The Influence of Past Investments and Macroeconomic Factors on Current Non-Financial Investments

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Abstract

This research investigates the determinants of economic growth in a developing country context, utilizing secondary data from the World Bank spanning 1972 to 2016. The ARDL (Autoregressive Distributed Lag) estimation technique is employed to analyze the relationships between net investment in non-financial assets, GDP per capita growth, taxes on income, profits, and capital gains, and economic growth. The findings reveal that all three independent variables exert a positive and statistically significant impact on economic growth. In simpler terms, the study suggests that increasing investments in non-financial assets, achieving higher GDP per capita growth rates, and implementing effective taxes on income, profits, and capital gains can all contribute positively to economic expansion in developing countries.

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Introduction

Investment plays a crucial role in fostering economic growth within a nation. It manifests in diverse forms, including non-financial investment, which entails allocating resources into tangible assets like real estate, infrastructure, and machinery. Such investments are instrumental in enhancing a company's production capabilities and competitive edge (Siregar et al., 2023). In general, it can be asserted that the investment made in non-financial assets during the preceding period holds considerable sway over the investment decisions concerning non-financial assets in the current period. Through diligent evaluation and refinement of investment strategies, investments from prior periods can be leveraged as a potent mechanism to stimulate investment activities in corporate finance during the current period. This study intends to examine the impact of past-period non-financial asset investment on present non-financial asset investment (Trisantosa et al., 2022).

Investing in non-financial assets during the preceding period significantly influences current investment decisions in such assets. The success of previous investments serves as a positive indicator for current investment decisions. Profitable outcomes from prior investments encourage companies to continue investing in the current period, underscoring the importance of past investment performance. Consequently, prior-period investments positively impact current investment activities. Additionally, previous investment endeavors contribute valuable insights and expertise to the company's knowledge base (Remelko & Setiawan, 2021).

Various elements can impact non-financial investments, including historical investment trends and macroeconomic indicators. Previous investments provide insights for investors regarding future economic outlooks. Furthermore, macroeconomic elements like interest rates, inflation levels, and overall economic expansion can sway decisions regarding non-financial investments (Wati, 2021).

Literature Review

The insights and expertise gained from past investments are valuable assets that companies can utilize to improve their investment decisions in the present period. Consequently, previous investments can positively impact current investment endeavors. However, it's crucial to recognize that this beneficial influence of prior investments on current ones is contingent upon companies evaluating and adapting their investment strategies. Thus, it's essential for companies to consistently assess and refine their investment approaches based on the outcomes of past investment activities (Hasan et al., 2022).

To begin, let's elucidate the concept of NINFA. NINFA encompasses a company's investments in tangible assets like land, buildings, machinery, and equipment, reflecting its enduring commitment to growth and development. The positive relationship observed between prior-period NINFA and current NINFA holds intriguing implications. Profitable investments made by companies in the past can bolster their financial standing, enabling them to persistently allocate resources to productive assets. Hence, sustained growth in NINFA serves as a promising indicator of performance. Furthermore, the correlation between past and present NINFA offers insights into a company's investment strategy. Consistent allocation of funds towards non-financial assets that yield profits signals prudent management policies. Nonetheless, it's imperative to consider additional factors influencing NINFA, such as market dynamics, regulatory frameworks, and technological advancements. Consequently, further analysis is warranted to comprehensively comprehend the impact of prior-period NINFA on current NINFA (Kirono et al., 2022). Drawing from prior research, we formulate the following hypothesis:

H1: Net Investment in Non-Financial Assets in the previous period had a significant positive effect on Net Investment In Non-Financial Assets.

The growth of GDP per capita plays a crucial role in a nation's economy, particularly concerning investment activities. One notable consequence of GDP per capita growth is its impact on Net Investment in Non-Financial Assets (NINFA). GDP per capita growth is likely to exert a positive influence on this investment, particularly during the current period (Matondang & Manulang, 2019).

