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RESEARCH ARTICLE

The Influence of Macroeconomic Variables on External Debt in G7 Countries

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Abstract

The purpose of this research is to use panel data regression analysis and path analysis with the Sobel test mode to examine the impact of macroeconomic factors on foreign debt in G7 nations for the 2019–2023 timeframe. The findings of the research indicate that while interest rates and the money supply have a negative impact on saves, taxes and GDP have a favorable impact. Foreign debt is negatively impacted by the variables of taxes, money supply, interest rates, and savings. Meanwhile, foreign debt is positively impacted by GDP. In addition, interest rates and money supply have a positive impact on foreign debt through savings, whereas GDP and taxes have a negative impact.
Keyword: Debt, Macroeconomic Variables, G7 Countries

INTRODUCTION

The IMF (International Monetary Fund) explains that foreign debt (ULN) is all foreign loan obligations owed by residents of a country to non-residents (IMF, 2025). Foreign debt has a significant impact on a country's economic growth. A nation's economic progress will be hampered by really bad foreign debt, whether it be private or public (Abidin et al., 2022). Developed and developing countries generally need foreign debt to meet their economic needs, one of which is the countries that are members of the G7. The G7 member countries have a very large influence in the global economy and politics. The policies and decisions they take often have a significant impact on other countries in the world. In the G7 countries, external debt can be a useful tool to finance investment and economic growth, so debt management is important to avoid economic and financial risks (Putri & Aimon, 2024). In 2019 to 2023, the foreign debt of the G7 countries experienced fluctuating developments with the highest ratio reaching its peak in 2020 which experienced a rapid increase due to Covid-19, while in the following year, several G7 member countries experienced a decrease in the level of foreign debt due to economic conditions that gradually improved after Covid-19.

The external debt situation and level varies between G7 member countries, this is due to factors such as the magnitude of macroeconomic variables, growth rates and also monetary and fiscal policies (OECD, 2025). Macroeconomic variables reflect a country's economic performance, with strong macroeconomic conditions tending to reduce the need and increase the country's ability to manage foreign debt sustainably. One of the macroeconomic variables is the interest rate, in research (Marliana & Yasa, 2024) shows significant or influential results regarding the relationship between interest rates and foreign debt. The study's outcome have been explained by Keynes' theory that high or low interest rates are unable to encourage productive economic activities because when interest rates decrease, the country will still not be able to encourage economic activities. Increasing interest rates can increase the cost of foreign debt payments for G7 countries, this can be a challenge especially for

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countries with high debt levels (World Bank, 2025).

The average interest rate of G7 countries in 2019-2023 fluctuated, in 2020 and 2021 the average interest rate continued to decline, then in 2022 and 2023 it continued to increase. In 2021, when the average interest rate decreased, followed by a decrease in the average overseas debt. According to Tambunan's research, this is not consistent with the idea. (Afandi, 2022) which states that when foreign interest rates are high, it will make foreign debt more burdensome. borrowing costs and the country that will borrow will think twice about loans with high interest rates and increase the burden of foreign debt payments later, where when costs are high, more state funds will be used to pay the debt, likewise when interest rates are high, foreign debt will be held back or reduced, and vice versa. An increase in the amount of money in circulation is one of the reasons that can lead to a fall in interest rates.

In research (Nuraini & Roup, 2020) getting the result that the increase in the amount of money in circulation will increase foreign debt, in the modern economic system the monetary side is always greater than the real side, consequently the quantity of money in circulation rises. Central banks in the G7 countries implemented expansionary monetary policies such as lowering interest rates to encourage economic growth, this policy led to an increase in liquidity and money supply (IMF, 2025). In the G7 countries in 2020, when the Covid-19 pandemic occurred, the average amount of money in circulation increased, which also had an impact on the increase in the average foreign debt. This is in accordance with the monetary theory in (Obstfeld, M., & Rogoff, 1996) research where the quantity of money in circulation rises can lower interest rates, so that low interest rates will encourage investment and economic growth which will have an impact on increasing imports so that it can encourage an increase in foreign debt. In 2021 and 2022, when there was an increase in the average amount of money in circulation, it was followed by a decrease in the average foreign debt, this is contrary to the theory and research conducted by (Istinganah, 2021) where the quantity of money in circulation rises will also be followed by an increase in foreign debt. The greater a country's foreign debt, the greater the development will be, which will ultimately accelerate a country's economic growth, thus also causing the quantity of money in circulation rises.

