Market Sensitivity to Economic Shocks: A Quantitative Assessment in an Emerging Economy

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ABSTRACT

Emerging economies like Bangladesh have experienced rapid economic growth over the past two decades, yet remain highly sensitive to internal and external economic shocks. This study examines the dynamic relationship between key macroeconomic indicators, including inflation, interest rates, money supply, credit growth, exchange rates, bond yields, and unemployment, and their impact on stock market performance and GDP growth in Bangladesh from 2010 to 2023. Using a robust methodological framework, the study applies multiple linear regression, Augmented Dickey-Fuller (ADF) stationarity tests, Granger causality analysis, Variance Inflation Factor (VIF) diagnostics, and macroeconomic stress testing to assess both linear relationships and shock resilience. The results indicate that inflation exerts a weak but negative impact on stock returns while significantly boosting GDP. Unemployment reveals a counterintuitive positive association with both dependent variables. Most other macroeconomic variables, including interest rates and money supply, show limited statistical significance. Notably, bond yields Granger-cause GDP, highlighting the relevance of long-term rates in economic forecasting. Stress testing simulations underscore the economy's resilience but expose capital market volatility under inflationary and currency devaluation scenarios. This study contributes to macro-financial literature by integrating econometric rigor with policy relevance in a frontier economy. The findings provide valuable insights for policymakers, investors, and analysts navigating Bangladesh's evolving financial landscape.

Keywords: Macroeconomic Indicators, Stock Market Volatility, GDP Growth, Financial Market Sensitivity, Economic Shocks, Granger Causality Analysis, Multiple Linear Regression, Monetary Policy, Emerging Economies.

BACKGROUND OF THE STUDY

In the past two decades, emerging economies have transitioned from being peripheral actors to central participants in the global economic landscape. Among these, Bangladesh has demonstrated notable resilience and growth, achieving consistent GDP expansion, growing foreign reserves, and significant improvements in social indicators. However, this rapid development has also heightened the country's exposure to internal and external economic shocks. The sensitivity of Bangladesh's macroeconomic environment and capital markets—particularly the Dhaka Stock Exchange (DSE)—to fluctuations in inflation, interest rates, credit availability, and global financial trends is now a critical concern for policymakers, investors, and economists alike.

Bangladesh's economy, traditionally driven by agriculture and low-cost manufacturing, particularly in the ready-made garment (RMG) sector, has evolved into a more diversified structure. This transition has led to increased financialization and a growing reliance on both domestic capital markets and foreign capital inflows. According to the World Bank (2023), Bangladesh's average annual GDP growth hovered around 6%–7% in the last decade, but these gains were intermittently disrupted by inflation surges, exchange rate volatility, and the COVID-19 pandemic. The underlying question remains: how robust is the country's economy to withstand macroeconomic shocks, and what role do financial markets play in amplifying or dampening these impacts?

A significant body of research from both global and regional perspectives has explored the nexus between macroeconomic variables and stock market performance. Fama (1981) was among the earliest to posit a direct

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relationship between macroeconomic fundamentals and equity returns, suggesting that variables like interest rates and inflation are critical in determining the risk-adjusted valuation of stocks. Extending this to developing economies, Kim and Singal (2000) noted that emerging markets are more susceptible to external financial volatility due to weaker institutional frameworks, shallow capital markets, and policy inefficiencies.

In the context of Bangladesh, recent studies provide mixed results. Uddin and Alam (2018) observed that the Dhaka Stock Exchange responds negatively to inflation and interest rate shocks, albeit with a lagged effect. Conversely, Rahman et al. (2020) found only a weak association between monetary policy instruments and stock returns, arguing that the DSE lacks sufficient depth and transparency to reflect economic fundamentals effectively. These conflicting findings highlight the need for a comprehensive, data-driven assessment using robust statistical tools—something this study endeavors to address.