The increase in GDP per Capita can serve as a catalyst for investment in non-financial assets through various channels. For instance, as GDP per Capita rises, individuals' purchasing power grows, prompting companies to invest in non-financial assets to meet heightened public demand. Moreover, the growth in GDP per Capita can enhance investor confidence in a country's economic stability, leading to a greater willingness to invest in non-financial assets. Nonetheless, it's crucial to note that the positive impact of GDP per Capita growth on Net Investment in Non-Financial Assets hinges on the improvement in people's quality of life following the economic growth. Therefore, continuous governmental efforts are necessary to ensure that economic progress translates into tangible benefits for all societal strata (Khoiruddin, 2023).

In summary, it can be concluded that the growth of GDP per Capita significantly impacts Net Investment in Non-Financial Assets. When GDP per Capita experiences robust and equitable growth, it can effectively stimulate investments in non-financial assets (Setiawati & Alqoodir, 2021). Drawing from prior studies, we formulate the following hypothesis:

H2: GDP Growth per Capita has a significant positive effect on Net Investment In Non-Financial Assets for the current period.

Inflation plays a significant role in a nation's economy, particularly regarding investment. A notable consequence of inflation is its effect on Net Investment in Non-Financial Assets. Inflation may positively influence this investment, particularly during the present period (Septiani, 2023).

Inflation can serve as a catalyst for investment in non-financial assets through several mechanisms. For instance, during periods of inflation, the purchasing power of money typically diminishes over time, prompting firms to prefer investing their funds in non-financial assets rather than holding onto cash. Consequently, inflation may incentivize companies to allocate resources towards non-financial assets. Moreover, inflation has the potential to enhance the value of non-financial assets. As the prices of goods and services rise, the value of non-financial assets tends to increase as well. Hence, investing in non-financial assets can serve as an effective hedge against the adverse effects of inflation. Nonetheless, it's essential to recognize that the positive impact of inflation on Net Investment in Non-Financial Assets may not materialize if the inflation rate is excessively high or unstable. Therefore, it is imperative for the government to maintain inflation control measures to ensure economic stability (Septiani, 2023).

In general, it can be concluded that inflation significantly influences Net Investment in Non-Financial Assets. With adequate control measures in place, inflation can serve as an effective mechanism to stimulate investment in non-financial assets (Wijayanti et al., 2024). Drawing from prior research, we formulate the following hypothesis:

H3: Inflation has a significant positive effect on Net Investment In Non-Financial Assets for the current period.

Taxes play a crucial role in a nation's economy, particularly concerning investment activities. One notable consequence of taxes is their impact on Net Investment in Non-Financial Assets. Taxes may potentially exert a positive influence on this investment, particularly during the present period (Septiani, 2023).

Taxes can incentivize investment in non-financial assets through various means. For instance, governments can offer tax breaks or deductions to companies that allocate funds towards non-financial assets, thereby fostering motivation for investment. Furthermore, taxes can serve as a means for the government to generate revenue, which can subsequently be utilized for infrastructure development. Such development projects can enhance the value of non-financial assets owned by companies, further encouraging investment. Nonetheless, it's crucial to note that the positive impact of taxes on Net Investment in Non-Financial Assets relies on the implementation of appropriate tax policies by the government. Therefore, continuous evaluation and adjustment of existing tax policies are essential (Septiani, 2023).

In general, it can be concluded that taxes play a substantial role in shaping Net Investment in Non-Financial Assets. With appropriate tax policies in place, taxes can serve as a potent mechanism to stimulate investment in non-financial assets (Septiani, 2023). Drawing from prior research, we formulate the following hypothesis:

H4: Tax has a significant positive effect on Net Investment In Non-Financial Assets for the current period.

Research Method

This study primarily employs secondary data sourced from the World Bank spanning the years 1972 to 2016 for analysis. The dependent variable under examination is net investment in non-financial assets, with the independent variables comprising the inflation rate, tax rate, and GDP. Detailed descriptions of these variables are provided in Table 1.

