of the post-COVID-19 pandemic, the world economy has had many fluctuations, especially the global economic crisis, which has reduced economic growth and caused inflation to rise in many countries. However, the goal of high and sustainable economic growth along with low inflation is often the main goal of each country's macroeconomic policy. So, this study aims to determine the relationship between inflation and economic growth in Vietnam, in the period 1996-2023, to determine the inflation threshold and make effective recommendations. The regression will use the least squares method (OLS) with the Newey-West standard error. This study shows that inflation supports growth in the short term and harms growth in the long term, at a light level, but does not find a converse impact, which is economic growth affecting inflation. The relationship between economic growth and inflation is a long-term relationship. Simultaneously, the study also agrees that effective control of inflation is essential for economic growth in Vietnam by proposing some solutions.

Keywords: Economic growth, inflation, relationship.

1. Introduction

Inflation is a common macroeconomic phenomenon, that profoundly affects the economic and social aspects of countries' economic development. So, stabilizing and controlling inflation is always one of the most important goals in macroeconomic policy. However, in Vietnam, due to many subjective and objective factors, the inflation rate fluctuates quite strongly. Specifically, inflation decreased from 310% in 1988 to 34.7% in 1989. Average inflation in the 1989-1991 period was 56.4% and in the 1992-1999 period it was 8.4% before recording a deflation in 2000-2001. During the period 2002-2006 and 2007-2011, the average inflation rate was 6.5% and 13.8%, respectively. Since 2011, the Government of Vietnam has used an inflation-targeting policy to maintain a reasonable inflation level in the context of continuously fluctuating inflation and significantly affecting macroeconomic policies.

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Stability becomes the top goal of monetary policy. In 2015, inflation decreased to 0.63%. In the period 2016-2023, inflation was kept stable at around 2.5-3.5%, except for 1.84% in 2021.

From a practical perspective, the period 1996-2023 marks major changes in the Vietnamese economy. Under the impact of the Asian financial crisis in 1997, global economic integration (joining the WTO in 2007), the 2008 economic crisis, and recently the COVID-19 pandemic, Vietnam's economy has undergone significant fluctuations. Concurrently, in recent years, Vietnam's economy has been faced with major external risks including: (1) geopolitical risks and strategic competition between countries, (2) the global inflation rate has decreased but is still high, (3) the failure of some banks in the US and Switzerland increases global finance risks, (4) an unstable world economy recovery. Together with the impact of the post-COVID-19 pandemic, Vietnam has also been negatively affected by these trends. In the context that interest rates in some countries such as the US, EU and UK have continuously increased and remained at high levels, Vietnam's central bank has implemented a loose monetary policy, implementing interest rate cuts four times in 2023, bringing the re-discount rate down from 4.5% to 3.0 % and the refinancing interest rate decreased from 6.0% to 4.5%. Differences in Vietnam's monetary policy compared to other countries can bring pressure on capital flows and exchange rates as well as an increase in inflation. In addition, as a country oriented towards economic development, based on imports and exports, Vietnam will face the risk of import inflation due to the trend of increasing prices of raw materials, thereby further increasing inflationary pressure. In 2024, Vietnam will set a growth target of 6.0-6.5% and keep inflation below 4.0-4.5% which will require caution and strict control of monetary policy. So, studying inflation and economic growth throughout this period helps better understand how the Vietnamese economy responded and adapted to global fluctuations. Understanding past trends and fluctuations will be the basis for forecasting and guiding future policies.

From a theoretical perspective, typically, inflation harms economic growth because it alters relative prices and misallocates resources. Therefore, the goal of high and sustainable economic growth along with low inflation is often the main goal of each country's macroeconomic policy. However, many economists have argued that if inflation is at a moderate level, below the inflation threshold, it will have a positive effect on economic growth. Each scholar has his/her view and model to demonstrate the relationship between inflation and growth. According to Adam Smit's classical growth theory, inflation is said to have a negative impact as it reduces business profits as well as savings through higher wage costs (Niebyl, 1940). In the Keynesian model, there is a short-run trade-off between inflation and output growth. However, in the long run, inflation and growth will have an inverse relationship. It means that, for inflation to decrease, the economy must accept a period of output lower than the potential output level. Under Keynes's model, to keep inflation stable, output must reach potential output (Weintraub, 1960). According to the view of monetarism, in the long run, prices are affected by the money supply but do not have an impact on growth (Frisch, 1984). If the money supply increases faster than the economic growth rate, inflation will inevitably occur. If the money supply and money creation coefficient are kept stable, high growth will reduce inflation. In contrast to this view, the neoclassical growth school of thought believes that there exists a relationship between inflation and economic growth. Generally, views can be recognized as stating that the relationship between inflation and growth is not a one-way relationship but an interaction. Whether the impact of inflation on economic growth is positive or negative depends on the inflation threshold used to determine this correlation. Because the relationship between inflation and economic growth is complex, it needs to be studied more deeply to understand the impact factors and transmission mechanisms. For studies applied to Vietnam, the relationship between inflation and economic growth and the determination of the inflation threshold are still controversial. Therefore, this study provides an additional practical case to determine a reasonable inflation threshold, as a basis for economic policy planning after COVID-19 and global geopolitical conflicts.