Another macroeconomic variable that can affect foreign debt is tax. The higher of tax revenue, the higher the country's ability to finance its expenditures such as infrastructure development, education, health, and others. Strong tax revenue can increase the country's ability to pay its debts (Syamsuri et al., 2024). In recent years, G7 countries have faced challenges related to external debt and taxes, when government spending increased and tax revenues decreased as a result of the COVID-19 epidemic, so that in order to overcome the health and economic crisis, many G7 countries experienced an increase in external debt (OECD, 2025). Ricardian theory in (Syamsuri et al., 2024) research argues that debt is a result of low current tax revenues and will cause the government to bear debt in the future. The situation that occurred in the G7 countries after Covid-19 in 2021 and 2022 is not in accordance with the theory because when the average tax decreases, it is also followed by a decrease in the average foreign debt, and also in 2022 the average tax and foreign debt both decreased. This problem is also not in accordance with (Syamsuri et al., 2024) research which has an impact on increasing government tax revenues, then foreign debt will also decrease because the government can meet its own state budget needs and make foreign debt payments.

There are other factors that can affect foreign debt, namely economic growth as measured by GDP. The higher a country's GDP, the more it will increase the welfare of the community so that it can reduce foreign debt (Marliana & Yasa, 2024). The G7 nations are a collection of wealthy nations with the biggest economies in the world, as

determined by gross domestic product (GDP). In the G7 countries in 2022 and 2023, the average GDP increased which resulted in a decrease in the average foreign debt, this is in accordance with (Romer, 1990) endogenous growth theory which explains that high economic growth can increase investment in research, development, and innovation. This investment can increase productivity and competitiveness, which in turn can increase exports and reduce the need for foreign debt, but this theory and it is not in accordance with research (Abidin et al., 2022) which states that short-term GDP growth has no effect on foreign debt.

Other macroeconomic variable factors that can affect foreign debt are savings, which in this study are intervening variables. The savings-investment gap theory in (Sukirno S, 2006) explains that in an open economy, a country's investment is not only financed by domestic savings but also by capital flows from abroad. If the savings rate is low and investment is high to drive the economy, a savings-investment gap will arise, so that to close the gap the country will tend to seek financing from abroad in the form of foreign debt. With a high savings rate reflecting a country's ability to finance its own investment, this reduces dependence on external financing sources, including foreign debt. In the G7 countries in 2022, it is not in accordance with the theory because in 2021 to 2022, the average savings and foreign debt (ULN) both decreased. In the study (Prasetyo & Kurnia, 2021) explained that the problems faced by developing countries are inseparable from foreign debt management, with limited domestic savings being the reason developing countries take on foreign debt as well as in the G7 countries

Research related to factors affecting foreign debt has been widely conducted, in the description of the background and problems above there are many conflicting studies. In this study, updates or modifications were made to the object, namely the G7 countries and to the variables used, such as the addition of intervening variables, namely savings. The purpose of this study is to determine the effect of macroeconomic variables on foreign debt in G7 countries using an intervening variable, namely savings, using a panel data regression analysis model. This research is expected to enrich insight into the factors that influence foreign debt, especially such as interest rates, money supply (JUB), taxes, and GDP and savings as intervening variables on foreign debt (ULN), especially in G7 countries, in addition to increasing public understanding, especially investors who want to invest by looking back at macroeconomic indicators nationally and globally to expand cooperation, the international economy and help equalize the economy, as well as increase economic growth in a region.

METHOD

This kind of quantitative study seeks to ascertain how macroeconomic factors affect foreign debt (ULN) in G7 nations. The objects in this study are the G7 countries consisting of the United States, Canada, Italy, Japan, England, France, and Germany. The Annual data from each independent variable, namely interest rates, money supply (JUB), taxes and GDP, intervening variables, namely savings, and dependent variables, namely foreign debt (ULN) from the official websites of the World Bank and IMF (International Monetary Fund) taken in the period 2019 to 2023 is used as secondary data in this study.

This study employs Eviews-12 software to analyze panel data using a multiple linear regression data analysis model. The method used is Path Analysis and Sobel Test to determine the direct and indirect effects of interest rates, money supply, taxes and GDP on foreign debt with savings as an intervening variable. The regression equation model used is as follows:

$$Z_{it} = \alpha + \beta 1X1_{it} + \beta 2X2_{it} + \beta 3X3_{it} + \beta 4X4_{it} + \varepsilon_{it} \text{ ..... (1)}$$

$$Y_{it} = \alpha + \beta 1X1_{it} + \beta 2X2_{it} + \beta 3X3_{it} + \beta 4X4_{it} + \beta 3Z_{it} + \varepsilon_{it} \text{ ..... (2)}$$

Where:

Z = Savings
Y = Foreign debt
$X1_{it}$ = Interest rate
$X2_{it}$ = Money supply
$X3_{it}$ = Tax
$X4_{it}$ = GDP
Z_{it} = Savings
α = Constant
β = Regression coefficient
εt = Error term

The research hypothesis is as follows:

H_1 : Interest rates have a positive effect on savings
H_2 : The amount of money in circulation has a positive effect on savings
H_3 : Taxes have a positive effect on savings
H_4 : GDP has a positive effect on savings
H_5 : Savings have a positive effect on foreign debt
H_6 : Interest rates have a positive effect on foreign debt
H_7 : The amount of money in circulation has a positive effect on foreign debt
H_8 : Taxes have a positive effect on foreign debt
H_9 : GDP has a positive effect on foreign debt
H_{10} : Interest rates have a positive effect on foreign debt through savings
H_{11} : The amount of money in circulation has a positive effect on foreign debt through savings
H_{12} : Taxes have a positive effect on foreign debt through savings
H_{13} : GDP has a positive effect on foreign debt through savings

RESULTS AND DISCUSSION

Model Identification

This analysis's goal is to evaluate the variables' direct and indirect relationships., in addition the model only consists of observed variables, namely interest rates, money supply, taxes, GDP, savings and foreign debt.

