

# Micro and Macro Determinants of Non-Performing Loan (NPL) in Banking Sector of Bangladesh

Mobasshir Anjum<sup>1</sup>

<sup>1</sup> Chief Economist's Unit, Bangladesh Bank, Dhaka, Bangladesh

Correspondence: Mobasshir Anjum, Chief Economist's Unit, Bangladesh Bank, Motijheel C/A, Dhaka-1000, Bangladesh. Tel: 880-167-477-5274. E-mail: mobasshir.anjum@bb.org.bd

Received: June 12, 2023

Accepted: November 23, 2023

Online Published: November 30, 2023

doi:10.5539/ijef.v16n1p15

URL: <https://doi.org/10.5539/ijef.v16n1p15>

## Abstract

This study seeks to determine the drivers of Non-performing Loans in the Bangladeshi banking system. To achieve this, panel data from four types of Bangladeshi banks from 2008 to 2021 are utilized. It has employed a fixed effect regression model to analyze the influence of bank-related variables and variables related to macroeconomics on the NPL ratio. This study utilizes return on assets (ROA), return on equity (ROE), and capital to risk-weighted assets (CRAR) as bank-specific variables, whereas GDP Growth, broad money supply, real interest rate, and domestic credit to private sector by banks are employed as macroeconomic variables. The study demonstrates that ROA and ROE have little bearing on the NPL situation of banks, however an increase in the CRAR ratio can enhance the NPL position of banks. Furthermore, the analysis demonstrates that GDP growth and domestic credit to the private sector are the most influential macroeconomic determinants on the NPL condition of the banking system. In addition, the study gives some recommendations that could be crucial in addressing the NPL situation in the Bangladeshi banking system.

**Keywords:** Non-performing Loans, Bangladeshi Banking System, ROA, CRAR, GDP Growth

## 1. Introduction

The banking channel renders a vital service in the economy by collecting funds and diverting those towards productive investment. Banks act as intermediaries between borrowers and lenders, channeling funds from savers to borrowers. This process facilitates the effective disbursement of financial resources in the economy, supporting growth and development of the economy. When there is a lack of a sophisticated capital market, banks remain the principal source of long-term financing in developing nations such as Bangladesh.

In the immediate aftermath of the country's independence, the banking industry in Bangladesh endured difficult circumstances. Early in the 1970s, with the exception of a few foreign commercial banks, the government made some commercial banks state-owned to channel the prevalent scant amount of savings via the formal sector to boost economic activities. This was reasonable because the public sector was the primary driver of economic activity. At the beginning of the 1980s, the government undertook banking sector reforms, which included allowing private sector banks to operate with a view to fostering competition in the banking system. To boost money and capital markets, the government also recapitalized banks, implemented fresh systems of loan classification, and made rates of interest more malleable (ADB Brief, 2019).

Lending is one of the most important operations a bank should monitor closely as banks mostly lend money. These loans boost the bank's income and profitability. Therefore, proper distribution and collection processes of interest and principal should be closely monitored. Otherwise, banks may suffer from loss of income. Despite several reform initiatives, our banking system has a significant issue with problem loans due to poor lending procedures. No worldwide standard has yet been established for defining NPL. The categorization structure, extent, and contents of various nations vary according to their own circumstances and regulations. The IMF devised the most well-known international definition of non-performing loans within the framework of the Financial Soundness Indicators (FSIs) approved by the IMF Executive Board. The FSI Compilation Guide of March 2006 (IMF, 2006, p. 46) recommends that credits (and other assets) be categorized as NPL when (1) repayments of interest and principal are more than ninety days (3 months) past due, or (2) payments of interest amount to three months (90 days) or more have been capitalized (re-invested into the principal amount), refinanced, or rolled over. In Bangladesh, NPLs are classed as substandard, doubtful, and bad or loss depending

on a specified set of criteria. If a loan remains due for 3 months or more but less than 9 months, it is substandard; if it is for 9 months or more but less than 12 months, it is doubtful; and if it remains due for 12 months or more, it is bad or a loss (BRPD, Circular no. 3).

NPL is a burning issue in the banking industry of Bangladesh. There has been a constant call from the development partners i.e., World Bank, IMF to reduce the amount of NPL in the banking system. The non-performing loans have had a detrimental consequence on the expansion of this industry. The banking industry and the economy as a whole may suffer severely if this continues. There's a great deal of initiatives that needs to be done to alleviate this problem.