In conclusion, it is necessary to research the relationship between inflation and economic

growth in Vietnam to determine the inflation threshold and make effective recommendations in the context of a volatile world economy.

2. Literature review

Internationally, there have been many studies on the relationship between economic growth and inflation using many different methods, for either groups of countries or a specific country. Sidrauski (1967) argued that reasonably low inflation makes investing more attractive than holding cash because holding cash reduces its value faster than investing. Tobin (1972) stated that moderate inflation helps manufacturers reduce labor costs, thereby increasing savings and investment, and encouraging them to expand the production scale. In contrast to the two views, Fischer (1993) argues that inflation affects growth by reducing investment, as well as reducing productivity growth rates. In the case of low inflation and a small budget deficit, it may not have a positive impact on economic growth, even in the long term. But, if inflation is high it will harm economic growth. A study by Sarel (1996) examined the possibility of nonlinear effects of inflation on economic growth (data from 87 countries) and found evidence of a significant structural break in the function that relates economic growth to inflation when the inflation rate is 8%. Inflation below that rate has a slightly positive effect or even does not have any effect on growth. However, the estimated effect of inflation on growth rates is significantly negative if the inflation rate is above the threshold. Khan and Senhadji (2001) believe that low inflation will have a positive effect on economic growth, but if inflation exceeds a certain threshold, it will negatively impact economic growth. They used econometric methods to estimate thresholds previously developed by Chan and Tsay (1998) and Hansen (1999) for 140 countries over the period 1960-1998 with two key variables, namely, GDP growth rate and inflation. Using different approaches, they found inflation thresholds for developing countries (11-12%) and industrial countries (1-3%). Alam and Hasan (2003) investigated the direct cause-and-effect relationship between rising inflation and economic growth in the United States during the period 1991-2000. Research shows that there exists a long-term relationship between economic growth variables and inflation due to the expectation of short-term changes in future GDP. Agrawalla and Tuteja (2007) studied the causal relationship between economic growth and inflation in India and found a long-run equilibrium relationship between economic growth and inflation in India. Some other studies from Malaysia, China, and Nepal also show that inflation has a positive impact on economic growth (Munir et al., 2009; Hwang & Wu, 2011; Bhusal & Silpakar, 2012). Mario and Josipa (2017) investigated the relationship between economic growth and inflation in Italy and Austria which featured long-term low inflation, for a period between 1980-2016, and showed that low inflation is an important but not sufficient factor for economic growth. Another study examined the relationship between price stability and economic growth of the selected countries applying inflation-targeting (Ramazan et al., 2020). According to the findings of the study, the inflation threshold is 4.182% in inflation-targeting countries. Below the threshold, the inflation-growth relationship is insignificant, and above the threshold, inflation affects economic growth negatively.

In Vietnam, sharing the same view as foreign studies, most Vietnamese studies recognize that the inflation-economic growth relationship is nonlinear. A study used a qualitative method over the period 1987-2010 and showed that, in the long run, inflation has a weak negative impact on growth (Ngan et al., 2010). The study also concluded that the inflation threshold in Vietnam should be between 5 and 6%. Another study based on the model of Khan and Senhadji (2001) tested the non-linear relationship between inflation and economic growth using the autoregression method for 17 developing countries, including Vietnam, in the period from 2000 - 2012 (Sang & Khue, 2015). The results show that there was an inflation threshold in the range of 11 - 12%. Some other studies also show that there is a one-way causal relationship between inflation and economic growth. Specifically, with a certain (low) inflation rate, the relationship is considered positive or non-existent (inflation has no impact on growth), but with a high inflation rate, this relationship is

negative. The optimal inflation threshold for Vietnam found in these studies is about 7% (Dang & Nguyen, 2016), 5.0-6.5% (Quynh, 2018) or 3.5%/year (Online Finance Magazine, 2018). A recent study has relied on an overview of studies on inflation and its impact on economic growth to build an empirical model to test the non-linear relationship between inflation and economic growth in Vietnam in the period 2021-2022 (Uyen & Hung, 2022).

