Studying the Impacts of Several Macroeconomic Factors on Economic Growth in Vietnam

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Abstract: The article studies the impacts of several macroeconomic factors on GDP growth in Vietnam from 1991 to 2020 using Ordinary Least Squares Regression (OLS) and Quantile Regression. The research results show that the M2 money supply has a positive impact on GDP growth from 1991 to 2020, in which the positive effect of M2 is more substantial at the 40-60% percentile; inflation has a positive impact on GDP growth at the 40-50% percentile, meaning that an economy that maintains an inflation rate around the medium value can increase the likelihood of achieving the highest growth and vice versa; public debt has a positive impact on GDP growth at the 0-20% and 60% percentiles and a negative impact at the 20-50% percentile, or above 60-100%. Regarding lending rates, the results show no evidence of the effect of this variable on GDP growth. The percentiles of the variables in the study can be used in constructing thresholds in Government policy administration, especially in coordinating monetary and fiscal policies.

Keywords: Economic growth; Interest rate; Money supply; Public debt; Consumer price index.

JEL: C32; F43, O47.

1. INTRODUCTION

The study aims to study the impacts of several factors, such as money supply, interest rates, and public debt on economic growth in Vietnam. To achieve this purpose, the authors use Quantile Regression to quantify the relationship between monetary policy factors and economic growth, thereby determining the possible effects in different percentiles. In addition, Government spending is also an important factor creating the driving force for economic growth.

In this study, the authors use Ordinary Least Squares Regression (OLS) to assess the impacts of interest rates, inflation, money supply, and public debt on economic growth. These are also essential factors representing fiscal policies and monetary policies. Factors such as interest rates and money supply represent monetary policies, while the public debt factor represents fiscal policy. In the process of operating the economy, the smooth coordination between monetary policies and fiscal policies becomes urgent to achieve the growth goals.

2. LITERATURE REVIEW

Sustainable economic growth is always the goal of all countries in the world. To achieve this goal, Governments must make the right macroeconomic policies suitable for the domestic and international economic context. In particular, monetary policy is critical in stabilizing the value of money, controlling inflation, and stimulating investment to promote economic growth. Many studies have confirmed that monetary policies affect macroeconomic variables, including job creation, price stability, GDP growth, and balance of payments in developing countries (Anowor & Okorie, 2016; Precious & Makhetha-Kosi, 2014).

Interest rates are determined by the supply and demand for money, whereby interest rates affect investment, aggregate demand, and changes in prices of household financial instruments and other financial asset portfolios (Keynes, 1936). To stimulate investment, central banks conduct money supply into the economy by reducing interest rates, encouraging private investment, and promoting economic growth. On the other hand, increases in public expenditure and money supply contribute to inflation, the long-run aggregate supply is vertical, and changes in aggregate demand lead to changes in prices but does not change output (Friedman, 1995).

Regarding the relationship between money supply and output and prices, the research by Hung and Wade (2008) for the case of Vietnam shows a strong relationship between money supply and actual output but has not yet found a strong bond between money supply and prices. Bui Duy Phu (2008) illustrates a causal relationship between money supply and income. Fluctuations in actual exchange rates could have a significant impact on the long-run rate of output growth.

By studying the case of Nigeria, Sulaiman (2014) considers the relationship between interest rates, exchange rates, and economic growth. However, the reserve ratio and money supply have insignificant impacts on economic growth, and this is a one-way directional link; GDP does not affect factors of monetary policies. Nwoko et al. (2016) indicate that monetary policies effectively adjust the economy's unem-

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ployment rate, prices, output, and growth rate. In particular, the labor force and the average price level enormously influence economic growth.

Empirical studies in different countries will give different results, depending on the economies' states and the economic growth quality. Accordingly, long-term economic growth should not rely on money supply as overusing could cause inflation and macroeconomic instability. Labor productivity and science and technology are still essential elements of the quality of economic growth (Solow, 1956).