Table 1. Deskripsi Variabel

Variabel	Deskripsi Variabel	Unit Analisis
Net Investment in Non-Financial Asset	Net Investment adalah jumlah total dana yang dihabiskan oleh perusahaan untuk membeli aset modal, dikurangi depresiasi aset terkait. Non-financial asset adalah aset yang nilai nya ditentukan oleh karakteristik fisiknya.	Dolar (USD)
Inflasi	Indlasi adalah tingkat kenaikan harga barang dan/atau jasa secara umum dalam perekonomian selama periode waktu tertentu.	Persentase (%)
Pajak	Pajak adalah kontribusi wajib kepada negara yang terutang oleh individu atau entitas berdasarkan hukum, tanpa menerima kompensasi langsung dan digunakan untuk kepentingan negara untuk kemakmuran terbesar rakyat.	Dolar (USD)
GDP (*Gross Domestic Product*) Growth per Capita	Pertumbuhan GDP per kapita adalah ukuran perkiraan nilai Gross Domestic Bruto (GDP) yang disumbangkan oleh setiap anggota populasi suatu negara. Ini dihitung dengan membagi GDP suatu negara dengan populasi negara tersebut.	Dolar (USD)

The study employs the ARDL (Autoregressive Distributed Lag) model, which is a technique utilized in econometrics for examining the enduring correlation between variables. Through the ARDL model, researchers can assess both the immediate and prolonged impacts of alterations in the independent variable on the dependent variable.

ARDL models are utilized to explore the connections between variables over short and long timeframes, even when these variables are not stationary. To ensure the reliability of the analysis, it is crucial to have stationary data, which is verified using unit root tests like ADF and PP methods. The determination of the maximum lag in the ARDL model is guided by lag selection criteria such as AIC, SIC, HQ, and FPE. Evaluating the long-term relationship between variables involves conducting a bound test to ascertain cointegration. The estimation of the ARDL model is carried out through the OLS method, which yields estimators that are unbiased, consistent, and efficient, provided classical assumptions hold. The significance of the independent variable's impact on the dependent variable is assessed using the Wald test. Consequently, the ARDL model emerges as a robust instrument for regression analysis, taking into account factors such as stationarity, cointegration, and variable significance.

The ARDL model evaluates autocorrelation using the Breusch-Godfrey Serial Correlation LM Test, which examines the correlation between residuals over time. It also tests for heteroscedasticity with the Heteroscedasticity Test: Breusch-Pagan-Godfrey, detecting if the variance of the residuals changes based on the independent variable's value. Model specification is verified through the Ramsey RESET Test, assessing the model's ability to capture the relationship between variables effectively. Additionally, multicollinearity is checked using Variance Inflation Factors (VIF), identifying any correlation between independent variables. Therefore, the ARDL model conducts a comprehensive set of tests to ensure the accuracy and efficiency of parameter estimation.

Investigate the econometric model utilizing the Autoregressive Distributed Lag (ARDL) methodology with equations structured in the long-term format.

$$\text{Net Investment in Non-Financial Asset}_t = \alpha_{0i} + \alpha_1 \text{Inflasi}_t + \alpha_2 \text{Pajak}_t + \alpha_3 \text{GDP}_t + \varepsilon_t$$

In the short term:

Δ Net Investment in Non-Financial Asset$_t$ = $\beta_{0i}+\sum_{j=1}^{p}\ \beta_{1j}\Delta \text{Inflasi}_{t-j}+\sum_{j=1}^{p}\beta_{2j}\Delta \text{Pajak}_{t-j}+\sum_{j=1}^{p}\beta_{3j}$ $\Delta \text{GDP}_{t-j}+\varepsilon_t$

Where:
The net investment in non-financial assets serves as the dependent variable, influenced by various independent variables such as inflation, taxes, and GDP. The time index denoted by "t" is employed in this analysis. Long-term coefficients in this model are represented by symbols: α_{0i}, α_1, α_2, α_3, α_4, while short-term coefficients are denoted by symbols: β_{0t}, β_{1j}, β_{2j}, β_{3j}, β_{4j}. The symbol "p" signifies the lag order, indicating the number of time periods considered in the model. Lastly, ε_t represents the error term, signifying the variation in the dependent variable not accounted for by the independent variables in this model.