3. Research methodology

Based on the research overview, to study the impact of inflation on economic growth, it can be seen that some econometric models are used. Under the study of Sarel (1996), the author made some OLS regressions for $\Delta y = \alpha + \beta_1.\pi + \theta.X + \varepsilon_t$ if $\pi \leq \pi^*$ and $\Delta y = \alpha + \beta_1.\pi + \beta_2.(\pi - \pi^*) + \theta.X + \varepsilon_t$ if $\pi > \pi^*$, with different threshold values π^* to maximize the coefficient of determination R2 (R-squared) or minimize the Root Mean Square Error (RMSE), to estimate the inflation threshold. Δy is economic growth, π is the inflation rate, π^* is the inflation threshold. X represents other explanatory variables and θ is the corresponding regression coefficient. The explanatory variables used in Sarel's model are population, GDP, CPI, trade turnover, exchange rate, government spending, and investment. Hansen (1999) proposed to estimate using the least squares method, the inflation threshold chosen will be the value π^* corresponding to the estimate that minimizes RSS value. Developing the econometric method to estimate the threshold previously proposed by Hansen (1999), Khan and Senhadji (2001) tested the impact of the inflation threshold on the growth of 140 countries in the period from 1960 to 1998, with two main variables being GDP growth rate (the base year 1987) and inflation (change in the CPI). Explanatory variables include total investment capital per GDP, population, GDP per capita, exchange rates and dummy variable D (takes value 1 when $\pi > \pi^*$ and takes value 0 when $\pi \leq \pi^*$). The method proposed to estimate here is the OLS least squares method with a non-linear (logarithmic) relationship between variables, iteratively estimated with different inflation thresholds to find the smallest RSS value. According to Bhusal and Silpakar (2012), the model estimates the relationship between the inflation rate and economic growth rate as follows: $GDP = \beta_0 + \beta_1 * CPI + \beta_2 * Z * (CPI - K) + \varepsilon t$, where K is the optimal inflation level (inflation threshold) and Z is a dummy variable, with Z = 1 if CPI > K and Z = 0 if CPI $\leqslant$ K K. In Vietnam, based on the model by Khan and Senhadji (2001), and Bhusal and Silpakar (2012), the equation to determine the inflation threshold for Vietnam has added a lagged variable of GDP growth (Quynh, 2018) and a lagged variable of inflation (Online Finance Magazine, 2018) with the model: $GDPt = \beta_0 + \beta_1 * GDP_{t-3} + \beta_2 * GDP_{t-6} + \beta_3 * CPI_t + \beta_4 * CPI_{t-3} + \beta_5 * Z * (CPI_t - K) + \varepsilon t$.

To simplify determining the relationship between inflation and economic growth, based on the theories developed by Sarel (1996), Khan and Senhadji (2001), Uyen and Hung (2022), the regression model is proposed below:

$LnGDP = \beta_0 + \beta_1*I + \beta_2*D*(I - I*) + \beta_3*LnGpC + \beta_4*CFpG + \beta_5*LnTO + \varepsilon t$

The regression will use the least squares method (OLS). The inflation threshold chosen will be the value to minimize RSS. Control variables include GDP, Inflation Rate (I), GDP per Capita (GpC), Capital Formation per GDP (CFpG), and Trade Openness (TO). Because control variables showed almost all factors impacting the growth of the whole economy, adding lagged variables of GDP growth and inflation to capture the effects of other explanatory variables that have not been included in the model is not essential. Specifically:

To estimate the model for determining the relationship between inflation and economic growth, this study used time-series data in Vietnam, from 1996 to 2023 with a total of 28 observations. The data from 1996 to 2022 is collected from the World Bank, and for 2023, it is collected from the Vietnam General Department of Customs and the General Statistics Office.