Rank Test dan Order Test

This test is conducted to ensure that the structural model can be estimated uniquely and validly, so that the results of causal analysis such as Path Analysis or Structural Equation Modeling (SEM) have a strong statistical basis. There are six variables observed, namely X_1 (Interest rate), X_2 (Money supply), X_3 (Tax), X_4 (GDP), Z (Savings), and Y (Foreign debt).

Counting Rules

The variance-covariance matrix's unique data must equal or exceed the number of free parameters that need to be estimated.

Number of information= $\frac{k\,(k+1)}{2} = \frac{6\,(6+1)}{2} =$ 21

Where:
k is the number of variables observed in the model.

Number of parameters estimated
X_1, X_2, X_3, X_4 to Z = 4 lanes
X_1, X_2, X_3, X_4, Z to Y = 5 lanes
Total lines are 9.

Variance of exogenous variables = X_1, X_2, X_3, X_4 (4 varians).

The error variance (residual) on the endogenous variables, namely Z (residual of the regression results of X_1 to X_4) and Y (residual of the regression results of X1 to X4 and Z), then there are 2 error variances.

Total Parameters
Total Parameters = path + exogenous variable + error variable = 9 + 4 +2 = 15 parameters.

Number of information > Number of parameters

21 > 15

So the overidentified model with positive degrees of freedom (df > 0) or can be estimated uniquely and validly from the covariance or correlation matrix of observed data, making it possible to test the suitability of the model to the data using the Path Analysis model because the variables are also identified as overidentified.

Data Analysis

Model Selection Test

The selection of the best model is required to determine which approach is most appropriate in estimating panel data parameters.

a. Chow Test

The Chow test is used to determine whether the Fixed Effects Model (FEM) approach is better than the Common Effects Model (CEM) approach used to estimate panel data.

Table 1. Chow Test

Redundant Fixed Effects Tests	PROBABILITY	
Effect Test	**Equation 1**	**Equation 2**
Cross–Section F	0.0000	0.0000
Cross–Section Chi–Square	0.0000	0.0000

Source: Processed data, 2025

b. Hausmant Test

The Hausman test is a test used to select the best Fixed Effects Model (FEM) or Random Effects Model (REM) approach to estimate panel data.

Table 2. Hausmant Test

Corelated Random Effect	PROBABILITY	
Effect Test	**Equation 1**	**Equation 2**
Cross–Section Random	0.0026	0.0000

Source: Processed data, 2025

c. Langrange Multiplier Test

The Random Effects Model (REM) method is evaluated for superiority over the Common Effects Model (CEM) using the Lagrange Multiplier Test).

Table 3. Langrange Multiplier Test

Lagrange Multiplier Test for Random Effect	PROBABILITY	
Effect Test	**Equation 1**	**Equation 2**
Bresuch_pagan	0.0000	0.5010

Source: Processed data, 2025

There are differences in model selection from the two equations above. In equation 1 it can be concluded that the model used is the Random Effect Model (REM), because seen from the Hausman Test and the Lagrange Multiplier (LM) Test the probability value of Cross-section random and Bresuch pagan <0.05. While in equation 2 show the probability value of the cross-section random and Bresuch pagan >0.05, as determined by the Hausman Test and the Lagrange Multiplier (LM) Test, leads to the conclusion that the Common Effect Model (CEM) is the model in use.

Classical Assumption Test

The classical assumption test is an important step in regression analysis which aims to evaluate whether the data used in the study meets the basic requirements of classical linear regression.

a. Multicollinearity Test

Multicollinearity is a test that aims to detect the existence of a perfect or definite linear relationship between some or all of the independent variables in the regression model used.

Table 4. Multicollinearity Test Equation 1

	X1	X2	X3	X4
X1	1.000000	0.354135	-0.261608	0.058480
X2	0.354135	1.000000	-0.557064	-0.029290
X3	-0.261608	-0.557064	1.000000	0.373335
X4	0.058480	-0.029290	0.373335	1.000000

Source: Processed data, 2025

Table 5. Multicollinearity Test Equation 2

	X1	X2	X3	X4	Z
X1	1.000000	0.354135	-0.261608	0.058480	0.059729
X2	0.354135	1.000000	-0.557064	-0.029290	-0.218795
X3	-0.261608	-0.557064	1.000000	0.373335	0.547724
X4	0.058480	-0.029290	0.373335	1.000000	0.765050
Z	-0.059729	-0.218795	0.547724	0.765050	1.000000

Source: Processed data, 2025

In equations one and two, no variables exceed 0.90, so it can be assumed that both equations have passed multicollinearity.

b. Heteroscedasticity Test

The heteroscedasticity test is conducted to check whether there is a violation of the classical assumptions in the regression model. This test aims to detect whether the residual variance is constant or not.