Results and Discussion

Tabel 2. Descriptive Statistic

	Net Investment In Non Financial Aset	GDP Per Capita Growth	Inflation	Taxes On Income Profits And Capital Gains
Mean	5.167778	3.668167	14.18207	60.31352
Median	4.965743	4.305797	10.55972	58.67903
Maximum	12.61221	7.413629	75.27117	84.11909
Minimum	0.903687	-14.47565	2.356069	42.00849
Std. Dev.	3.263532	3.179347	12.89995	12.22881
Skewness	0.265252	-4.298274	2.949785	0.477435
Kurtosis	1.810911	24.90166	13.19659	2.029232
Jarque-Bera	3.178810	1037.969	260.2037	3.476563
Probability	0.204047	0.000000	0.000000	0.175822
Sum	232.5500	165.0675	638.1931	2714.108
Sum Sq. Dev.	468.6283	444.7628	7321.978	6579.929
Observations	45	45	45	45

The average net investment in non-financial assets is 5.17. Having a median value of 4.97, it signifies that half of the dataset lies below this value. The range, illustrated by the maximum and minimum values of 12.61 and 0.90 respectively, portrays the span of the data. Meanwhile, the standard deviation of 3.26 provides insight into the dispersion of the data points from the mean.
The mean GDP per capita growth stands at 3.67. With a median value of 4.31, it suggests that half of the dataset lies below this value. The range of growth, delineated by the maximum and minimum values of 7.41 and -14.48, respectively, illustrates the extent of variability in the growth rates. The standard deviation of 3.18 provides insight into the dispersion of the data around the mean.
The mean inflation rate is 14.18. The median value of 10.56 indicates that half of the dataset lies below this value. The range of inflation, represented by the maximum and minimum values of 75.27 and 2.36, respectively, illustrates the extent of variability in the inflation rates. The standard deviation of 12.90 provides a measure of the dispersion of the data around the mean.
Taxes on income, profits, and capital gains exhibit a mean of 60.31. The median value of 58.68 illustrates that half of the dataset is below this value. The range, defined by the maximum and minimum values of 84.12 and 42.01, respectively, highlights the spread of the tax values. The

standard deviation of 12.23 provides a measure of the extent to which the data deviates from the mean.
The net investment in non-financial assets data exhibits a positive skewness of 0.27, suggesting a slight right-skewed distribution. With a kurtosis of 1.81, the distribution appears to be flatter than a normal distribution. The Jarque-Bera statistic of 3.18, coupled with a probability of 0.20, suggests that the distribution is reasonably close to normal.
GDP per capita growth demonstrates a negative skewness of -4.30, implying a left-skewed distribution. The substantial kurtosis of 24.90 suggests that the distribution has heavier tails than a normal distribution. With a Jarque-Bera statistic of 1037.97 and a probability of 0.00, the distribution significantly deviates from normality.
Inflation exhibits a positive skewness of 2.95, suggesting a right-skewed distribution. The kurtosis of 13.20 suggests that the distribution has fatter tails than a normal distribution. With a Jarque-Bera statistic of 260.20 and a probability of 0.00, the distribution significantly deviates from normality.
Taxes on income, profit, and capital gains exhibit a positive skewness of 0.48, suggesting a slight rightward skew in the distribution. The kurtosis value of 2.03 indicates a distribution that is less peaked and flatter compared to a normal distribution. The Jarque-Bera test statistic of 3.48 with a probability of 0.18 suggests that the distribution closely approximates a normal distribution.