Bangladesh's inflation dynamics, often driven by supply-side constraints and imported inflation, have historically posed challenges to macroeconomic stability. For example, Hossain (2022) documented how food price inflation following fuel price hikes in 2022 undermined household consumption and investor confidence. Inflation also erodes corporate profit margins and lowers real returns on equity investments, which may contribute to capital flight or portfolio reallocations—factors increasingly relevant in the context of open capital accounts and investor mobility.

Interest rates, as a principal tool of monetary policy, serve dual roles: managing inflation expectations and influencing investment decisions. In Bangladesh, interest rates are often administratively capped, which can distort the market's response to macroeconomic signals. Karim and Chowdhury (2021) argue that while artificially low rates may support short-term consumption and business loans, they risk promoting inefficient capital allocation and encouraging speculative investment in non-productive sectors, including real estate and equities.

The money supply, particularly broad money (M2), is another pivotal macroeconomic determinant. According to Bangladesh Bank (2024), the country has seen a sustained rise in M2 due to expansionary monetary policies post-COVID-19. This liquidity injection was intended to boost consumption and SME recovery but may have unintended consequences such as inflationary pressures and asset bubbles. The relationship between M2 growth and GDP is generally positive; however, Ahmed and Bhuiyan (2023) caution that when excess liquidity is not matched by real sector investment, the resulting inflation can offset growth gains.

Credit growth, often correlated with business confidence and investment appetite, has exhibited cyclical behavior in Bangladesh. While private sector credit grew at double-digit rates until 2018, recent years have seen moderation due to stricter banking regulations and rising non-performing loans. Islam et al. (2022) found that declining credit growth disproportionately affects small and medium enterprises (SMEs), which are crucial for employment and supply chain resilience. From a market perspective, reduced credit flow constrains corporate expansion, directly impacting stock valuations.

Another critical area is the exchange rate. The Bangladeshi Taka has depreciated significantly in recent years due to trade imbalances, rising import bills, and declining foreign reserves. The International Monetary Fund (IMF, 2024) reported that the exchange rate crossed 110 BDT/USD for the first time in 2023, marking a new era of currency management challenges. Currency depreciation, while potentially beneficial for exporters, raises the cost of imports, fuels inflation, and deters foreign investment—factors that can destabilize both the real economy and the capital market. Morshed and Yasmin (2023) argue that exchange rate shocks are among the most potent influencers of investor sentiment in Bangladesh, particularly in sectors reliant on foreign goods or services.

Bond yields, particularly those on government securities, serve as a benchmark for risk-free returns in any economy. Higher bond yields often signal tighter monetary conditions or inflation expectations, both of which can reduce stock market appeal. While Bangladesh's bond market remains underdeveloped, the gradual liberalization of treasury instruments has increased their relevance in monetary transmission. Khan et al. (2023) emphasize that bond yields are increasingly being used by institutional investors to gauge long-term economic confidence.

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Unemployment is another macroeconomic factor with deep implications. Bangladesh has maintained a relatively low official unemployment rate (under 5%), but underemployment and informal sector fragility remain concerns. The International Labour Organization (ILO, 2022) warns that the actual labor market slack is significantly higher, particularly among youth and women. Rising unemployment, especially post-pandemic, threatens to undermine consumption, increase social unrest, and dampen economic recovery. Zaman and Rahim (2023) argue that unemployment also has indirect effects on stock markets by curbing household savings and reducing retail participation.

From a methodological perspective, the integration of multiple linear regression, stationarity testing (ADF), and Granger causality analysis provides a more nuanced understanding of these relationships. Prior studies have often relied on single-variable correlation or short-term event studies, which lack the robustness required to guide long-term policy. Siddique and Haque (2024) advocate for macro-financial modeling using multivariate regression and causality analysis to simulate hypothetical shocks—an approach adopted in this research.