There is very scant amount of literature on what causes the increases of bad loans in the Bangladeshi banking sector. The existing literatures have found inconclusive results on the factors working behind NPL in the banking sector as a whole. Given this background, it is very important to have an up-to-date analysis of this topic. As far as we are aware, there is no empirical research on the determinants of NPL involving different categories of banks in Bangladesh which are State-owned Commercial Banks, Specialized Banks, Private Commercial Banks and Foreign Commercial Banks. It is important to analyze these categories of bank separately as they have different features and characteristics. Apart from this, we have used an updated data set up to 2021 which includes the COVID-19 time period. Therefore, the finding of the study will take into account the effect of COVID-19 on the condition of NPL as it was difficult for the businesses to pay back loans during economic hardship. In addition, we have used "Domestic credit to private sector by banks" instead of "Domestic credit to private sector by total financial system" as an independent variable to capture the sole impact of banking credit system on the amount of NPL. This paper will try to fill in these research gaps.

There are some limitations of our study. This research is restricted to seven variables as drivers of non-performing loans in Bangladeshi banks. This list of variables is not comprehensive. In particular, other variables including total assets of banks, loan to assets ratio, and the inflation rate are removed. The interpretation of these data in terms of the reasons of non-performing loans must be limited to the factors under investigation.

The second constraint is the duration of the investigation. Due to data availability, fourteen-year time span is selected. However, such a brief period is insufficient for long-term conclusions.

The third constraint pertains to the population under study. In order to provide a broader perspective, the study is limited to the banking sector in Bangladesh and does not consider other financial institutions across all sectors.

Following the introduction, the remaining part of the research is structured as following: section 2 provides an explanation of the study's objectives while section 3 contains the literature review.

Section 4 illustrates the data and method of the study, while section 5 describes a brief picture of the main variable in the context of Bangladesh. Section 6 delineates the empirical results and findings. Lastly, section 7 provides an overall conclusion and policy suggestions.

## **2. Objective of the Study**

In summary, the target of this study is to identify the important characteristics which impact NPL in the banking system of Bangladesh. The specific goals of the paper are the followings:

- i) To find out and evaluate the impact of bank-specific and other macroeconomic determinants of commercial banks' non-performing loans.
- ii) Relying on the outcomes of this study, propose policies for reducing the number of non-performing loans in the underlying sector.

## **3. Literature Review**

Numerous studies have advanced to investigate the influence of a variety of macroeconomic and bank-specific indicators on non-performing loans. Some studies have studied their impacts independently, while others have evaluated them jointly.

Khemraj and Pasha (2009) performed an econometric model-based analysis on non-performing loans in Guyana, which revealed an inverse link between GDP and NPL volume. According to the findings of the research, it was found that an increase in a country's GDP should lead to a decline in NPL.

İslamoğlu (2015) investigated the influence of macroeconomic variables (commercial credit, rate of interest and national debt to GDP ratios) on non-performing loans using data from thirteen banks in Borsa and Istanbul from 2002 to 2013. The study indicated that a reduction in interest rates generates excessive loan growth and an

increase in NPL over time. Furthermore, the paper indicated that a rise in public debt leads to a rise in problematic loans.

Badar and Javid (2013) analyzed both the long run and short run relationships between non-performing credits of commercial banks and macroeconomic indicators (inflation, rate of exchange, rate of interest, GDP, and supply of money) in Pakistan from 2002 to 2011. Long-run correlation between macroeconomic factors and NPLs was found using the multivariate co-integration technique developed by Johansen and Juselius. In a similar vein, the vector error correction model discovered a correlation in the short term.

Vogiazas and Nikolaidou (2011) investigated the macroeconomic causes of non-performing credits in the Romanian banking sector between December 2001 and November 2010 using time series modeling. Monetary aggregates, rates of return, credit markets, and bank-specific variables were found to be the macroeconomic indicators of non-performing loans in the Romanian banking industry. The paper's findings indicated that variables related to macroeconomics, specifically construction and investment spending, rising prices, joblessness, foreign debt to GDP ratio and money supply, as well as variables specific to the Greek financial crisis, influenced the default risk of the Romanian banking sector.

According to Ozili (2018), financial progress is positively related with non-performing loans. He also observed that NPLs are inversely correlated with regulatory capital and liquidity of bank, meaning that banking sectors with stronger regulatory capital and liquidity have lower non-performing loans.