Table 3. Unit Root Test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.65103	0.0494	4	172
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.22047	0.0006	4	172
ADF - Fisher Chi-square	36.0361	0.0000	4	172
PP - Fisher Chi-square	36.5307	0.0000	4	176

In the Levin, Lin & Chu test, the obtained statistical value is -1.65103 with a probability of 0.0494. The test evaluates the null hypothesis, which assumes that all series follow a generalized unit root process. However, given that the p-value is below 0.05, the null hypothesis is rejected, indicating that the series lack unit roots and are stationary.In the Im, Pesaran, and Shin test, the calculated statistical value is -3.22047 with a probability of 0.0006. Under the null hypothesis, which assumes that each series follows an individual unit root process, the obtained p-value being less than 0.05 leads to the rejection of the null hypothesis. Consequently, it suggests that the series lack a unit root and are stationary.The ADF - Fisher Chi-square test yields a statistical value of 36.0361 with a probability of 0.0000. Under the null hypothesis that all series possess unit roots, the obtained p-value being less than 0.05 leads to the rejection of the null hypothesis. This implies that the series are devoid of unit roots and are stationary.In the PP - Fisher Chi-square test, the obtained statistical value is 36.5307 with a probability of 0.0000. The test assesses the null hypothesis that all series possess unit roots. However, since the p-value falls below 0.05, the null hypothesis is refuted. This suggests that the series lack unit roots and are stationary.

Table 4. Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ

0	-494.2059	NA	421365.1	24.30272	24.46990	24.36360
1	-412.8702	142.8333*	17483.13*	21.11562*	21.95151*	21.42000*
2	-405.5620	11.40797	27368.58	21.53961	23.04421	22.08750
3	-394.1148	15.63521	36341.67	21.76170	23.93501	22.55310
4	-385.7030	9.847969	59446.19	22.13185	24.97387	23.16676

Lag, a crucial aspect in time series analysis, denotes the number of lags incorporated into the model. Log-likelihood (LogL) serves as a metric for assessing the model's goodness-of-fit, with higher values indicative of superior model performance as they imply a higher likelihood of the observed data under that model. Likelihood Ratio (LR) also assesses model adequacy, with higher LR values indicating better model fit. Final Prediction Error (FPE) functions as a comparative criterion for models, with lower values suggesting fewer prediction errors and thus better model performance. Akaike Information Criterion (AIC) is another comparative measure, with lower AIC values signifying superior model fit. Similarly, Schwarz Information Criterion (SC) is employed for model comparison, where lower SC values indicate better model adequacy. Lastly, the Hannan-Quinn Information Criterion (HQ) is utilized as yet another comparative metric, with lower HQ values reflecting better model performance, akin to AIC, FPE, and SC.
The table indicates that among the models with different lags, the one with lag 1 exhibits the highest LogL value and LR, as well as the lowest values for FPE, AIC, SC, and HQ, denoted by an asterisk (*). Consequently, based on these lag selection criteria, the model with lag 1 appears to be the most favorable. However, the determination of the optimal model might also be influenced by the specific context and objectives of the analysis.

Table 5. Bound Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.595759	1.441164	-2.495038	0.0173
Net Investment In Non-Financial Aset(-1)*	-0.248860	0.108513	-2.293365	0.0278
Gdp Per Capita Growth (-1)	0.261544	0.093386	2.800670	0.0082
Inflation (-1)	0.038575	0.027132	1.421740	0.1637
Taxes On Income Profits And Capital Gains (-1)	0.054534	0.031162	1.750035	0.0886
D(Gdp Per Capita Growth)	-0.006020	0.079458	-0.075765	0.9400
D(Inflation)	0.004236	0.020032	0.211474	0.8337
D(Taxes On Income Profits And Capital Gains)	-0.069654	0.050984	-1.366194	0.1804

The intercept of the model, represented by a coefficient of -3.595759 with a standard error of 1.441164, exhibits a t-statistic of -2.495038, yielding a probability of 0.0173. Given that this probability falls below 0.05, it indicates statistical significance for the intercept. As for the coefficient associated with net investment in non-financial assets (lagged by one period), it suggests that for every one-unit increase, the dependent variable decreases by 0.248860 units. This finding is statistically significant at the 5% level, with a probability of 0.0278.
The coefficient associated with GDP per capita growth (lagged by one period) suggests that a one-unit increase corresponds to an increase of 0.261544 units in the dependent variable. This finding is statistically significant at the 1% level, with a probability of 0.0082. Regarding inflation (lagged by one period), the coefficient indicates that a one-unit increase results in an increase of 0.038575 units in the dependent variable. However, with a probability of 0.1637, this variable is not statistically significant at the 5% or 10% level.