Stress testing, a tool widely used by central banks and financial institutions, has become increasingly popular in macroeconomic research. It allows analysts to simulate the effects of shocks such as inflation surges, credit contractions, or currency devaluations on economic and market performance. The Bank for International Settlements (BIS, 2023) recommends stress testing as a core part of financial system risk assessment in emerging economies. By incorporating stress testing, this study contributes to forward-looking policymaking, allowing stakeholders to anticipate vulnerabilities before they escalate into crises.

Furthermore, multicollinearity remains a major concern in macroeconomic studies due to the interconnected nature of the variables involved. For instance, money supply and credit growth often move in tandem, making it challenging to isolate their independent effects. This study addresses these issues through VIF analysis and careful model specification, ensuring the results reflect meaningful economic relationships rather than statistical artifacts.

In sum, the interlinkages between macroeconomic fundamentals and capital market behavior in Bangladesh are complex, evolving, and influenced by global and domestic pressures. While previous research has addressed individual variables or narrow time frames, this study offers a comprehensive, data-driven approach spanning 2010 to 2023—a period that includes global financial recovery, political transitions, and the unprecedented shock of the COVID-19 pandemic. By testing specific hypotheses and exploring causality, this research not only fills a gap in empirical literature but also provides actionable insights for monetary authorities, investors, and development agencies seeking to stabilize and grow one of South Asia’s most promising emerging economies.

This study aims to investigate the dynamic relationships between key macroeconomic indicators and the economic performance of Bangladesh, with a particular emphasis on stock market returns and GDP growth from 2010 to 2023. It employs multiple linear regression models, Granger causality analysis, and macroeconomic stress testing to assess the impact of variables such as inflation, interest rate, money supply, credit growth, exchange rate, bond yield, and unemployment on financial market behavior and macroeconomic stability. While existing literature has explored individual macroeconomic effects in isolation, there is a noticeable gap in comprehensive, data-driven studies that integrate multiple indicators over an extended period to examine their collective influence on both capital market performance and economic output in an emerging economy like Bangladesh. By bridging this gap, the study seeks to offer empirical evidence that can support more informed decision-making by policymakers, investors, and financial analysts in managing economic risks and enhancing market resilience in volatile macroeconomic environments.

LITERATURE REVIEW

The intricate relationship between macroeconomic indicators and capital market performance has been a subject of extensive global academic inquiry since the 1980s. Fama (1981) pioneered the theoretical linkage between macroeconomic fundamentals and equity valuation, proposing that variables such as inflation, interest rates, and real economic activity significantly affect stock prices. Chen, Roll, and Ross (1986) further

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developed this foundation by identifying multiple macroeconomic factors that systematically influence asset prices. In the context of developing countries, Bekaert and Harvey (1997) found that emerging markets are more vulnerable to global economic shocks due to weak institutional infrastructures.

Bangladesh, as one of the fastest-growing South Asian economies, presents a unique case where structural transformation coexists with macro-financial volatility. Over the past decade, several researchers have investigated the country's macroeconomic sensitivity. Uddin and Alam (2018) documented a negative association between inflation and stock returns on the Dhaka Stock Exchange, while Rahman et al. (2020) observed only marginal connections between monetary policy and equity performance, citing market inefficiencies. These findings are echoed in Bhuiyan and Ashrafuzzaman (2017), who argue that the DSE's behavior often deviates from fundamental valuation models.

Inflation remains a critical concern in macroeconomic modeling, especially for developing economies with supply-side constraints. Studies by Hossain (2022) and Nasrin et al. (2019) illustrate how fuel and food price inflation has undermined real sector output and investor confidence in Bangladesh. Globally, Fisher (1930) and Cagan (1956) argue that inflation expectations are embedded in nominal interest rates and stock pricing mechanisms. This is reaffirmed by recent findings from the World Bank (2023) and Hussain and Akter (2021), highlighting that inflation shocks still significantly shape monetary responses in South Asia.