Between 2004 and 2008, Messai and Jauini (2013) performed a study on the causes of non-performing loans using a sample of eighty five banks from three economies (Greece, Italy, and Spain). The study indicated that non-performing loans were inversely linked with the growth of the economy and bank profitability, and favorably correlated with the rate of unemployment, loan loss reserves as a percentage of total credits, and real rate of interest.

Bercoff et al. (2002) examined the instability of the banking industry of Argentina from 1993 to 1996 and determined that non-performing loans are influenced by both bank-related and macroeconomic factors. To disentangle the influence of bank-specific and macroeconomic factors, the author employed an analysis of surveys, a dynamic framework, and a set of panel data while, also, investigating the causes of problem loans at commercial and saving banks between 1985 and 1997.

Using data from 1982 to 1996 and vector auto regression model, Keeton (1999) analyzed the influence of credit expansion and loan defaults in the United States. There was evidence of a substantial correlation between loan expansion and defective assets. Rapid credit expansion, which was coupled with weaker credit standards, contributed to larger loan losses in certain U.S. states.

## 4. Data and Methodology

### 4.1 Data

Based on our literature review, we believe it is appropriate to select seven indicators as explanatory variables to assess their influence on non-performing loans: return on assets (ROA), return on equity (ROE), capital to risk-weighted assets ratio (CRAR), GDP growth, supply of money, real rate of interest and domestic credit to private sector by banks. The study utilized ROA, ROE, and CRAR as bank-specific variables, whereas GDP growth, broad money supply, real interest rate, and domestic credit to private sector by banks were employed as macroeconomic variables. Our research utilizes data from four categories of Bangladeshi banks which are State-owned Commercial Banks, Specialized Banks, Private Commercial Banks and Foreign Commercial Banks. The study includes annual time series data from 2008 to 2021. The information is gathered from various publications of Bangladesh Bank and World Development Indicators.

### 4.2 Methodology

In a panel data set, one may isolate unobserved cross-sectional and time-fixed effects from the error term and then minimize bias from the calculated coefficient (Wooldridge 2012:484, Gujarati 2003:636). Both fixed effects and random effect models are often utilized to estimate coefficient in panel data analysis. However, fixed effects would be beneficial in the current context since we try to account for unobserved bank specific and time fixed effects.

The econometric model is specified as follows:

$$NPL_{it} = c_0 + \delta_1 GDPG_t + \delta_2 M2_t + \delta_3 DCG_t + \delta_4 INR_t + \delta_5 ROA_{it} + \delta_6 ROE_{it} + \delta_7 CRAR_{it} + \beta_i + \pi_t + \varepsilon_{it} \quad (1)$$

Where,  $i$  denotes bank category and  $t$  represents year in the sample.

NPL= Gross Non-performing Loan ratio.

GDPG= Gross Domestic Product Growth Rate.

M2= Broad Money Supply (% of GDP)

DCG= Domestic Credit to Private Sectors by Bank (% of GDP)

INR=Real Interest Rate

ROA= Return on Assets

ROE= Return on Equity

CRAR= Capital to Risk Weighted Assets Ratio.

$\varepsilon_{it}$ = Error term

$\pi_t$  and  $\beta_i$  are time fixed effect and bank fixed effect respectively.

Based on the estimation results from Hausman test, we found fixed effect model is suitable for our study over the random effect model. Therefore, to find out the impacts of the relevant factors on the NPL condition in Bangladesh, we have used fixed effect estimation technique on the panel data set of four categories of banks in Bangladesh.