The coefficient associated with taxes on income, profits, and capital gains (lagged by one period) indicates that for every one-unit increase, the dependent variable will increase by 0.054534 units. This finding is statistically significant at the 10% level, with a probability of 0.0886. Regarding GDP per capita growth, the coefficient suggests that for every one-unit increase, the dependent variable will decrease by 0.006020 units. However, with a probability of 0.9400, this variable is not statistically significant at the 5% or 10% level. Similarly, the coefficient for inflation implies that for every one-unit increase, the dependent variable will increase by 0.004236 units. However, with a probability of 0.8337, this variable is not statistically significant at the 5% or 10% level.

Table 6. ARDL Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Net Investment In Non Financial Aset(-1)	0.751140	0.108513	6.922120	0.0000
Gdp Per Capita Growth (-1)	0.267564	0.080986	3.303816	0.0022
Inflation (-1)	0.034338	0.021048	1.631409	0.1115
Taxes On Income Profits And Capital Gains (-1)	0.124188	0.045763	2.713713	0.0101
C	-3.595759	1.441164	-2.495038	0.0173
R-squared	0.899247	Mean dependent var		5.164719
Adjusted R-squared	0.879656	S.D. dependent var		3.301197
S.E. of regression	1.145204	Akaike info criterion		3.272009
Sum squared resid	47.21375	Schwarz criterion		3.596407
Log likelihood	-63.98420	Hannan-Quinn criter.		3.392311
F-statistic	45.90145	Durbin-Watson stat		2.308208
Prob(F-statistic)	0.000000			

The coefficient associated with net investment in non-financial assets (lagged by one period) suggests that for each unit increase, there is an increase of 0.751140 units in the dependent variable. This finding is statistically significant at the 1% level, with a probability of 0.0000. Conversely, the coefficient for GDP per capita growth indicates that a one-unit increase results in a decrease of 0.006020 units in the dependent variable. However, with a probability of 0.9400, this variable is not statistically significant at the 5% or 10% level. For GDP per capita growth with a one-period delay, the coefficient implies that a one-unit increase leads to an increase of 0.267564 units in the dependent variable. This finding is statistically significant at the 1% level, with a probability of 0.0022. Regarding inflation, the coefficient suggests that each one-unit increase results in a 0.004236 unit increase in the dependent variable. However, with a probability of 0.8337, this variable is not statistically significant at the 5% or 10% level. Similarly, for inflation with a one-period delay, the coefficient indicates that a one-unit increase leads to an increase of 0.034338 units in the dependent variable. However, with a probability of 0.1115, this variable is not statistically significant at the 5% or 10% level. As for taxes on income, profits, and capital gains, the coefficients imply that each one-unit increase leads to a decrease of 0.069654 units in the dependent variable. However, with a probability of 0.1804, this variable is not statistically significant at the 5% or 10% level. Finally, for taxes on income, profits, and capital gains with a one-period delay, the coefficient suggests that each one-unit increase results in an increase of 0.124188 units in the dependent variable. This finding is statistically significant at the 1% level, with a probability of 0.0101.

The constant or intercept coefficient in the model stands at -3.595759. With a t-statistic of -2.495038 and a probability of 0.0173, it demonstrates the statistical significance of the constant, given the probability is below 0.05. The R-squared value of 0.899247 indicates that 89.92% of the variation in the dependent variable is accounted for by the independent variables in the model. The Adjusted R-squared value of 0.879656, considering the number of predictors, suggests that even after adjustment, 87.97% of the variation in the dependent variable remains explained by the model. The regression standard error, measuring 1.145204, denotes the average deviation between the actual data points and the predicted regression line. The residual sum of squares, totaling 47.21375, represents the unexplained variation in the dependent variable by the model. The log likelihood, reported as -63.98420, serves as a means to compare the relative fit of statistical models for the same dataset. The F statistic of 45.90145 with a probability of 0.000000 indicates the overall significance of the model. Lastly, the Durbin-Watson statistic of 2.308208 is utilized to detect potential autocorrelation in the residuals from the regression analysis.