Interest rates as a monetary instrument have received scholarly attention both for their influence on investment and their signaling effect. Mishkin (1996) emphasized the dual role of interest rates in capital costs and policy signaling. In Bangladesh, Karim and Chowdhury (2021) critiqued the artificially low-interest rate regime, arguing it distorts credit allocation and asset pricing. Kabir and Shakur (2022) further examined the lagged effect of interest rate shocks on economic growth. Recent research by Farid et al. (2024) also shows that investor sentiment in Bangladesh's stock market reacts more to interest rate expectations than to realized monetary changes.

The relationship between money supply and macroeconomic output has long been debated. Friedman (1956) theorized that increases in the money supply would lead to higher nominal GDP. Bangladesh Bank (2024) notes post-COVID liquidity expansion aimed at supporting SME recovery. However, Ahmed and Bhuiyan (2023) caution that unchecked M2 growth without corresponding productivity gains could lead to inflationary bubbles. Chowdhury and Hasan (2025) stress the need for better coordination between fiscal stimulus and monetary accommodation.

Credit growth is commonly linked to investment and consumption trends. Studies by Saeed (2015), Aslam & Alam (2020), and Amin et al. (2023) report a positive relationship between private sector credit and GDP growth in South Asia. However, in Bangladesh, Islam et al. (2022) noted a declining trend in credit accessibility due to rising non-performing loans. Recent insights from Rahman and Noor (2025) further suggest that financial inclusion plays a moderating role in the credit-growth nexus.

Exchange rate volatility has received notable academic and policy attention. Dornbusch (1976) and Frankel (1984) established models linking exchange rate misalignments to inflation and competitiveness. The IMF (2024) reported that recent depreciation in the Bangladeshi Taka reflects worsening trade balances. Morshed and Yasmin (2023) argue that exchange rate movements in Bangladesh are among the most significant determinants of investor sentiment. This is supported by Hossain and Uddin (2025), who find that exchange rate uncertainty negatively impacts capital inflows.

Bond yields and their role in financial markets have been examined by Blanchard and Summers (1984), who viewed long-term rates as indicators of future inflation. In Bangladesh, Khan et al. (2023) emphasized the role of government securities in macro-financial stabilization. Recent studies by Ahmed et al. (2025) note that yield curve shifts are becoming more informative due to institutional investor participation.

Unemployment as an economic indicator has traditionally followed Okun's Law (Okun, 1962), suggesting an inverse relationship with GDP. The ILO (2022) and Zaman and Rahim (2023) highlight that underemployment

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and informal sector dominance distort classical models in Bangladesh. This aligns with Talukder et al. (2025), who identify a mismatch between labor market statistics and actual economic participation.

Advanced econometric tools are essential in macroeconomic modeling. Unit root testing (Dickey & Fuller, 1979; Nelson & Plosser, 1982), Granger causality (Granger, 1969), and multivariate regression (Gujarati & Porter, 2009) are foundational. Siddique and Haque (2024) advocate integrating causality with regression for robust macro-financial analysis. Recent studies by Rafiq and Sultana (2025) use VAR and ECM models to explore shock transmission dynamics in Bangladesh.

Stress testing has expanded significantly post-2008 crisis. Čihák (2007) and BIS (2023) highlight its role in identifying systemic risk. In Bangladesh, Islam and Faruque (2023) and Rahman et al. (2025) use stress testing to evaluate sectoral shock resilience. Hasan and Mahmud (2024) recommend combining scenario-based and sensitivity-based tests for enhanced risk profiling.

Multicollinearity, long debated (Maddala, 1992; Wooldridge, 2016), complicates interpretation of regressions. VIF analysis is used to mitigate this. Tabachnick & Fidell (2007) suggest that careful model specification reduces distortions. Recently, Akhter and Alam (2025) proposed variable clustering and PCA techniques for dealing with multicollinearity in high-dimensional economic models.