Table 1: Description of variables

Variables	Description	Expected Impact
GDP	LnGDP represents the growth of gross domestic product, which most fully reflects the current economic status of a country.	N/A
Inflation Rate	Inflation is a factor that has both positive and negative impacts on the economy. At a reasonable level, inflation positively impacts economic growth; conversely, if it increases to a high level, it harms the economy (Khan & Senhadji, 2001; Ramazan et al., 2020). In Vietnam, in the long term, inflation generally harms economic growth (Ngan et al., 2010; Sang & Khue, 2015).	+
D*(I - I*)	D is a dummy variable with D = 1 if I > I* and D = 0 if I ≤ I*. As the theoretical framework and empirical studies mentioned, there will be a threshold that if the inflation rate exceeds this value, its impact on GDP growth is negative.	-
GDP per Capita	GDP per Capita is the basis for individual consumption and government spending, laying the foundation for economic growth. Its logarithm represents the income growth, thereby showing the consumption growth of the whole economy (Khan & Senhadji, 2001; Uyen & Hung, 2022).	+
Capital Formation per GDP	Gross Capital Formation (or gross domestic investment) contains the expenditure on additions to the fixed assets of the economy plus net changes in the level of inventories. Generally, the higher the capital formation of an economy, the faster an economy can grow its aggregate income. In Vietnam, it can be seen that it has a positive impact on economic growth (Quynh, 2018; Uyen & Hung, 2022).	+
Trade Openness	Trade openness is defined as the ratio of exports plus imports over GDP. Its logarithm represents the growth of international trade in the whole economy. The higher the openness, the more market opportunities for domestic firms, stronger productivity, and innovation through competition. Previous studies mostly mentioned Trade Openness but concluded that its impact on GDP growth is not significant (Dang & Nguyen, 2016).	+

Source: The author.

4. Empirical results

4.1. The reality of Vietnam's inflation and economic growth from 1996 to 2023

The period 1999-2003 marked the domestic economy's recession due to the Asian economic crisis (1997-1998). During this time, inflation was low and even recorded two deflations in 1999 and 2000. Since 2003, the macroeconomy has been relatively stable, inflation has been controlled below 8.5 %. At the same time, the growth rate is also high in the range of 6.9-7.55% annually. However, the global economic crisis of 2007 - 2008 caused inflation to go out of control and peaked at 23.12% in 2008. At the same time, the growth rate also declined sharply for three consecutive years from 7.13% in 2007 to only 5.4% in 2009. A loose monetary policy and expansionary fiscal policy were implemented simultaneously, but they caused instability in the macroeconomics, creating inflation in momentum to 18.68% in 2011 and a decline in the growth rate. From 2012 to now, the inflation rate has been kept stable due to the pursuit of an inflation-targeting policy, accompanied by high and stable GDP growth, apart from the COVID-19 period.

From Figure 1, the inflation rate in Vietnam in the period from 1996 - 2023 recorded the highest value in 2008 with an increase of 23.12%; the lowest value was in 2015 with 0.63%, except for deflation in 2000-2001. The inflation rate fluctuates quite strongly. Average inflation in the 1996-1999 period was 5.06% before recording two deflations in 2000-2001. During the period 2002-2006 and 2007-2011, the average inflation rate was 6.5% and 13.8%, respectively. From 2014 to 2022, Vietnam has

made great efforts to successfully control inflation and stabilize it at below 4%. In the period 2016-2023, inflation was kept stable at around 2.5 - 3.5%, except for 1.84% in 2021. In 2024. Vietnam's inflation is expected to be at 3.5%, before decreasing to 3.2% in 2025. This inflation rate is still lower than the target of 4-4.5%.