Table 7. Heteroscedasticity Test of Equation 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.022372	0.380497	0.058798	0.9535
Interest Rate	-0.000585	0.002437	-0.240184	0.8118
Money Supply	0.017856	0.011827	1.509746	0.1416
Tax	0.001114	0.002325	0.479362	0.6352
GDP	-0.000703	0.031255	-0.022482	0.9822

Source: Processed data, 2025

Table 8. Uji Heterokedaktisitas Persamaan 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.315697	0.178661	1.767018	0.0877
Interest Rate	-0.000687	0.003109	-0.220909	0.8267
Money Supply	-0.002112	0.006966	-0.303228	0.7639
Tax	0.001019	0.002018	0.504693	0.6176
GDP	0.091450	0.093063	0.982662	0.3339
Savings	-0.122261	0.100165	-1.220598	0.2321

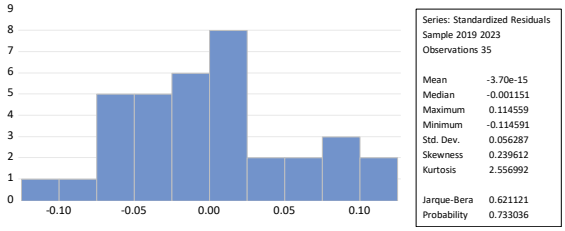
Source: Processed data, 2025

In the results of the heteroscedasticity test calculations for the variables, equations one and two both exceed the significance level (5%) meaning that there is no heteroscedasticity problem.

c. Normality Test

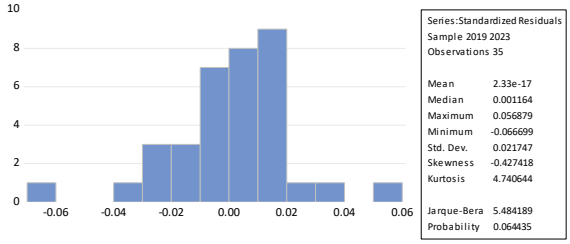
The purpose of the normality test is to determine if the linear regression model's residual or disturbance variables have a normal distribution.

Figure 1. Normality Test of Equation 1



Source: Processed data, 2025

Figure 2. Normality Test of Equation 2



Source: Processed data, 2025

In the study of equation one, the Jarque-bera (JB) probability value is 0.733036 > 0.05, so in equation one there is no normality problem and in equation two, the Jarque-bera (JB) probability value is 0.064435 > 0.05, so in equation two there is no normality problem.

d. Autocorrelation Test

The purpose of the autocorrelation test is to ascertain whether the residual from a linear regression model at one time and the disturbance variable (residual) at another time are related or correlated.

Table 9. Autocorrelation Test Equation 1

R-square	0.928016	Mean dependent var	3.214201
Adjusted R-square	0.918418	S.D. dependent var	0.104738
S.E of regression	0.029916	Sum squared resid	0.026849
F-statistic	96.68989	Durbin-Watson stat	1.760307
Prob(F-statistic)	0.000000		

Source: Processed data, 2025

Table 10. Autocorrelation Test Equation 2

R-square	0.931815	**Mean dependent var**	2.070274
Adjusted R-square	0.920059	**S.D. dependent var**	0.169099
S.E of regression	0.047811	**Akaike info criterion**	-3.088320
Sum squared resid	0.066291	**Schwars criterion**	-2.821689
Log likelihood	60.04560	**Hannan-Quinn criter.**	-2.996279
F-statistic	79.26250	**Durbin-Watson stat**	0.935146
Prob(F-statistic)	0.000000		

Source: Processed data, 2025

In the first equation of this study, the Durbin-Watson stat value is 1.760307 and in the second equation, the Durbin-Watson stat value is 0.935146, so there is no autocorrelation in the first and second equations.

Regression Analysis

In this study, panel data regression analysis was carried out twice, namely in equations 1 and 2.

Figure 3. Regression Results of Equation 1

Dependent Variable: TABUNGAN
Method: Panel EGLS (Cross-section random effects)
Date: 05/12/25 Time: 03:45
Sample: 2019 2023
Periods included: 5
Cross-sections included: 7
Total panel (balanced) observations: 35
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.560778	0.561165	-0.999310	0.3256
SUKU_BUNGA	-0.003456	0.002921	-1.183269	0.2460
JUB	-0.051700	0.017241	-2.998572	0.0054
PAJAK	0.004315	0.002957	1.459067	0.1549
PDB	0.983904	0.045623	21.56602	0.0000

Source: Processed data, 2025

Based on the results of the panel data regression estimation above, the model in equation 1 that is appropriate in this study is the Random Effect Model (REM), the following is the panel data regression estimation model equation.