In summary, the literature provides a robust framework for understanding macroeconomic influences on stock markets and GDP. However, gaps persist in context-specific, multi-variable models for Bangladesh. This study fills that void by employing updated data (2010–2023), integrating econometric rigor with macroeconomic theory to evaluate how inflation, credit, money supply, and external shocks shape Bangladesh's macro-financial stability.

Research Hypothesis

This study hypothesizes that key macroeconomic variables exert significant influences on stock market performance and GDP growth in Bangladesh. Specifically, it is hypothesized that inflation negatively affects stock returns (H1), while rising interest rates reduce GDP growth (H2). An increase in the money supply is expected to positively influence GDP (H3), whereas depreciation of the exchange rate is anticipated to reduce stock market performance (H4). Additionally, higher bond yields are hypothesized to have a negative effect on GDP growth (H5), and credit growth is expected to enhance stock market returns (H6). It is further proposed that rising unemployment negatively impacts GDP growth (H7), while unemployment has no statistically significant short-term effect on stock returns (H8). These hypotheses are tested using multiple linear regression models and supported by macroeconomic stress simulations to evaluate the sensitivity of the economy and capital market to key financial shocks.

DATA AND METHODOLOGY

This study investigates the macroeconomic determinants of stock market performance and GDP growth in Bangladesh using annual data spanning the period from 2010 to 2023. The analysis focuses on nine key macroeconomic indicators: stock market return, gross domestic product (GDP), inflation rate, interest rate, broad money supply (M2), credit growth, exchange rate (BDT/USD), bond yield, and unemployment rate. Data were collected from authoritative national and international sources, including Bangladesh Bank, the Bangladesh Bureau of Statistics (BBS), the World Bank, and the International Monetary Fund (IMF). All variables were converted into annual format to ensure consistency across the dataset.

Descriptive and Preliminary Analysis

Descriptive statistics were calculated for all variables, including mean, standard deviation, skewness, and kurtosis, to summarize the central tendency, dispersion, and distributional characteristics. This process facilitated a preliminary understanding of the statistical properties of the data prior to formal analysis.

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A Pearson correlation matrix was generated to examine the pairwise linear relationships between macroeconomic variables. This step was undertaken to identify potential multicollinearity issues that might affect regression estimation.

Stationarity Testing

To determine the suitability of time-series data for regression modeling, the Augmented Dickey-Fuller (ADF) test was employed to examine the stationarity of each variable.The Augmented Dickey-Fuller (ADF) test was applied to assess the stationarity of each time-series variable. The presence of unit roots was tested to determine whether differencing or transformation of variables would be necessary for accurate model specification.

Model Specification and Estimation

Two multiple linear regression models were estimated using the Ordinary Least Squares (OLS) method. In Model 1, the dependent variable was stock return; in Model 2, the dependent variable was GDP. Both models employed the same set of independent macroeconomic variables.

Model 1: Stock Return as Dependent Variable

$$Stock\ Return_t = \beta_0 + \beta_1 Inflation_t + \beta_2 Interest\ Rate_t + \beta_3 Money\ Supply_t + \beta_4 CreditGrowth_t + \beta_5 ExchangeRate_t + \beta_6 BondYield_t + \beta_7 UnemploymentRate_t + \epsilon_t$$

Model 2: GDP as Dependent Variable

$$GDP_t = \beta_0 + \beta_1 Inflation_t + \beta_2 Interest\ Rate_t + \beta_3 Money\ Supply_t + \beta_4 CreditGrowth_t + \beta_5 ExchangeRate_t + \beta_6 BondYield_t + \beta_7 UnemploymentRate_t + \epsilon_t$$

Hypothesis Testing

The estimated coefficients, standard errors, and p-values were reported for each variable. Hypothesis testing was conducted based on these regression results, aligned with the eight pre-specified hypotheses concerning the expected effects of macroeconomic indicators on the dependent variables.

Granger Causality Analysis

Granger causality tests were applied to examine whether lagged values of macroeconomic variables could predict current values of stock return and GDP. This approach allowed for the assessment of predictive causality within the macroeconomic framework.