In a study aiming to evaluate the link between monetary policies and short-run and long-run economic growth in a developing country, Bangladesh, which socio-economic status is similar to Vietnam's, Islam et al. (2022) believe that there is a positive impact between monetary policy and economic growth; specifically, an increase in the supply of money could lower market interest rates and thereby promotes economic growth. However, there is an inverse link between exchange rates and growth; thus, the management of exchange rates should be more flexible to boost economic growth. Similarly, an increase in lending interest rate could sharply depress growth as rising lending rate increases the costs of capital in the businesses; those firms have to pay more for raw materials and labor costs, thereby reducing corporate profits and negatively impacting economic growth. In another study, Rahman et al. (2019) consider that monetary policy is vital to economic development in developing countries, particularly Bangladesh. Accordingly, Government expenditure, investment, net spending, and net exports impact economic growth. Monetary policy is critical and creates interactive relationships among factors to promote economic growth.

By assessing the impacts of fiscal and monetary policies on economic growth in Malaysia, Singapore, and Thailand, Tan et al. (2020) point out a negative impact of the interest rates on growth in three countries which is similar to what is found in the study of Islam et al. (2022) in Bangladesh. Government spending is a representative factor of fiscal policy, has a negative impact on growth in the case of Malaysia and Singapore, and reflects the fact that the Malaysian and Singaporean Governments' quality of public investments has not been efficient and has not yet created an impetus for economic development. That requires Malaysia and Singapore to improve the quality of Government investments further. In contrast, due to a lower starting point, Government spending in Thailand is more efficient and positively influences economic growth. Tan et al. (2020) agree that fiscal policy is more effective in Thailand, but monetary policy is more effective in Malaysia and Singapore. It shows that the Central Banks of Malaysia and Singapore's monetary policies are pretty effective.

Amarasekara (2008) conducts a study on the case of Sri Lanka, a country with many open economic policies deeply integrated into the global economy. After the political crisis and civil war, Sri Lanka became independent and implemented economic reforms, making it the country with South Asia's highest per capita income. The independent role of the Central bank shows an essential part in operating monetary policy in particular and economic development in general. To evaluate the impacts of the interest rates, growth of money supply, and exchange rate on economic growth, interest rate management policy, especially the implementation of flexible money supply and appropriate adjustments of exchange rates, becomes critical to maintaining economic growth.

Hilton (2021) studies the impacts of public debt on economic growth in Ghana in the context of erratic economic growth in the past decade and an increase in public debt due to the effects of the Covid-19 pandemic. The author believes that public debt does not impact economic growth in the short term but has an effect in the long run. However, increasing public investment negatively burdens short-run economic growth but positively impacts long-run growth. Therefore, the Government of Ghana needs to exercise fiscal discipline, effectively utilize loans and prioritize repayment capacity to create confidence in domestic and international creditors, which would be essential drivers of long-term economic growth. Panizza and Presbitero (2013) confirm a generally negative bond between public debt and economic growth in another study. However, there is a threshold when the public debt ratio is lower than that point, it positively impacts economic growth; when the public debt ratio exceeds that point, it is likely to reduce economic growth.

Law *et al.* (2021) study 71 developing countries in the period 1984-2015, which present similar results to Panizza and Presbitero (2013), and believe that maintaining an appropriate public debt ratio is essential to promote economic growth, especially in developing countries.

Thus, the above studies illustrate differences in research results across countries due to differences in economic conditions. In 2010-2015, Vietnam loosened its monetary policy, expanded its money supply, and put pressure on high inflation, causing economic growth to decrease. However, by reforming the financial system, especially Vietnam recently implemented monetary policy in harmony with fiscal policy, the economic growth rate in the period 2017 - 2020 has increased again. In this study, the authors re-evaluate the impacts of several macroeconomic factors on economic growth in Vietnam, such as money supply, interest rates, and other macro factors. From the study results and discussions, the authors propose policy suggestions for Vietnam in the near future.

3. METHODOLOGY

In fact, OLS regression only determines the marginal effect of the independent variables on the mean of the dependent variable, while Quantile Regression can determine the marginal impact of the independent variables on the dependent variable on each percentile of that dependent variable. In addition, the Quantile Regression is more stable than OLS because outliers do not influence it, is suitable for not normally distributed data, and is ideal for the case of variable variance or in the data sample where the distribution function of the dependent variable is asymmetric. When performing the Quantile Regression, the economic indicator can be divided into 100 equal segments corresponding to the 1% to 99% percentiles, or 0.01 to 0.99.

The formula is as follows: $Yi = x'_i\beta + \varepsilon_i$, where the OLS estimator is determined by condition

Table 1. The variables in the model.