## 5. NPL Situation in Bangladesh

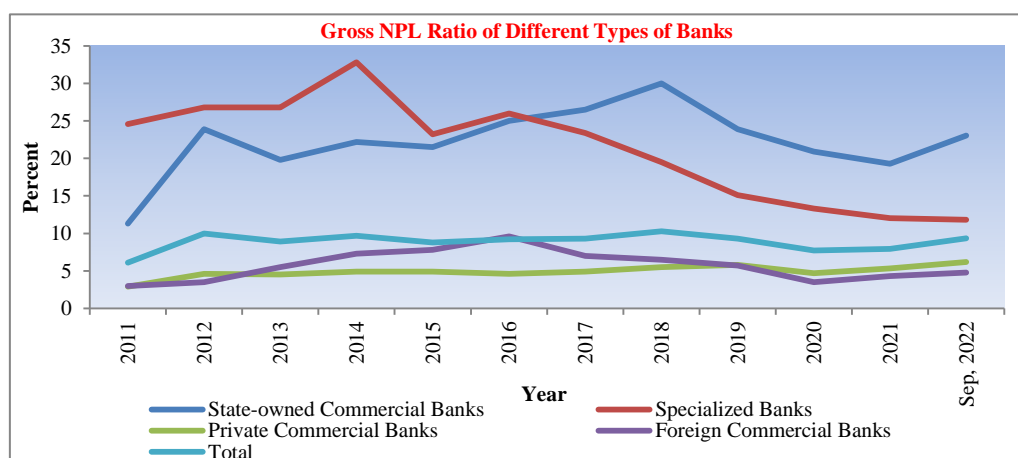


Figure 1. Graph of NPL Ratio

The ratio of non-performing loan in Bangladesh followed an irregular trend. It was 6.1 in 2011 and then rose to 9.36 in September 2022 with experiencing major ups-downs in the interim period. The NPL condition of Specialized Banks was on an alarming state in 2011 but the situation improved by the end of September 2022. On the contrary, NPL condition of State own Banks was on a better state in 2011 and after that period, the situation deteriorated. As for both Private Commercial Banks and Foreign Commercial Banks, the NPL condition stayed in a favorable state as compared to other types of banks, with maintaining a steady state since 2011.

## 6. Empirical Results

### 6.1 Descriptive Statistics

Table 1. Summary statistics

Variables	NPL	ROA	ROE	CRAR	GDPG	M2	DCG	RINT
Mean	14.12	0.81	2.64	6.32	6.43	57.92	40.14	3.69
SD	9.97	1.61	28.77	16.79	0.74	3.95	3.02	5.35
Min	1.9	-3.3	-171.7	-35.45	5.04	51.19	33.82	-13.64
Max	32.8	3.38	26.2	28.1	7.88	64.51	44.20	6.88

From the descriptive statistics, it can be observed that the mean of gross NPL ratio is 14.12 with a very high standard deviation. The mean value for other variables, i.e. ROA, ROE, CRAR, GDPG, M2, PCG and RINT are 0.81, 2.64, 6.32, 6.43, 57.92, 40.14, and 3.69, respectively. The values of ROE show the highest variability which has a standard deviation of 28.77.

## 6.2 Correlation Matrix

Table 2. Correlation matrix

Variables	NPL	ROA	ROE	CRAR	GDPG	M2	RINT	DCG
NPL	1.0000							
ROA	0.7090	1.0000						
ROE	-0.4724	0.4048	1.0000					
CRAR	-0.6412	0.8491	0.3391	1.0000				
GDPG	0.0318	-0.3386	0.0441	0.1454	-1.0000			
M2	0.0026	0.0959	0.0840	-0.0009	-0.1598	1.0000		
RINT	-0.0630	0.1379	0.0013	0.0785	-0.3263	0.3037	1.0000	
DCG	0.0012	0.0096	0.1088	-0.0447	0.1171	0.9198	0.2846	1.0000

Table 2 depicts the correlation analysis among the variables. It is discernible that ROA, GDPG, M2, DCG are positively related to NPL whereas ROE, CRAR and RINT are negatively correlated with NPL.

## 6.3 Fixed Effect Regression Model

Table 3. Fixed effect regression result

Variable	Coefficient	t-statistics
ROA	-0.7657	-0.68
ROE	-0.0109	-0.47
CRAR	-0.1914**	4.83
GDPG	0.2990***	5.23
M2	0.1326	0.28
RINT	-0.1441	-1.29
DCG	-0.0289*	-2.95
Constant	5.6413	0.47
R Square	0.245	

Source: Author's calculation using STATA. Note: 1%, 5%, 10 % level of significance is denoted by \*\*\*, \*\* and \* respectively.

The outcomes from fixed effect model are shown in the table 3. The regression values of ROA and ROE denotes that both are unfavorably related to NPL. The result is in line with the studies of Boudriga, Taktak, and Jellouli (2010), Cotugno, Stefanelli, and Torluccio (2010) and Messai and Jauini (2013). However, the results are statistically insignificant. The only significant bank-specific variable is CRAR. The negative value of the parameter denotes that rise in the CRAR ratio of banks will lead to fall in the NPL ratio. This result suggests that as banks become more capitalized it has more capacity for provisioning and long-term financing. Thus, the banks with high CRAR have lower level of NPL ratio. However, the result deviates from the study of Vatansever and Hepsen (2013) which ascertains CRAR to impact NPL positively.