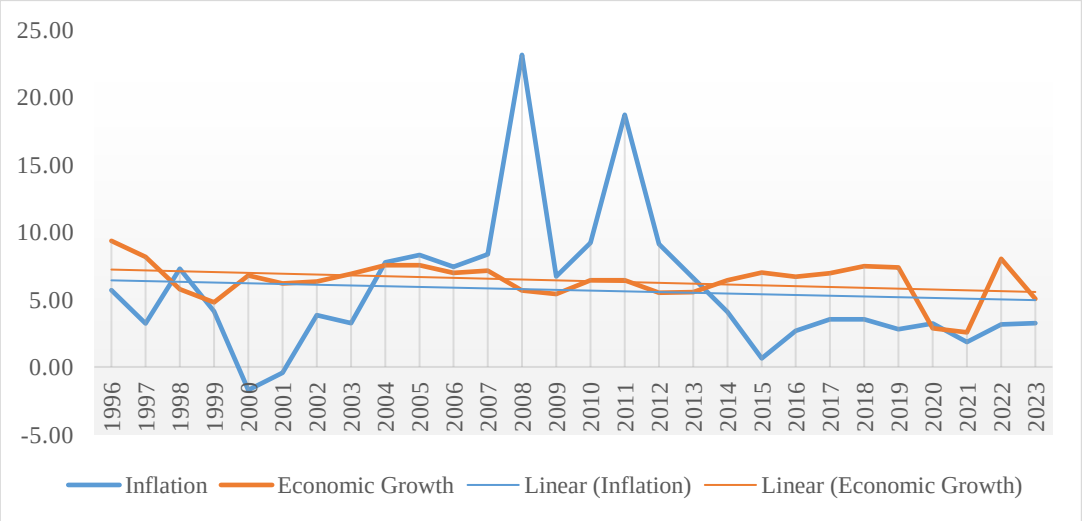

Figure 1: Inflation rate and economic growth rate (%) in Vietnam 1996-2023
Source: World Bank and Vietnam General Statistics Office (2024).

In contrast to the fluctuations in inflation rates, Vietnam's annual growth rate is more stable. According to the statistical data from the World Bank and Vietnam General Statistics Office, the real average GDP growth rate in the period from 1996 to 2023 is 6.383%. Particularly for the period 2014-2023, the real average GDP growth rate is 6.04% while the average potential GDP growth rate in Vietnam is estimated to be about 6.0%. The growth of the economy's real output compared to the growth of potential output is equivalent. When these two quantities are in balance, Vietnam's economy is expected to be stable in the future.

4.2. Empirical findings through the Regression Model

4.2.1. Descriptive statistic table

Table 2: Descriptive statistics of variables

Variables	Observation	Mean	Standard Deviation	Min	Max
LnGDP	28	25.4118	1.009147	23.92835	26.79483
CFpG	28	32.58709	2.938979	27.62976	39.6627
LnGpC	28	7.131529	.9261249	5.796062	8.382322
LnTO	28	4.892757	.1943234	4.52943	5.22805
Inflation Rate	28	5.682153	5.165277	-1.710337	23.11545
D*(I - I*) 1%	28	4.843249	4.973504	0	22.11545
D*(I - I*) 3%	28	3.118292	4.747102	0	20.11545
D*(I - I*) 6%	28	1.659757	3.918944	0	17.11545
D*(I - I*) 5%	28	2.076721	4.196329	0	18.11545
D*(I - I*) 7%	28	1.291555	3.666181	0	16.11545
D*(I - I*) 9%	28	.8605482	3.175258	0	14.11545
D*(I - I*) 11%	28	.7068993	2.66486	0	12.11545
D*(I - I*) 15%	28	.421185	1.6602	0	8.115448
D*(I - I*) 19%	28	.1469803	.7777466	0	4.115448

Source: Author's calculations.

4.2.2 Results of regression model analysis

Before making regressions with the OLS method, the Augmented Dickey-Fuller and Phillip-Perron tests will be used to consider the stationarity of the time-series data. The Granger causality Wald test will also be used to analyze the cause-and-effect relationship between these two variables.

Table 3: Augmented Dickey-Fuller and Phillips-Perron tests

Data	Augmented Dickey-Fuller		Test Phillips-Perron Test	
	I(0)	I(1)	I(0)	I(1)
LnGDP	-0.590	-3.602**	-0.553	-3.635**
LnGpC	-0.535	-3.596**	-0.519	-3.623**
CFpG	-2.039	-4.930***	-2.066	-4.927***
LnTO	-2.064	-3.764***	-1.751	-3.657**
Inflation Rate	-3.132**	-7.398***	-3.055**	-8.519***

Note: The test value in the table is T-statistics.
***,**,* correspond to statistical significance levels of 1%, 5%, 10%.
Source: Author's calculations.

Table 3 presents the results of testing the stationarity of time-series data in Vietnam from 1996 to 2023. Accordingly, the results show that all data are stationary series at the first difference with a significance level of 5% at both the Augmented Dickey-Fuller test and the Phillip-Perron test. Besides, the results of the Granger causality test show that the first hypothesis H0 "Inflation does not Granger cause GDP growth" is rejected at the 1% significance level (F-statistic is 9.4656 and p-value is 0.009), according to which inflation is the cause of GDP growth. At the same time, there is an acceptance of the second hypothesis H0 that "GDP growth does not Granger cause inflation" because the F-statistic and p-value through the Granger causality Wald test are 1.4012 and 0.496. It is concluded that there is no impact of economic growth on inflation. Thus, the cause-and-effect relationship between these two variables is a one-way relationship. This result is consistent with the regression model that has been shown.