$Z = -0.560778 – 0.003455X1_{it} - 0.051699X2_{it} + 0.004315X3_{it} + 0.983903X4_{it} + e_{it}$

Based on the estimation results and regression equations above, it can be explained that savings have a coefficient value of C of 0.560778, this proves that when all independent variables such as interest rates (X_1), money supply (X_2), taxes (X_3), and GDP (X_4) are zero, then the savings rate (Z) as the dependent variable is predicted to decrease by 0.56% assuming ceteris paribus. Every 1% increase in the money supply (X2) will result in a 0.05% decline in savings (Z), and every 1% increase in interest rates (X1) will make savings (Z) 0.003% smaller, every 1% increase in taxes (X_3) will increase savings (Z) by 0.004%, and every 1% increase in GDP (X_4) will increase savings (Z) by 0.98% assuming ceteris paribus.

Figure 4. Regression Results of Equation 2

Dependent Variable: LOG_ULN
Method: Panel Least Squares
Date: 06/17/25 Time: 13:54
Sample: 2019 2023
Periods included: 5
Cross-sections included: 7
Total panel (balanced) observations: 35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.743868	0.145197	5.123157	0.0000
SUKUBUNGA	-0.003612	0.002527	-1.429331	0.1636
JUB	-0.106517	0.005661	-18.81446	0.0000
PAJAK	-0.009425	0.001640	-5.746620	0.0000
PDB	0.451675	0.075632	5.971991	0.0000
TABUNGAN	-0.456331	0.081404	-5.605775	0.0000

Source: Processed data, 2025

Based on the results of the panel data regression estimation above, the model in equation 2 that is appropriate in this study is the Common Effect Model (CEM), the following is the panel data regression estimation model equation.

$LOG\_Y = 0.743868 – 0.003612X1_{it} - 0.106517X2_{it} - 0.009425X3_{it} + 0.451675X4_{it} – 0.456331\ Z_{it} + e_{it}$

Based on the estimation results and regression equations above, it can be explained that foreign debt has a coefficient value of C of 0.743868, this proves that when all independent variables such as interest rates (X_1), money supply (X_2), taxes (X_3), and GDP (X_4) are zero, then the level of foreign debt (Y) as the dependent variable is predicted to increase by 0.74% assuming ceteris paribus. Every 1% increase in interest rates (X_1) will reduce foreign debt (Y) by

0.003%, every 1% increase in money supply (X_2) will reduce foreign debt (Y) by 0.10%, every 1% increase in taxes (X_3) will reduce foreign debt (Y) by 0.009%, and every 1% increase in GDP (X_4) will increase foreign debt (Y) by 0.45%, and every 1% increase in savings (Z) will reduce foreign debt (Y) by 0.45% assuming ceteris paribus.

Statistical Test of Regression Analysis

Statistical tests consist of partial tests (t-test), simultaneous tests (f-test) and determination coefficient tests (R^2).

a. Coefficient of Determination (R^2)

The coefficient of determination (R^2) is basically used to measure the extent to which the model is able to explain the variations that occur in the dependent variable.

Table 11. Coefficient of Determination (R^2)

Equality	R-Square (R^2)
Equation 1	0.918418
Equation 2	0.920059

Source: Processed data, 2025

In the test results that have been carried out on equation 1, the variables of interest rates, money supply, taxes, and GDP are able to explain the savings variable by 0.91 or 91%, while the remaining 9% is explained by other variables. In equation 2, the variables of interest rates, money supply, taxes, GDP, and savings are able to explain the savings variable by 0.92 or 92%, while the remaining 8% is explained by other variables.

b. F test (simultaneous)

The F test is used to test whether independent variables simultaneously or together have an influence on the dependent variable. This test is done by comparing the F-statistic value with the F-table.

Table 12. F Test

Equality	Prob (F-Statistic)
Equation 1	0.00000
Equation 2	0.00000

Source: Processed data, 2025

In equation 1, the value of prob f stat 0.00000 < 0.05 means that simultaneously the variables of interest rate, money supply, tax, and GDP affect savings and in equation 2, the value of prob f stat 0.00000 < 0.05 means that simultaneously the variables of interest rate, money supply, tax, GDP, and savings affect foreign debt.

c. t-test (partial)

The t-statistic test is a test to determine the partial effect of independent variables on dependent variables. The t-test is carried out by looking at the probability value of the independent variables.

Table 13. t-Test

Variable	Equation 1	Equation 2
	Prob. T-stat	Prob. T-stat
X1	0.2460	0.1636
X2	0.0054	0.0000
X3	0.1549	0.0000
X4	0.0000	0.0000

Source: Processed data, 2025

Based on the results of testing equation 1, the probability value of t statistic X_1 (interest rate) is 0.2460 > 0.05, so the interest rate variable does not affect savings. For the probability value of X_2 (money supply) 0.0054 < 0.05, then the money supply variable affects savings. The probability of X_3 (tax) is 0.1549 > 0.05, which means that the tax variable does not affect savings. For the probability value of X_4 (GDP) 0.0000 < 0.05, it means that the GDP variable affects savings.