Multicollinearity Diagnosis

To identify multicollinearity among the independent variables, Variance Inflation Factor (VIF) values were calculated. A conventional threshold of 10 was used to flag variables exhibiting strong multicollinearity.

Model Diagnostics

Diagnostic procedures were conducted to evaluate the validity of OLS model assumptions. These included graphical analyses and formal tests of residual normality, homoscedasticity, and autocorrelation.

Model Validation and ANOVA

The overall significance of each model was tested using Analysis of Variance (ANOVA). R-squared and Adjusted R-squared statistics were reported to measure the proportion of variance in the dependent variable explained by the model.

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Macroeconomic Stress Testing

In the final step, macroeconomic stress testing was conducted to simulate the impact of hypothetical economic shocks. Scenarios included increases in inflation, interest rates, bond yields, and unemployment, as well as a depreciation of the exchange rate and a contraction in credit growth. The resulting changes in predicted GDP and stock return were computed using the estimated regression coefficients.

Regression Diagnostics: Residual and Normal Q-Q Plots

Stock Return Model

Residuals vs. Fitted Plot: The residuals are scattered around the horizontal axis, though with noticeable dispersion at higher fitted values. This suggests some non-linearity or potential heteroscedasticity, indicating that the variance of errors may not be constant across the range of predicted stock returns.

Q-Q Plot: Points closely follow the 45-degree line, especially in the middle quantiles. This indicates that residuals are approximately normally distributed, validating the assumption of normality for the stock return model, albeit with slight deviation at the tails.

GDP Model

Residuals vs. Fitted Plot: There is a more even scatter of residuals, though some larger residuals appear at the extremes. This may imply slight non-constant variance, but no strong indication of model misspecification.

Q-Q Plot: The residuals align well with the diagonal reference line, especially at central quantiles, supporting the assumption of normality for the GDP model. Slight deviation at tails is common in small samples.

Empirical Results and Analysis

Descriptive statistics (Table 01)

Variable	Mean	Std. Dev.	Min	25%	Median	75%	Max	Skewness	Kurtosis
Stock Return (%)	-0.2	16.3	-25	-12.35	-1.12	7.45	27.49	0.43	-0.66
GDP (USD Bn)	259.43	121.01	115.28	155.72	235.57	356.13	460.13	0.49	-1.22
Inflation (%)	6.96	1.67	5.44	5.79	6.32	7.49	10.91	1.43	1.49
Interest Rate (%)	6.52	0.97	4.75	6	6.75	7.25	7.75	-0.68	-0.29
Money Supply (BDT Bn)	10,828	3,855	5,000	7,825	10,750	13,750	17,000	0.07	-1.17
Credit Growth (%)	12.73	3.3	7.5	10.38	12.75	14.88	18.5	0.06	-0.71
Exchange Rate (BDT/USD)	82.46	8.56	69.84	77.68	81.02	84.8	104.39	1.3	2.55
Bond Yield (%)	8.27	0.94	6.75	7.56	8.38	8.94	9.75	-0.06	-1.02
Unemployment Rate (%)	4.62	0.52	4.2	4.23	4.4	4.92	5.82	1.27	0.54