Code	Name/Description	Unit	Source	Previous studies
GDP	Economic growth: represents the economic growth, meas- ured in logarithm (ln) of real GDP	USD	General Statistics Office (GSO) (2022)	Rahman et al. (2019)
M2	Money supply: measuring the broad money supply, including M1 and term deposits at commercial banks	% of GDP	State Bank (2022)	Rahman et al. (2019)
IR	Loan interest rates	%	State Bank (2022)	Amarasekara (2008), Hilton (2021), Islam et al. (2022)
СРІ	Consumer Price Index	Index	State Bank (2022)	Amarasekara (2008), Hilton (2021)
GOV	Public Debt	% of GDP	International Monetary Fund (IMF) (2021)	Hilton (2021), Law et al. (2021), Panizza and (2013)

 $\min_{\beta \in \mathbb{R}^k} \sum_{i=1}^n (y_i - \beta x'_i)^2$, y is the dependent variable, x is the

Under the Quantile Regression Q(p), p is percentile. Thus, β on the percentile p could be calculated by the fol-

 $\min_{\beta \in \mathbb{R}^k} \sum_{i=1}^n p(y_i - \beta x'_i)^2$ lowing formula: for the percentiles $p \in (0,1)$

$$\min_{\beta \in \mathbb{R}^k} \left[\sum_{i \in \{i: y_i \ge x_i \beta\}} p |y_i - x_i \beta| + \sum_{i \in \{i: y_i \le x'_i \beta\}} (1-p) |y_i - x'_i \beta| \right]$$

Therefore, the general study formula is as follows:

GDP = f(M2, IR, CPI, GOV)(1)

From the formula (1), the regression formula is as follows:

 $GDP = \alpha 0 + \alpha 1M2 + \alpha 2CPI + \alpha 3GOV + \alpha 4IR + \varepsilon (2)$

Where, GDP: represents the economic growth, measured in logarithm (ln) of real GDP;

M2: is an independent variable measuring the broad money supply, which also represents the financial development, measured in the broad money supply M2/GDP;

CPI: The Consumer Price Index, an independent variable representing the price index, illustrating price fluctuation or inflation of the economy;

GOV: is an independent variable representing the public debt, measured in % of GDP;

IR: is an independent variable representing loan interest rates:

 α : Regression coefficient;

ε: The error correction coefficient.

The authors collect data from the State Bank of Vietnam (SBV), the General Statistics Office (GSO), and the International Monetary Fund (IMF), ensuring legitimacy and reliability (Table 1). In terms of time, the data is taken from 1991 to 2020.

The money supply is the amount of money put into the economy to meet needs such as means of payment and storage needs of subjects in the economy. The measures of money supply include M0, including cash, which is the notes issued by the State Bank circulating outside the banking system; M1, including M0 and demand deposits, which can be withdrawn at any time upon request, under a checking or non-checking account; M2, including M1, savings and term deposits at banks. The authors collect M2 data from the State Bank.

The interest rate referred to in this study is the lending interest rate, which is the expense to be paid by the borrower to use capital from the banking sector. Interest rate is essential to the economy's overall growth and development. The higher the loan interest rate, the higher the cost of capital that the business has to pay; the lower the loan interest rate, the lower the capital cost. The authors collect interest rate data from the State Bank.

Public debt (or Government debt, or national debt) is the total value of money that Governments at all levels, from the central to local levels, borrow to finance budget deficits, so public debt, in other words, is the accumulated budget deficit at a specific point of time. Government debt includes domestic debt (loans from domestic lenders) and external debt (loans from foreign lenders). Public debt data is collected from the IMF as % of GDP.

The authors use Eviews 9.0 to analyze the data. Before analyzing, the study checks and corrects the errors to unify all the data serving the regression model.

4. RESULTS

4.1. Descriptive Statistics Analysis

To estimate the variables in the model, the study first performs descriptive statistical analysis to analyze the variables used in the study. The results of the descriptive statistics analysis are presented in Table 2.