The results of testing equation 2, the probability value of X_1 (interest rate) is 0.1534 > 0.05, so the interest rate variable has no effect on foreign debt. The probability value of X_2 (money supply) is 0.0000 <0.05, which means that the money supply variable has an effect on foreign debt. For the probability value of X_3 (Tax) 0.0000 <0.05, the tax variable has an effect on foreign debt. At the probability value of X_4 (GDP) 0.0000 <0.05, the GDP variable has an effect on foreign debt. While for the probability value of Z (Savings) 0.0000 <0.05, the savings variable has an effect on foreign debt.

Path Analysis

Path Analysis is used to test the influence of intervening variables. Path analysis is a development of multiple regression that allows analysis of the relationship between independent variables and dependent variables directly or indirectly.

Sobel Test

The purpose of the Sobel test is to ascertain if the relationship can be significantly mediated by intervening variables. The following is the Sobel test for the relationship between interest rates (X_1) and foreign debt (Y) through savings (Z), the relationship between the amount of money in circulation (X_2) and foreign debt (Y) through savings (Z), the relationship between taxes (X_3) and foreign debt (Y) through savings (Z), and the relationship between GDP (X_4) and foreign debt (Y) through savings (Z).

Table 14. Sobel Test

Variable	*Coeficient/ Indirect Effect*	*t-Statistic*	*One Tailed Probability*	*TwoTailed Probability*
X1	0.00155142	1.14004903	0.12713294	0.25426588
X2	0.02359071	2.64423908	0.00409374	0.00818748
X3	-0.00196665	-1.41378693	0.07871224	0.15742447
X4	-0.044895357	-5.42538836	0.00000003	0.00000006

Source: Processed data, 2025

In the calculation results of the Sobel test, variable X_1 obtained a one-sided probability value of 0.127132 and a two-sided probability value of 0.254265. Both values are greater than the 5% significance level and with a t-statistic value of 1.14004903. So it can be concluded that variable X_1 has a positive effect on variable Y through variable Z with a coefficient value or indirect effect of 0.001551, but through the results of one-sided and two-sided probabilities indirectly, the savings variable is unable to mediate the effect of the interest rate variable on the foreign debt variable.

In the variable of money supply (X_2) has a one-sided probability value of 0.004093 and a two-sided probability of 0.008187, both of which are smaller than the 5% significance level. So it can be concluded that the variable X_2 has a positive effect on the variable Y through the variable Z with a coefficient value or indirect effect of 0.02359 or indirectly the savings variable is able to mediate the effect of the variable of money supply on the foreign debt variable.

Meanwhile, for the tax variable (X_3), the probability value of one side and two sides is greater than the significance level of 5% and with a t-statistic value of -1.413786. So it can be concluded that the variable X_3 has a negative effect on Y through Z with a coefficient value or indirect effect of -0.001966. Indirectly, the savings variable is unable to mediate the tax variable against the foreign debt variable. In the GDP variable (X_4), the one-tailed and two-tailed probability values are smaller than the 5% significance level and with a t-statistic value of -5.425388. So it can be concluded that the X_4 variable has a negative effect on the Y variable through the Z variable with a coefficient value or indirect effect of -0.04489535. However, through the results of the one-tailed and two-tailed probabilities, the savings variable is able to indirectly mediate the effect of the GDP variable on the foreign debt variable.

The effect of interest rates on savings

According to the Random Effect Model n(REM) approach, it shows that the interest rate variable has a negative effect on the savings variable so that H_1 is rejected. This is in line with research conducted by (Felici, M., Kenny, G., & Friz, 2023) demonstrates that savings may react negatively to changes in interest rates at very low and negative interest rates.

Also supported by research (Staal, 2023) which found that negative interest rates significantly increase savings. This result is in line with the Keynesian approach in Savings Theory which explains that rising interest rates can suppress consumption and investment, inhibit economic growth and income, and ultimately reduce national savings (Keynes, 1936).

The effect of the amount of money in circulation on savings

Based on the Random Effect Model (REM) approach, it shows that the variable of the amount of money in circulation has a negative effect on savings so that H_2 is rejected. This result is also explained by (Friedman, 1957) in the Consumption Function Theory which states that a raise in the amount of money in circulation that is not considered permanent by individuals tends to increase consumption and reduce savings. This theory is also supported by research (Widodo, B. & Susanti, 2023) which states that an increase in the amount of money in circulation as a monetary policy to stimulate the economy results in inflationary pressures. When inflation increases, the purchasing power of savings decreases in real terms so that in aggregate it reduces the savings rate.