GDP growth is the most important macroeconomic indicator of a country which shows the economic and financial progression of the economy. In the regression result, GDP growth exerts a positive impact on NPL ratio, and the result is statistically significant. As the country becomes financially stronger, the banks have the capacity to disburse more loans and more is the amount of defaults and thus, contributes to the increase in NPL ratio. Similar results were found in the research of Murumba (2013) but contrary to Beck, Jakubik and Piloiu (2015) and Khemraj and Pasha (2009).

As for the coefficient of money supply, a positive coefficient implies that rise in money supply leads to a rise in non-performing loans. However, we should use this interpretation with caution as the result is not statistically significant. It is derived from our result that monetary policy is ineffective in explaining the NPL situation in Bangladesh.

Real Interest Rate was found to be unfavorably related to NPL, but the coefficient was statistically insignificant. Similar results were found in the research of İslamoğlu (2015) although the variable was statistically significant. However, another important macroeconomic variable, domestic credit to private sectors by banks was found to be statistically significant and it is negatively related to NPL ratio meaning that, increase in credit growth by banks leads to fall in NPL ratio. This goes against prior expectation that the more loan the banks disburses, the more will be the default rate.

## 7. Conclusion and Policy Suggestions

This paper strives to find out the drivers of Non-performing Loan in the banking sector of Bangladesh. To this end, it has used panel data of four categories of bank in Bangladesh with time period spanning from 2008 to 2021. It has used fixed effect regression model to capture the impact of both bank-specific variables as well as macroeconomic variables to assess the impact on NPL ratio. This study has used return on assets (ROA), return on equity (ROE) and capital to risk-weighted assets (CRAR) as bank-specific variables whereas GDP Growth, broad money supply, real interest rate and domestic credit to private sector by banks as macroeconomic variables. The result from the study reveals that ROA and ROE is inconsequential in explaining the NPL situation of bank, whereas increase in CRAR ratio can improve the NPL condition of banks. The study also shows that GDP growth and Domestic Credit to private sector by bank are the most consequential macroeconomic variables in influencing the NPL situation of the Banking system. The study also gives some recommendations relying on the outcomes from the study that can be instrumental in improving the NPL situation in Bangladesh. These are as follows.

- i) The findings from the paper suggest that the profitability (ROA and ROE) of the bank doesn't influence the NPL ratio. The most important bank related variable is CRAR. Therefore, both the Central Bank and the Government should take appropriate policy to increase the CRAR of banks.
- ii) Corporate governance should be improved, and banks should do meticulous checking with due diligence when making loans in order to prevent defaults and the accumulation of NPLs. To ensure that loans are exclusively granted based on commercial considerations, free from administrative influences, efforts must be made. Effective steps must also be taken to guarantee that genuine efforts are made to recover loans.
- iii) The government and the central bank should ensure that the current banking laws and regulations are rigorously enforced. In the event of noncompliance with the yearly performance agreement with the Ministry of Finance or failing to fulfill the targets outlined in the signed memorandums of understanding with the central bank, punitive actions shall be implemented.

## Acknowledgments

The author would like to express gratitude to Md. Nur-E-Alom Siddique, Joint Director (Research), Bangladesh Bank for his valuable advice and criticism on earlier versions of this work.

## Disclaimer

The views expressed here are the author's own and do not reflect that of Bangladesh Bank.

## References

- Adusei, C., & Bannerman, J. (2022). A Retrospective Study of Non-Performing Loans of the Ghana Banking Sector between 1998 and 2019. *Theoretical Economics Letters*, 12(2), 498-517. <https://doi.org/10.4236/tel.2022.122028>
- Badar, M., Javid, A. Y., & Zulfiquar, S. (2013). Impact of macroeconomic forces on nonperforming loans: An empirical study of commercial banks in Pakistan. *wseas Transactions on Business and Economics*, 10(1), 40-48.
- Bank, B. (2019). Loan Classification and Provisioning. *Bangladesh Bank*. Retrieved from <https://www.bb.org.bd/en/index.php/mediaroom/circular>
- Beck, R., Jakubik, P., & Piloju, A. (2015). Key determinants of non-performing loans: new evidence from a global sample. *Open Economies Review*, 26, 525-550. <https://doi.org/10.1007/s11079-015-9358-8>
- Bercoff, J., Giovanni, J., & Grimard, F. (2002). Argentinean banks, credit growth and the tequila crisis: A duration analysis. *Unpublished Paper*.
- Boudriga, A., Taktak, N. B., & Jellouli, S. (2010, September). Bank specific, business and institutional environment determinants of banks nonperforming loans: Evidence from mena countries. *Journal of Financial Economic Policy*, 1(4), 286-318. <https://doi.org/10.1108/17576380911050043>
- Cotugno, M., Stefanelli, V., & Torluccio, G. (2010, August). Bank intermediation models and portfolio default rates: what's the relation? In *23rd Australasian finance and banking conference*. <https://doi.org/10.2139/ssrn.1662888>
- Dey, B. K. (2019). Managing nonperforming loans in Bangladesh. <https://doi.org/10.22617/BRF190507-2>
- Gujarati, D. N. (2003). *Basic Econometrics* (4th ed.). McGraw-Hill, New York.