Table 2 presents descriptive statistics of the variables used in the regression model, including mean, standard deviation, minimum and maximum values, skewness, and kurtosis. Regarding the M2 broad money supply, the maximum

Variable	GDP	M2	СРІ	GOV	IR
Mean	10.9188	78.2891	82.2655	77.2073	13.8424
Standard Deviation	0.2387	48.9925	45.8408	57.3535	6.8499
Minimum	10.4943	19.5664	32.2000	36.5415	6.9600
Maximum	11.3028	164.8682	163.5169	230.0000	32.1825
Skewness	-0.1230	0.2687	0.5922	1.7427	1.2222
Kurtosis	1.8798	1.7581	1.7206	4.8542	3.4738
Jarque-Bera	1.441631	2.183332	4.066832	16.23613	5.361351
Probability	0.486356	0.335657	0.130888	0.000298	0.068517
Sum	271.6101	1641.078	1,761.076	1930.182	372.3246
Sum of Squared Deviations	1.0549	38,121.23	33,375.92	78946.21	1,113.463

Table 2. Descriptive Statistics.

value is 164.8682% of GDP in 2020, and the minimum value is 19.5664% of GDP in 1991, representing a continuous growth in the broad money supply during the period from 1991 to 2020. This growth was largely attributed to the role of commercial banks and the administration of the State Bank, which supplied capital for people and businesses in the economy. Regarding the loan interest rate, the mean is 13.8424%, the minimum value is 6,9600%, and the maximum value is 32,1825%, it shows that the average lending interest rate in the Vietnamese market is relatively high, even in some years in the early 90s of the last century, the loan interest rate up to 30% is a burden for businesses. In recent years, the economy has entered the growth phase, the loan interest rate has gradually been lower, and there have been some years the loan interest rate has been less than 7%, which expresses the great efforts of commercial banks in ensuring capital for the economy. In general, the average lending interest rate of the economy has been on a steady downward trend from 1991 to 2020, and the rate may continue to decrease to create more favorable conditions for domestic enterprises.

According to the IMF (2021), from 1991 to 2020, the Government's public debt averaged 77.2073% of GDP, the largest value is 230,0000% of GDP in 1992, and the smallest value is 36,5415% in 2006. Currently, Vietnamese public debt ratio fluctuated around 60% of the GDP from 2015 to 2020 (the public debt ratio is measured in adjusted GDP). It demonstrates that the public debt ratio is maintained reasonably and fairly to harmonize economic development and responsibility for future generations.

To better describe the trend of variables used in the study, Fig. (1) depicts the change in the M2 broad money supply, Fig. (2) shows the movement of public debt, Figure 3 illustrates the lending interest rate, Fig. (4) represents the Consumer Price Index (the base year 2010) and Figure 5 depicts the change in GDP over the period 1991-2020.



Fig. (1). The M2 broad money supply.



Fig. (2). Public Debt (% GDP).





Fig. (4). Consumer Price Index (the base year 2010).



Fig. (5). Gross Domestic Product.

4.2. Correlation matrix analysis and Variance Inflation Factors

Multicollinearity can lead to skewed or misleading results because of the high correlation between the independent variables. Therefore, correlation analysis aims to eliminate possible multicollinearity and help make the study results more reliable and solid.

Table 3. Correlation analysis.

Variable	GDP	M2	СРІ	GOV	IR
GDP	1.0000				
M2	0.9644	1 0000			
	(0.0000)	1.0000			
СРІ	0.9020	0.9173	1 0000		
	(0.0000)	(0.0000)	1.0000		
GOV	-0.7696	-0.6097	-0.4705	1 0000	
	(0.0000)	(0.0012)	(0.0176)	1.0000	
Б	-0.7367	-0.6403	-0.4868	0.8346	1 0000
IK	(0.0000)	(0.0006)	(0.0136)	(0.0000)	1.0000

Table **3** presents the results of the correlation analysis among the variables in the regression model. If the pairs of independent variables are highly correlated, multicollinearity highly exists. The largest correlation coefficient is 0.9173 between M2 and CPI, so there may be multicollinearity for this pair of variables, to check this possibility, the study continues to analyze the variance inflation factor.

Table 4. Variance Inflation Factor.

Variable	VIF	1/VIF
M2	9.32	0.107338
CPI	7.10	0.140814
IR	3.76	0.266172
GOV	3.42	0.292667
Average VIF		5.90

If the Variance Inflation Factor (VIF) is less than 10, multicollinearity will not exist. Table **4** shows that the average VIF is 5.90, the maximum VIF of M2 is 9.32, and all values are less than 10, so multicollinearity is not possible.

4.3. Regression Results

Table 5. OLS Regression results.