The effect of taxes on savings

Based on the Random Effect Model (REM) approach, it shows that the tax variable has a positive effect on savings so that H_3 is accepted. These results are supported by the Keynesian Consumption Function theory which explains that savings are the difference between income spent and consumption. If taxes increase, then income spent will decrease so that savings will also decrease (Keynes, 1936). This is consistent with studies carried out by (Heider et al., 2021) which states that higher tax revenues contribute significantly to increasing government savings in developing countries so that there is a positive relationship between taxes and savings.

The effect of GDP on savings

According to the Random Effect Model (REM) approach, it shows that the GDP variable has a positive effect on savings so that H4 is accepted. Supported by the Endogenous growth theory of Romer & Barro, it shows that a growing economy (increasing GDP) tends to encourage capital accumulation through domestic savings. High GDP increases the income of people and companies, thus allowing for increased savings (household & corporate savings). According to studies carried out by (Brueckner et al., 2021), It was discovered that, particularly in developing nations, GDP per capita growth accelerates the growth rate of national savings rates.

Impact of savings on foreign debt

Based on the Common Effect Model (CEM) approach, it demonstrates that foreign debt is negatively impacted by the savings variable, leading to the rejection of H_5. In accordance with the Saving-Investment Gap Theory, if domestic savings are low, then to finance national investment the country must seek financing from abroad in the form of foreign debt. Conversely, if national savings increase, the need for foreign financing will decrease and foreign debt will decrease (Todaro & Smith, 2020). This is supported by research conducted by (Rahman, M. M., & Salahuddin, 2021) which found that research on 50 developing countries showed that increasing domestic savings significantly reduced the level of foreign debt, so that theoretically and empirically, high domestic savings can reduce the need for external financing (including ULN), thus having a negative impact on the level of foreign debt.

The effect of interest rates on foreign debt

Through the Common Effect Model (CEM) approach, it demonstrates that interest rates have a detrimental impact on foreign debt, leading to the rejection of H_6. This is supported by research (Marliana & Yasa, 2024) which is explained by Keynes' theory where there was an economic recession after Covid-19, so that interest rates did not affect the economy, especially the level of foreign debt (ULN). High or low interest rates are unable to encourage productive economic activities because when interest rates decrease, the country will still not be able to boost economic activities. This is further corroborated by study. (Kudaisi, 2020) showing that rising borrowing costs brought about by global interest rate increases have significantly reduced the amount of foreign debt in Sub-Saharan nations. Due to higher borrowing costs and currency rate risks, an increase in interest rates may decrease the country's desire or capacity to take on more foreign debt.

The Influence of Money Supply on Foreign Debt

According to the Common Effect Model (CEM) approach, it demonstrates that foreign debt is negatively impacted by the amount of money in circulation, leading to the rejection of H_7. This result is in line with the Keynesian Liquidity Preference and Interest Rate Theory which demonstrates how interest rates will drop as the amount of money in circulation rises. In order to pay the budget deficit without having to borrow money from outside, low interest rates will promote local investment and raise domestic savings (Keynes, 1936). This is corroborated by studies carried out by (Nur et al., 2017) which found a negative correlation between the amount of money in circulation and foreign debt over the long term, meaning that a rise in the amount of money in circulation will lower the amount of foreign debt. In this instance, this is because the government, acting as a stabilizing agent, can distribute the money in circulation throughout the region, making it more resilient to shocks to the global economy.

The impact of taxes on foreign debt

Based on the Common Effect Model (CEM) approach, it shows that taxes have a negative effect on foreign debt so that H_8 is rejected. This is in line with the Keynesian theory in (Mankiw, 2019), namely the existence of taxes as a fiscal policy tool to influence aggregate demand and output. Increasing taxes can reduce aggregate demand, thereby reducing the need for government debt.

Impact of GDP on foreign debt

Based on the Common Effect Model (CEM) approach, the results of the study indicate that GDP has a positive effect on foreign debt so that H_9 is accepted. The supporting theory is the endogenous growth theory according to (Romer, 1990) which explains that high economic growth can increase investment in research, development, and innovation. This investment can increase productivity and competitiveness, which in turn can increase exports and reduce the need for foreign debt. This result is in line with research conducted by (Cahyaningrum et al., 2022) which states that GDP growth has a positive and significant effect on the growth of a country's foreign debt. Although the economy is experiencing rapid growth, the macroeconomic imbalance that occurs is accompanied by low domestic resource mobilization, causing dependence on increasing economic debt even in the long term.

The impact of interest rates on foreign debt through savings

Based on the estimation results that have been carried out by researchers using the Sobel test regression, it shows that the interest rate variable has a positive effect on foreign debt through savings so that H_{10} is accepted. Supported by the Classical Theory of Savings and Interest in (Mankiw, 2019) states that savings are a function of interest rates. When interest rates increase, the incentive to save also increases because individuals get higher returns on their savings. Also supported by the theory developed by Harrod Domar (Sukirno S, 2006) which states that the gap between domestic savings and investment needs (savings-investments gap) must be closed by capital flows from abroad, one of which is through foreign debt. If domestic savings are low, then dependence on foreign debt will increase to finance development.