Table 4: Results of testing the inflation threshold

Inflation threshold	Variable	Coefficient	Standard deviation	T-statistic	P-value	RSS
1%	I	.0006125*	.0003405	1.80	0.086	.001240861
	D.(I-I*)	-.001737***	.0004123	-4.21	0.000	
3%	I	.0006132*	.0003374	1.82	0.083	.001223956
	D.(I-I*)	-.0018167***	.0004248	-4.28	0.000	
5%	I	.0006686*	.0003588	1.86	0.076	.001291227
	D.(I-I*)	-.0020058***	.0004977	-4.03	0.001	
6%	I	.0006851*	.0003759	1.82	0.083	.001358931
	D.(I-I*)	-.002079***	.0005484	-3.79	0.001	
7%	I	.0006616	.0003919	1.69	0.106	.001447451
	D.(I-I*)	-.0020959***	.0005995	-3.50	0.002	
9%	I	.0005886	.0004042	1.46	0.160	.001559156
	D.(I-I*)	-.0021911***	.0006985	-3.14	0.005	
11%	I	.0005846	.0004015	1.46	0.160	.001551146
	D.(I-I*)	-.0026137***	.0008265	-3.16	0.005	
15%	I	.0005537	.0003929	1.41	0.173	.001540709
	D.(I-I*)	-.0041698***	.001305	-3.20	0.004	
19%	I	.0002601	.0003757	0.69	0.496	.001729679
	D.(I-I*)	-.0071072**	.0027254	-2.61	0.016	

Note: ***, **, * correspond to statistical significance levels of 1%, 5%, 10%
Source: Author's calculations.

Based on basic tests, OLS regressions are made to determine the inflation threshold in the relationship between GDP growth and inflation. To ensure that all variables have the same level of stationary (the first difference with a significance level of 5%), the variable I is first differentiated before making regressions. The regression model is estimated with a residual sum of square RSS, corresponding to I* values ranging from 1% to 19% because Vietnam's inflation fluctuates in this range. The results are summarized in the Table 4.

Making some regressions with different I* threshold values, it can be seen that at all different inflation thresholds, the coefficient of D.(I-I*) is significant at the 5% level. However, at the level I* = 7%, the coefficient I is not significant at the 10% level, meaning that inflation initially has no positive impact on economic growth. At the same time, at this threshold, the RSS value reached its smallest value, compared to thresholds of 9%, 11%, 15%, and 19%. Therefore, it can be expected that Vietnam's inflation threshold is 7%. Making an OLS regression at the threshold level I* = 6% and 7%, the results show that GDP growth has a positive correlation with inflation if it is below 7% and a negative correlation with the D.(I-I*) variable at p-value 0.002.

To ensure the robustness of the estimation results, post-estimation tests are conducted. In the multicollinearity test, the VIF values between the independent variables are less than 10 (*lnTO (4.42), lnGpC (3.67), CFpG (1.61), Inflation (1.82), Threshold7 (1.88)*), and mean VIF is 2.68. So it is concluded that there is no multicollinearity. For correlation and heteroscedasticity, the Breusch-Godfrey LM test for autocorrelation and the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity were used. The p-values for the Breusch-Godfrey LM tests are 0.0166 (Figure 8), and for the Breusch-Pagan/Cook-Weisberg test are 0.6473 (Figure 7). Thus, the null hypothesis for the Breusch-Godfrey LM tests is rejected and for the Breusch-Pagan/Cook-Weisberg test is accepted at the 5% level, which means the model has faced an autocorrelation defect. To fix this defect, a regression with Newey-West standard error is made and compared to OLS.

Table 5: Regression estimation results at I* = 6% and I* = 7%

Variables	**OLS (LnGDP)**		**Newey-West Test (LnGDP)**	
CFpG	8.05e-06 [0.01]	-.0002279 [-0.32]	8.05e-06 [0.01]	-.0002279 [-0.33]
LnGpC	1.07338*** [320.13]	1.073036*** [311.28]	1.07338*** [340.46]	1.073036*** [333.79]
LnTO	.088101*** [4.83]	.0921157*** [4.96]	.088101*** [7.85]	.0921157*** [8.48]
D1.I (Inflation)	.0006851* [1.82]	.0006616 [1.69]	.0006851** [2.74]	.0006616** [2.62]
Threshold6 D.(I-I*) with I* = 6%	-.0020798*** [-3.79]	–	-.0020798*** [-5.34]	–
Threshold7 D.(I-I*) with I* = 7%	–	-.0020959*** [-3.50]	–	-.0020959*** [-5.19]
_cons	17.32995*** [290.6]	17.31968*** [283.61]	17.32995*** [381.72]	17.31968*** [386.34]
N	27	27	27	27
R^2	0.9999	0.9999	–	–

Note: T-statistics in brackets, *p < 0.1, **p < 0.05, ***p < 0.01.
Source: Author's calculations.