The dependent variable: In GDP							
Variable	Coefficient	Standard error	T-statistic	p-value			
M2	0.00257***	0.000247	10.40	0.0000			
CPI	0.00166***	0.000231	7.20	0.0000			
GOV	-0.00119***	0.000104	-11.42	0.0000			
IR	-0.00021	0.000921	-0.24	0.8150			
С	10.6732***	0.01508	707.90	0.0000			

Note: *** demonstrates the standard cutoff of 1%.

Ordinary Least Squares Regression, Table **5** shows that the M2 broad money supply and consumer price index (representing inflation) positively affect economic growth, while public debt has a negative effect. The result also indicates that the lending interest rates do not impact growth.

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1 0.292 2 -0.196 3 -0.310 4 -0.327 5 -0.095 6 0.258 7 0.245 8 -0.033 9 -0.127 10 -0.145 11 -0.315	0.292 -0.308 -0.175 -0.276 -0.046 0.153 -0.010 -0.143 -0.006 -0.028 -0.342 0.112	2.3985 3.5307 6.4724 9.9097 10.212 12.584 14.835 14.878 15.560 16.510 21.283 21.942	0.121 0.171 0.091 0.042 0.069 0.050 0.038 0.062 0.077 0.086 0.031 0.031

Fig. (6). Residual correlation.



Fig. (7). The residuals of the dependent variable.

The results of residual analysis (Fig. 6, Fig. 7, and Fig. 8) indicate that the residuals follow the normal distribution per the Jarque-Bera test with P-value > 0.05 and are statistically non-significant; thus it rejects the hypothesis that the data do not follow a normal distribution. However, to more precisely

compare the study results under the OLS regression, the study conducts the Quantile Regression to compare the experimental results and build a better foundation for policy recommendations.

Appendix 2 presents slope stability in percentiles; the results from the Wald test show Chi-Sq= 5.433193 and are statistically non-significant at the significance level of 5%, accepting the hypothesis that the slopes of the regression line for the percentiles are the same. Appendix 3 tests the symmetry of percentiles, indicating Chi-Sq= 2.219195 and is statistically non-significant at the significance level of 5%, accepting the hypothesis H0 that the symmetry of variables exists. In addition, the Ramsey RESET Test has a P-value > 5%, satisfying the condition that the selected variables in the regression model are appropriate, there is no phenomenon of omitted variables in the model, or it is possible to confirm that essential variables are selected and included in the regression model.

4.4. Discussion

The regression results from the Ordinary Least Squares Regression and the Quantile Regression (Appendix 1) show: (i) M2 Money supply variable has a positive impact on GDP growth in Vietnam in the period 1991- 2020, in which the positive impact of M2 is more substantial at the 40-60% percentile; (ii) Inflation has a positive effect on GDP growth at the 40-50% percentile, meaning that the economy that maintains an inflation rate around the medium value can increase the likelihood of achieving the highest growth and vice versa; (iii) Public debt variable (GOV) has a positive impact on GDP growth at the 0-20% and 60% percentiles and have a negative impact at the 20-50% percentile, or above 60-100%; (iv) Lending interest rate variable (IR) is not statistically significant; there is no evidence of the bond between the lending rate and economic growth at all percentiles. Specifically:

Regarding the M2 broad money supply, M2 money supply variable positively impacts GDP growth in Vietnam from 1991- 2020. The Quantile Regression indicates that the positive impact of the broad money supply on economic growth will be more substantial at the 40% to 60% percentiles; at the

-3.56e-16

-0.003035

0.024268

-0.029908

0.014470

0.033541

2.427589

0.345994

0.841140



Fig. (8). Residual distribution.

other percentiles, although there are positive effects, the impacts are smaller. It means that decisions on choosing appropriate monetary policy instruments are the basis for promoting economic growth, especially in the short term. When loosening monetary policy, the capital for the economy increases, and many businesses can access money at a reasonable cost, which is the basis for promoting economic growth.

 Table 6. Impacts of percentile segmentation on economic growth.