Table 7. Wald Test

Test Statistic	Value	df	Probability
t-statistic	3.469024	27	0.0018
F-statistic	12.03412	(1, 27)	0.0018
Chi-square	12.03412	1	0.0005

The t statistic value in this analysis is 3.469024. With 27 degrees of freedom and a probability of 0.0018, indicating that the probability is less than 0.05, we can conclude that the coefficients tested in this analysis are statistically significant at the 5% level. Moreover, the F statistic value in this analysis is 12.03412, with degrees of freedom (1, 27) and a probability of 0.0018, suggesting that the probability is less than 0.05. Therefore, we can infer that the overall model is significant at the 5% level. Lastly, the Chi-square statistic value in this analysis is 12.03412, with 1 degree of freedom and a probability of 0.0005, indicating that the probability is less than 0.05. Hence, we can conclude that the variables tested in this analysis are statistically significant at the 5% level.

Table 8. Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.783708	Prob. F(1,26)	0.1933
Obs*R-squared	2.632191	Prob. Chi-Square(1)	0.1047

The F statistic value in this analysis is 1.783708 with a probability of 0.1933, indicating that the probability exceeds 0.05. Therefore, we cannot reject the null hypothesis, which posits that there is no serial correlation in the model, at the 5% significance level. Similarly, the Chi-square statistic value is 2.632191 with a probability of 0.1047, which also surpasses 0.05. Consequently, we cannot reject the null hypothesis that there is no serial correlation in the model at the 5% significance level.

Table 9. Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.178750	Prob. F(13,27)	0.0426
Obs*R-squared	20.99051	Prob. Chi-Square(13)	0.0731
Scaled explained SS	10.50611	Prob. Chi-Square(13)	0.6521

The F statistic value in this analysis is 2.178750 with a probability of 0.0426, indicating that the probability is less than 0.05. Consequently, we reject the null hypothesis that the error variance is constant or homoscedasticity, concluding that there is heteroscedasticity in the model at the 5% significance level. Additionally, in the Obs*R-squared analysis, the Chi-square statistic value is 20.99051 with a probability of 0.0731, which exceeds 0.05. Hence, we cannot reject the null hypothesis that the error variance is constant or homoscedasticity at the 5% significance level. Lastly, in the Scaled explained SS analysis, the Chi-square statistic value is 10.50611 with a probability of 0.6521, indicating that the probability is greater than 0.05. Consequently, we cannot reject the null hypothesis that the error variance is constant or homoskedasticity at the 5% significance level.

Table 10. Ramsey RESET Test

	Value	df	Probability
F-statistic	2.509462	(4, 23)	0.0698
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	8.806904	4	2.201726
Restricted SSR	28.98641	27	1.073571
Unrestricted SSR	20.17950	23	0.877370

The F statistic value in this analysis is 2.509462. With degrees of freedom (4, 23) and a probability of 0.0698, indicating that the probability exceeds 0.05. Consequently, at the 5% significance level, we cannot reject the null hypothesis that the model lacks misspecification. Additionally, in the SSR test, the residual sum of squares for the tested model is 8.806904, resulting in an average squared residual of 2.201726, which measures the discrepancy between actual data points and the predicted regression line. Comparatively, in the restricted model, the residual sum of squares is 28.98641, with an average squared residual of 1.073571, while in the unconstrained model, the residual sum of squares is 20.17950, with an average squared residual of 0.877370.