4.2.3. Discussion

From the estimation results, the inflation threshold in Vietnam is expected to be at 7%. Comparing the regression results with different inflation thresholds, it can be seen that if the inflation rate exceeds the optimal inflation threshold, it has a negative effect on GDP growth, although its impact is very small.

Conversely, the impact of inflation on GDP growth (ignoring the impact of the inflation threshold) is positive if it is below the threshold, although its impact is very small as well. This result shows that the nonlinear relationship between inflation and growth in Vietnam is consistent with the theoretical framework and empirical studies mentioned. However, the inflation threshold found for Vietnam in the period 1996-2023 is different from the threshold found previously. It is lower than the threshold of 8% by Sarel (1996), 11-13% for developing countries by Khan and Senhadji (2001), and higher than the threshold of 3.5%/year (Online Finance Magazine, 2018), 3.6% proposed by the IMF (2006) for Asian developing countries including Vietnam, 5.0-6.5% (Nguyen, 2018) or 5.0-6.0% (Tran et al., 2010). The optimal inflation threshold for Vietnam found in this study is equivalent to the threshold of about 7% (Dang & Nguyen, 2016). Additionally, in both OLS and Newey-West regression, at the inflation threshold of 7%, the intercept coefficient and slope coefficients of the explanatory variables do not differ. So, it can be concluded that if inflation is above 7%, it has a significant negative impact on growth. On the contrary, when inflation is below the threshold, this impact is milder.

In addition, the study also showed other important results. Firstly, GDP per capita has a positive relationship with the economic growth rate at the 1% significance level. Increasing individual income in the economy will boost individual consumption and government spending (due to increased tax revenue), creating motivation for economic growth. Secondly, Trade Openness has a positive relationship with the economic growth rate at the 1% significance level as well. Vietnam is oriented towards economic development through promoting exports. So, greater trade openness, means a higher growth rate. Trade openness will promote economic growth in the long term through allocating efficient resources and improving productivity by applying modern technology. Finally, the regression result also shows that the impact of the gross capital formula on economic growth is not significant.

5. Conclusion and recommendations

This study shows that inflation supports growth in the short term and harms growth in the long term, at a light level, but does not find a converse impact, which is economic growth affecting inflation. The relationship between economic growth and inflation is a long-term relationship. In case of any shocks, inflation will reduce economic growth by an average of about 0.143 - 0.21% if the inflation rate is above the optimal threshold of 7.0 %/year.

Regarding the current situation, the risk of "imported inflation" is low internationally helping Vietnam keeps inflation below 4.5%. Inflation in China, a key supplier of inputs to Vietnam, is forecast to remain low at 0.5% in 2024. Inflation in Vietnam's major trading partners and main export markets is well-managed. Accordingly, US inflation will reach 3.1% and that of the EU will reach 2.9% in 2023, tending to decrease towards the target level of 2%. Domestically, macroeconomic policies including expansionary fiscal policy combined with loose monetary policy are maintained, based on foreign exchange reserves, trade balance surplus, and an increase in FDI inflows. To promote economic growth, Vietnam's central bank has implemented a loose monetary policy, implementing interest rate cuts four times in 2023, bringing the re-discount rate down from 4.5% to 3.0 % and the refinancing interest rate decreased from 6.0% to 4.5%. These will partly put pressure on Vietnam's inflation in 2024.

Therefore, to limit the negative impact of inflation on economic growth, the Government needs to closely follow the world's prices and inflation to promptly grasp risks affecting Vietnam's prices and inflation. In addition, the Government needs to ensure a full supply of strategic goods, especially petroleum, which is likely to be affected by global supply chain disruption and geopolitical conflicts. Concurrently, the Government also needs to maintain a proactive, flexible, and cautious approach, alongside other fiscal policy and macroeconomic policies, to keep inflation within the target goal.