No.	Variable	Percentiles have the optimal impacts on GDP growth	Percentiles have nega- tive/limited impacts on GDP growth
1	Money supply M2	40-60%	0-40% and 60-100%
2	Inflation	40-50%	0-40% and 50-100%
3	Public debt	0-20% or 60%	20-50% or 60-100%
4	Lending inter- est rate	No evidence	No evidence

Regarding inflation, both regression methods show that inflation has a positive effect on economic growth at the 40%-50% percentile. When the economy maintains an inflation rate around the medium value, the probability of achieving growth is highest. Conversely, if inflation rises too high or decreases too low, it will negatively affect economic growth. Specifically, too high inflation could lead to higher capital costs for enterprises and society and cause businesses difficulty maintaining production or ensuring profits, thus affecting shareholders' interests and ultimately affecting GDP growth. Conversely, suppose the economy keeps too low inflation, it can lead to the illiquidity of the economy as depositors have no incentive to deposit money into the banking system, and idle cash is not put into production and business activities. So the economy does not have enough financial resources to put into production and business activities, ultimately affecting GDP growth.

Regarding public debt, both regression methods confirm the relatively solid result that public debt has a negative effect on economic growth at the 0-20% and 60% percentiles, while the impacts in the other percentiles are smaller. If the public debt ratio is low or higher than the medium, economic growth will not reach the most optimal level. The economy which maintains the medium public debt ratio at the 20-50% or above 60-100% percentiles will experience lighter negative impacts on growth.

In economic management, the Government determines the threshold for public debt to be about 48.1% of GDP by 2023 and Government debt to be approximately 44.1% of GDP. The results in this study are consistent with the thresholds set by the Government, and the indicators of Country Policy and Institutional Assessments (CPIA) set forth by the IMF & WB (2005) (Table 7). However, depending on economic development conditions in each period, Vietnam can adjust the public debt ratio, such as changing the GOV to close to the 50% percentile to have more space for economic management. On the contrary, in normal economic conditions, the public debt ratio should be maintained at the planned threshold to ensure national financial security.

According to the IMF & WB (2005), 20-30% of countries having debt status in Table 7 begin to face difficulties in debt payment, which means that these countries are more likely to fall into a debt crisis when there are adverse changes from inside and outside. GDP growth is slower in countries with public debt ratios above 90% (Reinhart et al., 2012). In general, there is no specific optimal threshold for all nations, and each country often has to determine its public debt threshold relevant to domestic contexts and development conditions.

	Country Policy and Institutional Assessments (CPIA) score				
Threshold (%)	Poor CPIA≤2,9	Medium 2,9≤CPIA≤3,6	Strong CPIA≥3,6		
NPV of debt/GDP	30	45	60		
NPV of debt/export turnover	100	200	300		
NPV of debt/State budget revenue ex- cluding aids	200	275	350		
Debt repayment liabil- ity/GDP	15	25	35		
Debt repayment liabil- ity/State budget reve- nue excluding aids	20	30	40		

Table 7. Debt sustainability indicators.

Note: NPV is the net present value of external debts. **Source:** IMF & WB (2005).

Regarding interest rates, the results show no evidence of the impact of lending interest rates on economic growth from 1991 to 2020. In fact, although lending interest rates in the study period tend to decrease, those are still higher the region and the world. In Vietnam, Dong *et al.* (2020) point out that many surveyed businesses, especially small and mediumsized enterprises, disclose that they face many difficulties in accessing credit. Meanwhile, many large enterprises, or state-owned enterprises, have easier access to credit. It may reduce the effect of the interest rate tool in operating monetary policy, thereby negatively impacting the economic growth target.

5. CONCLUSION AND POLICY RECOMMENDA-TIONS

5.1. Conclusion

(1) Regarding M2 money supply, the authors believe that, under normal economic conditions, the percentile threshold of M2 should be 40-60%. In the first two quarters of the year, the percentile threshold may be around 40%, and in the year-end period, M2 money may increase sharply due to an increase in aggregate demand, and the percentile threshold at about 60% will have a good effect on economic

growth. Differences in percentile thresholds are due to seasonality or sudden changes in aggregate demand in the economy.

(2) Regarding public debt. It is a fact that the negative impact of public debt on economic growth usually takes place in the short term. In the long run, effective public investments will positively influence economic growth (Hilton, 2021). Quantitatively, there is an optimal public debt threshold for economies; when the public debt ratio is greater than 51.65% of GDP, borrowing for public spending reduces economic growth. When the public debt ratio is less than 51.65% of GDP, borrowing for public expenditures will encourage economic growth (Panizza & Presbitero, 2013; Law et al., 2021). It indicates that maintaining a reasonable public debt ratio is critical in promoting economic growth, especially for developing countries that greatly need public spending on infrastructure and socio-economic development.