- Indicators, F. S. (2006). *Compilation Guide*. Wash.: IMF.
- İslamoğlu, M. (2015). The effect of macroeconomic variables on non-performing loan ratio of publicly traded banks in Turkey. *Transactions on Business and Economics*, 12, 10-20.
- Keeton, W. R. (1999). Does faster loan growth lead to higher loan losses?. *Economic Review-Federal Reserve Bank of Kansas City*, 84(2), 57.
- Khemraj, T., & Pasha, S. (2009). The determinants of non-performing loans: An econometric case study of Guyana.
- Murumba, I. (2013). The relationship between real GDP and non-performing loans: Evidence from Nigeria (1995-2009). *International Journal of Capacity Building in Education and Management*, 2(1), 1-7.
- Ozili, P. K. (2019). Non-performing loans and financial development: New evidence. *The Journal of Risk Finance*. <https://doi.org/10.1108/JRF-07-2017-0112>
- Vatansever, M., & Hepsen, A. (2013). Determining impacts on non-performing loan ratio in Turkey. *Journal of Finance and Investment Analysis*, 2(4), 119-129.
- Vogiazas, S. D., & Nikolaidou, E. (2011). Investigating the determinants of nonperforming loans in the Romanian banking system: An empirical study with reference to the Greek crisis. *Economics Research International*, 2011. <https://doi.org/10.1155/2011/214689>
- Wooldridge, J. M. (2015). *Introductory econometrics: A modern approach*. Cengage learning.

## Appendix

### Description of the variables

Name of the Variable	Description	Source
Non-performing Loan (NPL)	NPL is a credit where the debtor has stopped making interest or principal repayments for a certain period of time, typically 90 days or more.	Bangladesh Bank
Return on Assets (ROA)	Return on Assets (ROA) is a financial indicator that evaluates the profitability and efficiency of a company's ability to generate profits from its assets The formula: $ROA = \text{Net Income} / \text{Total Assets}$	Bangladesh Bank
Return on equity (ROE):	Return on Equity (ROE) is a financial ratio that evaluates a company's profitability and efficacy in generating returns on shareholder investments. The formula: $ROE = \text{Net Income} / \text{Total Equity}$	Bangladesh Bank
Capital Adequacy Ratio (CRAR)	It measures the proportion of a bank's capital to its risk-weighted assets and serves as a measure of the institution's ability to absorb potential losses and maintain a sound financial position. The formula: $CRAR = (\text{Tier 1 Capital} + \text{Tier 2 Capital}) / \text{Risk-Weighted Assets}$	Bangladesh Bank
Gross Domestic Product (GDP)	Gross Domestic Product (GDP) is an economic indicator that determines the entire value of all products and services produced within the borders of a country during a specific period. It is widely used as an indicator of the overall economic activity and vastness of an economy.	Bangladesh Bank
Broad Money (M2)	Broad money, also known as money supply, refers to the sum of currency in the hands of the public and various types of deposits held by individuals, businesses, and other entities in financial institutions.	World Development Indicators
Real Interest Rate	The real interest rate is a measure of the actual cost of borrowing or the return on investment after accounting for inflation. It represents the nominal interest rate adjusted for inflation, reflecting the purchasing power of money. The formula: $\text{Real Interest Rate} = \text{Nominal Interest Rate} - \text{Inflation Rate}$	World Development Indicators
Domestic Credit to Private Sector	Domestic Credit to the Private Sector refers to the total amount of credit and loans extended by domestic financial institutions, such as banks and other financial intermediaries, to the private sector within an economy. It reflects the availability and utilization of credit by private individuals, households, businesses, and non-financial corporations.	World Development Indicators

## Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).