The influence of the amount of money in circulation on foreign debt through savings

Based on the estimation results that have been carried out by researchers using the Sobel test regression, it shows that the variable of the amount of money in circulation has a positive effect on foreign debt through savings. So H_{11} is accepted. These results are supported by research (Mohamed, A. H., & Salisu, 2022) which shows that the amount of money in circulation has a significant positive effect on national savings in developing countries because it has encouraged liquidity in the financial sector and increased banking intermediation.

The impact of taxes on foreign debt through savings

Based on the estimation results that have been carried out by researchers using the Sobel test regression, it shows that the tax variable has a negative effect on foreign debt through savings so that H_{12} is rejected. This is in line with research conducted by (Smith, J. & Jones, 2021) which found that increasing income tax progressivity tends to be negatively correlated with savings rates due to the disincentive effect on high-income groups who have a greater tendency to save. Regarding the relationship between savings and foreign debt, it is supported by research conducted by (Rahman, M. M., & Salahuddin, 2021) which found that a study of 50 developing countries showed that increasing domestic savings significantly reduced the level of foreign debt, so that theoretically and empirically, high domestic savings can reduce the need for external financing (including ULN), thus having a negative impact on the level of foreign debt.

Impact of GDP on external debt through savings

Based on the estimation results carried out by researchers using the Sobel test regression, it shows that the GDP variable has a negative effect on foreign debt through savings so that H13 is rejected. Supported by research (Ichi, A., 2022) that the government tends to be pro-cyclical, namely when GDP increases, there will be an increase in spending faster than income so that net savings actually decrease.

Disscussion

Using the outcomes of route analysis with the Sobel test and panel data regression, the interest rate variable shows a negative relationship to savings in G7 countries during the 2019-2023 period. This can be justified by several possibilities, one of which is when the country experiences a global recession such as COVID-19, there is an increase in interest rates but the public and government actually reduce savings for consumption and stimulus (Heider et al., 2021). In the case of the money supply variable, it also shows a negative relationship. This can be justified because an increase in the money supply without an increase in output often triggers inflation. Inflation erodes purchasing power so that people and governments tend to avoid saving money in the form of savings because its value continues to decline (Mishkin, 2019).

The savings variable shows a negative relationship to external debt in G7 countries. This can happen because countries with high savings rates can fund investment and government spending internally, this will reduce the need to borrow from abroad which significantly reduces financing from external debt (Kuncoro, 2022). The interest rate variable also has a negative relationship to external debt because when international interest rates rise, some countries stop accumulating external debt as part of a macroprudential response (Kose, M. A., 2024).

The money supply variable also shows a negative relationship to foreign debt. This is justified by the possibility that when the money supply increases, the government and the private sector have easier access to domestic funds, thereby reducing dependence on external financing and foreign debt tends to decrease (Basri, 2020). The tax variable also shows a negative relationship to foreign debt in the G7 countries, this is due to several possibilities. One possibility is because higher tax revenues will cover the fiscal deficit so that the government does not need to seek additional financing from abroad (IMF, 2025).

The tax variable also has a negative relationship to foreign debt through savings. If taxes reduce national savings, the gap between savings and domestic investment widens so that the government seeks external financing through foreign debt (Feldstein & Horioka, 1980). In addition, there is a GDP variable that has a negative relationship to foreign debt through savings. This is because an increase in GDP will increase income, thereby increasing savings and reducing the need for foreign debt. In research (Nguyen, T. H. & Vo, 2022) an increase in GDP tends

to increase the savings ratio and countries with high savings rates have lower levels of foreign debt.

Limitation Of The Study

One of the limitations of this study is that the findings from the G7 countries as developed countries cannot be directly generalized to developing countries or emerging markets due to the very significant differences in debt structure, financing sources, and macroeconomic stability. In addition, this study treats the G7 countries as a homogeneous group in responding to macroeconomic variables. In fact, the economic structure, fiscal/monetary policies, and fiscal resilience of each country are different, which may cause the aggregate results to not represent the specific conditions of each country.

Conclusions and Recommendations

Considering the outcomes of panel data regression analysis and path analysis using the Sobel test for the 2019-2023 period, it can be concluded that there are two variables that have a positive effect on savings, namely taxes and GDP, while interest rates and money supply have a negative effect. Foreign debt is negatively impacted by the factors of taxes, money supply, interest rates, and savings. While GDP has a positive effect on foreign debt. In addition, there are two variables that have a beneficial influence on foreign debt through savings, namely interest rates and money supply, while taxes and GDP have a negative effect.

The advice that can be given to the government is to control rates of interest and the quantity of money in use because both reduce savings and indirectly increase foreign debt. In addition, strengthen the role of savings as a buffer for foreign debt by encouraging policies that increase the national savings ratio. The government also needs to manage economic growth carefully.

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