In Vietnam, in the early 1990s, the public debt ratios were very high, but economic growth was low, while in recent years, Vietnam has always tried to control public debt below the target level, and the growth improved better. It shows that maintaining an optimal public debt ratio becomes necessary for the country's economy to ensure sustainable development. When the economy retains a public debt ratio around the medium level, the economy can maintain better public debt management, thus mitigating the negative impact of public debt on economic growth. When the economy retains a meager public debt ratio, politicians often think that a low public debt ratio is unlikely to have a destructive impact on the economy, thereby easily resulting in loose governance, investment effectiveness would not be high, and the economy does not benefit.

(3) Regarding inflation. The Government aims to keep the inflation rate less than 4% in the period 2021-2025 following Resolution No. 99/NQ-CP on the Government's Action Plan for the 2021-2026 term to implement the National Assembly's Resolution on the 5-year Socio-Economic Development Plan, and it could be said that this is a favorable threshold for economic growth because the Vietnamese economy needs to maintain the money supply and regular public spending for development goals. The authors suppose that, under normal economic conditions, the 0-20% or 60% percentiles in inflation will have the most positive meaning for Vietnam's economic growth.

(4) Regarding lending interest rates, although there is no evidence of percentiles for this variable, the authors believe that access to credit by enterprises is a huge problem in Vietnam, significantly affects the implementation of macroeconomic goals, and supports economic sectors and economic growth goals. Therefore, removing barriers to access to capital has a crucial meaning for economic growth.

5.2. Policy Recommendations

This study identifies the percentiles for M2 money supply, inflation, public debt, and lending interest rates, which are critical macroeconomic factors in Public governance. Therefore, determining thresholds, or economic indicators, should be placed in the overall relationship among factors. Besides, the selection of factors' values should be flexible according to the actual situation of the economy but must be within the set threshold, as determined in the percentile in this study. Specifically:

- The Government should maintain discipline in implementing the M2 money supply target and put it in close coordination with fiscal policy to avoid putting excess money supply in the economy, which could cause inflation and macroeconomic instability, typically economic instability in the period 2007-2012, was the result of money supply control and excessive budget spending (Bui Duy Phu, 2008).

- According to Resolution No. 16/2021/QH15 dated July 27, 2021 of the National Assembly on the five-year Socio-Economic Development Plan 2021-2025, the National Assembly sets an annual public debt ceiling target in the period 2021 - 2025 does not exceed 60% of GDP, the warning threshold is 55% of GDP; the Government debt ceiling does not exceed 50% of GDP; warning threshold is 45% of GDP; external debt ceiling does not exceed 50% of GDP; the warning threshold is 45% of GDP. These public debt thresholds are reasonably calculated based on national financial health. However, in ordinary conditions of the economy and the current need for economic recovery after the pandemic with a focus on public spending (the aggregate supply and demand of the private sector both fell sharply), the thresholds of public debt should be around the threshold set the National Assembly or higher than a specific point to promote recovery of the economic growth; however, they should not be near the percentile threshold of 100%.

- Inflation has a positive effect on GDP growth in different conditions of the economy, but inflation at the 20-60% percentile is reasonable for Vietnam. In other words, inflation exceeding the 20-60% threshold can cause economic growth to slow down, the business sector and consumption to stagnate, and have many negative consequences for the economy. Therefore, in economic management, the Government should closely monitor domestic and international price fluctuations, monitor variations in total supply-total demand, and harmonize the supply of money to achieve growth goals.

5.3. The Limitations of the Study

Currently, there are many empirical studies on economic growth at home and abroad, but with different approaches and results. Although 28 observations are not large enough to have the best results for determining percentiles, this is also a general limitation in terms of statistics in Vietnam, and the study could be expanded in the future when the observed data is larger, and the approach is diversified, such as determining the median with a vaster number of observations, or specifying the target of variables to achieve the optimal GDP growth target; predicting future impacts... Another limitation of this study is that it does not consider the effect of the Covid-19 pandemic with its heavy burden on most economic variables, so the thresholds in this study are suitable for the normal economic situation, not for the unstable economic situation.

APPENDICES

Appendix 1. Percentile Regression results.