Table 11. Variance Inflation Factors

	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
Net Investment In Non Financial Aset(-1)	0.024431	36.38018	10.27279
Net Investment In Non Financial Aset(-2)	0.031056	46.60032	12.81052
Net Investment In Non Financial Aset(-3)	0.021399	32.56934	8.524075
Gdp Per Capita Growth	0.007571	6.871932	3.105148
Gdp Per Capita Growth(-1)	0.007992	7.204993	3.279756
Gdp Per Capita Growth (-2)	0.004253	3.860699	1.748801
Inflation	0.000558	6.409439	2.905798
Inflation (-1)	0.000612	7.103616	3.124012
Taxes On Income Profits And Capital Gains	0.002739	394.9406	15.81059
Taxes On Income Profits And Capital Gains (-1)	0.004825	706.9188	28.12986
Taxes On Income Profits And Capital Gains (-2)	0.004542	676.2945	26.19251
Taxes On Income Profits And Capital Gains (-3)	0.003218	480.5794	18.22598
Taxes On Income Profits And Capital Gains (-4)	0.001607	240.5632	8.957697
C	4.531662	173.0656	NA

The VIF values for net investment in non-financial assets, with one-period and two-period delays, exceed 5, indicating potential multicollinearity between this variable and others in the model. Specifically, the non-centered and centered VIF values stand at 36.38018 and 10.27279 for the one-period delay, and 46.60032 and 12.81052 for the two-period delay, respectively.

The VIF values for net investment in non-financial assets with a three-period delay are both above 5, with non-centered and centered values of 32.56934 and 8.524075, respectively, suggesting potential multicollinearity. However, regarding GDP per capita growth, while the non-centered VIF value exceeds 5 at 6.871932, indicating possible multicollinearity, the centered VIF value stands at 3.105148, below 5, implying no significant multicollinearity when considering the influence of other variables in the model.

The VIF values for GDP per capita growth, with one-period delay, are 7.204993 for non-centered and 3.279756 for centered, respectively. While the non-centered VIF value exceeds 5, indicating potential multicollinearity with other variables in the model, the centered VIF value is below 5, suggesting no significant multicollinearity after accounting for the effects of other variables. As for GDP per capita growth with a two-period delay, both the non-centered and centered VIF values stand at 3.860699 and 1.748801, respectively, which are both below 5, indicating no significant multicollinearity with other variables in the model.

The VIF values for inflation suggest potential multicollinearity with other variables in the model. Specifically, for inflation without a delay, the non-centered VIF value exceeds 5 at 6.409439, while the centered VIF value is below 5, standing at 2.905798, indicating no significant multicollinearity after accounting for other variables. Similarly, for inflation with a one-period delay, the non-centered VIF value surpasses 5 at 7.103616, yet the centered VIF value is below 5 at 3.124012, suggesting no significant multicollinearity after considering the effects of other variables.

The VIF values for inflation suggest potential multicollinearity with other variables in the model. Specifically, for inflation without a delay, the non-centered VIF value exceeds 5 at 6.409439, while the centered VIF value is below 5, standing at 2.905798, indicating no significant multicollinearity after accounting for other variables. Similarly, for inflation with a one-period delay, the non-centered VIF value surpasses 5 at 7.103616, yet the centered VIF value is below 5 at 3.124012, suggesting no significant multicollinearity after considering the effects of other variables. Ultimately, the model's constant or intercept exhibits an uncentered VIF value of 173.0656. As it pertains to the constant term, centered VIF calculation is unnecessary.

Conclusion

The ARDL Estimation model findings reveal that certain variables significantly impact the dependent variable. Specifically, net investment in non-financial assets, GDP per capita growth (lagged by one period), and taxes on income, profits, and capital gains (lagged by one period) all show a positive and statistically significant relationship with the dependent variable. This suggests that increases in these variables correspond to a rise in the dependent variable's value. However, GDP per capita growth, inflation, lagged inflation, and taxes on income, profits, and capital gains do not significantly impact the dependent variable. The model effectively explains the relationship between the independent variables and the dependent variable, accounting for a significant portion of the variability in the dependent variable. Despite some unexplained variation, the model's overall fit and predictive accuracy are confirmed by several statistical measures. In conclusion, the ARDL Estimation model effectively captures the association between the independent variables and the dependent variable, with certain variables showing a significant impact.

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