References

Agrawalla, R. K., & Tuteja, S. (2007). Causality between stock market development and economic growth: A case study of India. *Journal of Management and Research*, *7*(3), 158-168. https://www.ijicc.net/images/vol_13/Iss_12/131205_Yaseen_2020_E_R1.pdf

Alam, I., & Hasan, T. (2003). The causality between stock market development and economic growth: Evidence from the United States. *Studies in Economics and Finance*, *21*(1), 93-104. https://doi.org/10.1108/eb028770

Bhusal, T. P., & Silpakar, S (2012). Growth and inflation: Estimation of a threshold point for Nepal. *Economic Journal of Development*, *13*(1-2), 131-138. https://doi.org/10.3126/ejdi.v13i0.7216

Chan, K. S., & Tsay, R. S. (1998). Limiting properties of the least squares estimator of a continuous threshold autoregressive model. *Biometrika*, *85*(2), 413-426. https://doi.org/10.1093/biomet/85.2.413

Dang, V. D., & Nguyen, A. K. (2016). Estimating the threshold level of inflation for economic growth in Vietnam. *Journal of Science and Banking Training*, *167*, 26-33.

Fischer, S. (1993). The role of macroeconomic factors in growth. *Journal of Monetary Economics*, *32*(3), 485-512. https://doi.org/10.1016/0304-3932(93)90027-D

Frisch, H. (1984). Monetarist inflation theory. In *Theories of Inflation* (pp. 90-152). Cambridge Surveys of Economic Literature. Cambridge University Press. https://doi.org/10.1017/CBO9780511664588.006

Hansen, B. E. (1999). Threshold effects in non-dynamic panels: Estimation, testing, and inference. *Journal of Econometrics*, *93*(2), 345-368. https://doi.org/10.1016/S0304-4076(99)00025-1

Hwang, J. T., & Wu, M. J. (2011). Inflation and economic growth in China: An empirical analysis. *China & World Economy*, *19*(5), 67-84. https://doi.org/10.1111/j.1749-124X.2011.01259.x

Khan, M. S., & Senhadji, A. S. (2001). Threshold effects in the relationship between inflation and growth. *IMF Staff Papers*, *48*(1), 1-21.

Mario, S., & Josipa, M. (2017). Relationship between inflation and economic growth: Comparative experience of Italy and Austria. *FIP - Journal of Finance and Law*, *5*(2), 91-101.

Michae, S. (1996). Nonlinear effects of inflation on economic growth. *IMF Staff Papers*, *43*(1), 199-215. https://doi.org/10.2307/3867357

Munir, Q., Mansur, K., & Furuoka, F. (2009). Inflation and economic growth in Malaysia: A threshold regression approach. *ASEAN Economic Bulletin*, *26*(2), 180-193. https://doi.org/10.1355/ae26-2d

Ngan, T. H., Huyen, N. T. M., & Thao, N. T. P. (2010). Inflation and economic growth rate in Vietnam. https://lib.agu.edu.vn/images_old_lib/image_content_lib/lamphat.pdf

Niebyl, K. H. (1940). A reexamination of the classical theory of inflation. *The American Economic Review*, *30*(4), 759-773.

Online Finance Magazine (2018). The relationship between economic growth and inflation and forecasting the appropriate inflation threshold for Vietnam. https://tapchitaichinh.vn/quan-he-giua-tang-truong-kinh-te-voi-lam-phat-va-du-bao-nguong-lam-phat-phu-hop-cho-viet-nam.html

Quynh, N. T. (2018). Determining a reasonable inflation threshold for economic growth in Vietnam. *Journal of Economics and Finance*, *1*.

Ramazan, S., Ali, A., & Muhammad, S. (2020). The relationship between inflation and economic growth: Experiences of some inflation targeting countries. *Financial Studies*, *24*(1), 6-20.

Sang, N. M., & Khue, N. N. D. (2015). Inflation and economic growth: Empirical study of developing countries and the case of Vietnam. *Journal of Development and Integration*, *21*(31), 23-33.

Sidrauski, M. (1967). Inflation and economic growth. *Journal of Political Economy*, *75*(6), 796-810. https://doi.org/10.1086/259360

Tobin, J. (1972). Inflation and unemployment. *American Economic Review*, *62*(1), 1-18.

Uyen, D. N. H., & Hung, D. T. (2022). Effects of inflation on economic growth: Overview and build an experimental research model in Vietnam. *Journal of Economics and Development*, *302*(2), 155-163.

Weintraub, S. (1960). The Keynesian theory of inflation: The two faces of Janus? *International Economic Review*, *1*(2), 143-55. https://doi.org/10.2307/2525293