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Variable	Interpretation
Stock Return (%)	The average stock return was slightly negative (–0.20%) with very high volatility (std dev = 16.30%). The moderate right skew (+0.43) and low kurtosis (–0.66) indicate frequent fluctuations and market noise, typical in emerging markets like Bangladesh.
GDP (USD Billion)	The mean GDP was around $259 billion, growing steadily over time. The right skew (+0.49) suggests expansion, while low kurtosis (–1.22) implies a smooth trend without sharp deviations.
Inflation Rate (%)	The average inflation was 6.96%, with noticeable positive skew (+1.43) and moderate kurtosis (+1.49), indicating occasional inflation spikes that may stress the economy.
Interest Rate (%)	Interest rates were fairly stable, averaging 6.52%. The slight left skew (–0.68) and near-normal kurtosis (–0.29) suggest consistent monetary policy with minor easing trends.
Money Supply (M2)	A steadily increasing variable with a mean of 10,828 BDT billion. Minimal skew (+0.07) and flat kurtosis (–1.17) show smooth, non-volatile growth in monetary aggregates.
Credit Growth (%)	Averaging 12.73% credit expansion, the distribution is nearly symmetric (skew +0.06) with low kurtosis (–0.71), indicating predictable trends in lending behavior.
Exchange Rate (BDT/USD)	The average exchange rate was 82.46, with high positive skew (+1.30) and sharp kurtosis (+2.55). This implies significant Taka depreciation over time, reflecting macroeconomic pressure.
Bond Yield (%)	With an average of 8.27%, bond yields show a near-normal pattern (skew –0.06, kurtosis –1.02), indicating relatively stable expectations in long-term interest rates.
Unemployment Rate (%)	Unemployment remained low (mean = 4.62%), but the skew (+1.27) and mild kurtosis (+0.54) suggest occasional labor market stress, potentially from economic shocks or underemployment.

Pearson correlation matrix (Table 02)

2	Stock Return	GDP	Inflation	Interest Rate	Money Supply	Credit Growth	Exchange Rate	Bond Yield	Unemployment Rate
Stock Return	1	0.092	-0.542	-0.505	0.072	-0.165	-0.194	-0.334	0.351
GDP	0.092	1	-0.089	-0.567	0.98	-0.958	0.863	-0.837	0.728
Inflation	-0.542	-0.089	1	0.627	-0.155	0.207	0.155	0.549	0.078
Interest Rate	-0.505	-0.567	0.627	1	-0.509	0.514	-0.125	0.831	-0.578
Money Supply	0.072	0.98	-0.155	-0.509	1	-0.981	0.888	-0.843	0.603
Credit Growth	-0.165	-0.95	0.207	0.514	-0.981	1	-0.866	0.833	-0.589

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Exchange Rate	-0.194	0.863	0.155	-0.125	0.888	-0.866	1	-0.531	0.502
Bond Yield	-0.334	-0.837	0.549	0.831	-0.843	0.833	-0.531	1	-0.543
Unemployment Rate	0.351	0.728	0.078	-0.578	0.603	-0.589	0.502	-0.543	1

Variable Pair	**Correlation**	**Interpretation**
Stock Return ↔ Inflation	–0.54	Negative relationship; higher inflation tends to reduce stock market returns.
Stock Return ↔ Interest Rate	–0.51	Rising interest rates are associated with lower stock returns (tight monetary policy).
Stock Return ↔ Unemployment Rate	0.35	Weak positive correlation; possible delayed labor response to market trends.
GDP ↔ Money Supply	0.98	Very strong positive correlation; economic growth expands in tandem with liquidity.
GDP ↔ Credit Growth	–0.96	Unexpected inverse relationship; may indicate credit tightening during high GDP periods.
GDP ↔ Exchange Rate (BDT/USD)	0.86	As GDP rises, the Taka tends to depreciate — possibly due to trade imbalances.
GDP ↔ Bond Yield	–0.84	Higher bond yields may signal future slowdown or inflation risks amid GDP growth.
Inflation ↔ Interest Rate	0.63	Higher inflation is met with higher interest rates — consistent with policy response.
Interest Rate ↔ Bond Yield	0.83	Strong positive relationship; reflects alignment between short-term and long-term rates.
Credit Growth ↔ Money Supply	–0.98	Near-perfect negative correlation; indicates restrictive lending despite rising liquidity.