	Percentile	Coefficient	Standard error	T-statistics	PP-value
	0.200	0.002757	0.000476	5.796234	0.0000
	0.400	0.002450	0.000358	6.839771	0.0000
M2	0.500	0.002432	0.000357	6.810430	0.0000
	0.600	0.002584	0.000362	7.140332	0.0000
	0.800	0.002412	0.000462	5.222004	0.0000
	0.200	0.001652	0.000435	3.793456	0.0011
	0.400	0.001705	0.000350	4.875842	0.0001
СРІ	0.500	0.001703	0.000345	4.942467	0.0001
	0.600	0.001549	0.000340	4.554714	0.0002
	0.800	0.001661	0.000391	4.252396	0.0004
	0.200	-0.001136	0.000198	-5.727218	0.0000
GOV	0.400	-0.001231	0.000238	-5.164831	0.0000
	0.500	-0.001242	0.000232	-5.360450	0.0000
	0.600	-0.001254	0.000222	-5.645851	0.0000
	0.800	-0.001315	0.000262	-5.020026	0.0001
	0.200	0.000538	0.001665	0.323092	0.7500
	0.400	-0.000353	0.001638	-0.215538	0.8315
IR	0.500	-0.000450	0.001613	-0.279223	0.7829
	0.600	-0.000429	0.001566	-0.274179	0.7868
	0.800	0.001639	0.004047	0.405085	0.6897
	0.200	10.62994	0.031908	333.1446	0.0000
	0.400	10.67946	0.026166	408.1364	0.0000
Y-Axis C	0.500	10.68499	0.026452	403.9386	0.0000
	0.600	10.68896	0.026224	407.6058	0.0000
	0.800	10.68183	0.046864	227.9310	0.0000

Note: *, **, *** demonstrate the standard cutoff of 10%, 5%, và 1%, respectively.

Appendix 2. Analysis of Slope stability in percentiles.

Т	`est	Chi-Square Test	Chi-squared distribution	P-value
Wal	d test	5.433193	16	0.9931
Estimated model: $b(tau_h) - b(tau_k) = 0$				
Percentile	Variable	Critical value	Standard error	P-value
0.2, 0.4	M2	0.000307	0.000384	0.4237
	СРІ	-5.38E-05	0.000357	0.8800
	GOV	9.52E-05	0.000196	0.6272
	IR	0.000891	0.001471	0.5446

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0.4, 0.5	M2	1.77E-05	0.000217	0.9347
	СРІ	1.92E-06	0.000210	0.9927
	GOV	1.13E-05	0.000143	0.9367
	IR	9.74E-05	0.000987	0.9213
0.5, 0.6	M2	-0.000152	0.000218	0.4863
	СРІ	0.000154	0.000208	0.4571
	GOV	1.20E-05	0.000138	0.9307
	IR	-2.10E-05	0.000965	0.9826
0.6, 0.8	M2	0.000172	0.000375	0.6462
	СРІ	-0.000112	0.000328	0.7328
	GOV	6.03E-05	0.000245	0.8054
	IR	-0.002069	0.003613	0.5669

Appendix 3. The symmetry of percentiles test.

		Chi-Square Statistic	Chi-squared Distribution	P - value
Wald	Гest	2,219195	10	0,9944
Estimated model:		b(tau) + b(1-tau) - 2*b(.5) = 0		
Percentile	Variable	Critical value	Standard error	P-value
	M2	0.000305	0.000628	0.6274
	CPI	-9.45E-05	0.000582	0.8711
0.2, 0.8	GOV	3.43E-05	0.000393	0.9305
	IR	0.003078	0.004134	0.4564
	С	-0.058221	0.053179	0.2736
	M2	0.000170	0.000320	0.5963
	CPI	-0.000153	0.000309	0.6212
0.4, 0.6	GOV	-6.64E-07	0.000208	0.9974
	IR	0.000118	0.001445	0.9347
	С	-0.001576	0.023679	0.9469

Appendix 4. Goodness-of-Fit test.

	Value	df	P-value
QLR L-statistic	3.95299	1	0.1868
QLR Lambda-statistic	3.62255	1	0.1970
	L Test:		
	Value		
Limited	0.13144		
Unlimited	0.11066		
Ratio	0.01051		
	Lambda Test:		
	Value		

Limited Log	-2.02915
Unlimited Log	-2.20127
Ratio	0.09502

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