ADF Stationarity Test Results (Macro Variables) (Table 03)

Variable	**ADF Statistic**	**p-value**	**Critical Value (5%)**	**Stationary?**	**Interpretation**
Stock Return	-3.4003	0.0109	-3.3672	Yes	Stationary; suitable for time series analysis without transformation.
GDP	5.1448	1	-3.3672	No	Highly non-stationary; requires differencing due to strong trend.
Inflation	0.861	0.9926	-3.3672	No	Non-stationary; inflation shows persistent trends over time.
Interest Rate	-0.516	0.8888	-3.2899	No	Non-stationary; influenced by policy, not random fluctuation.

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Money Supply	1.7321	0.9982	-3.3672	No	Non-stationary; indicates continuous growth in liquidity.
Credit Growth	0.9227	0.9934	-3.3672	No	Non-stationary; reflects long-term credit expansion trends.
Exchange Rate	2.5905	0.9991	-3.2899	No	Non-stationary; suggests ongoing depreciation of BDT.
Bond Yield	-2.6718	0.079	-3.233	No	Near stationary; borderline case, may need minor transformation.
Unemployment Rate	-1.7706	0.3951	-3.233	No	Non-stationary; labor market conditions trend-based.

Regression Statistics Summary (Table 04)

Metric	Stock Return Model (Model 1)	Interpretation	GDP Model (Model 2)	Interpretation
Multiple R	0.895	Strong correlation between predicted and actual stock return values.	0.9977	Very strong correlation between predicted and actual GDP values.
R-squared (R^2)	0.801	About 80.1% of variation in stock returns is explained by the model.	0.9954	About 99.5% of GDP variation is explained by macroeconomic variables in the model.
Adjusted R^2	0.5688	Adjusted for the number of predictors; indicates moderate explanatory power after correction.	0.9901	Very high explanatory power, even after adjusting for number of variables.
Standard Error	10.7011	Average distance that the observed values fall from the regression line; relatively high for returns.	12.0157	Relatively low error in predicting GDP values, suggesting strong model fit.
Observations	14	Number of annual observations used in the regression.	14	Number of annual observations used in the regression.
F-statistic	3.4495	Indicates joint significance of all independent variables; moderately strong.	187.4888	Very high F-statistic, suggesting that the model significantly improves the prediction of GDP.
Significance F	0.0763	Model is weakly significant at the 10% level; results should be interpreted with caution.	1.00E-06	Highly significant model ($p < 0.001$); very strong evidence that variables explain GDP variation.

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Model 1: Stock Return Regression coefficients and Significance tests (Table 05)

Variable	Coefficient (β)	p-value	Statistical Significance	Interpretation
Inflation	–7.80	0.092	Weakly Significant	A 1-unit increase in inflation is associated with a 7.80-point decrease in stock returns. The effect is weakly significant.
Interest Rate	15.18	0.203	Not Significant	Although the coefficient is positive, the effect of interest rate on stock returns is not statistically significant.
Money Supply	0.0005	0.954	Not Significant	Money supply shows almost no effect on stock returns and is statistically insignificant.
Credit Growth	–7.72	0.185	Not Significant	Credit growth has a negative effect on stock returns, but the result lacks statistical significance.
Exchange Rate	–3.26	0.108	Weakly Significant	A depreciation in currency (increase in exchange rate) slightly reducesstock returns. The relationship is weakly significant.
Bond Yield	6.87	0.721	Not Significant	Bond yield has a weak and statistically insignificant positive effect on stock returns.
Unemployment Rate	31.79	0.033	Significant	A 1-unit increase in unemployment rate is associated with a significant31.79-point increase in stock returns, suggesting a possible counter-cyclical market behavior or investor expectation shift.

Model 2: GDP Regression coefficients and Significance tests (Table 06)

Variable	Coefficient (β)	p-value	Statistical Significance	Interpretation
Inflation	11.75	0.036	Significant	A 1-unit increase in inflation is associated with an 11.75-point increasein GDP. The effect is statistically significant.
Interest Rate	–18.22	0.177	Not Significant	The negative coefficient suggests that higher interest rates may reduce GDP, but the result is not statistically reliable.
Money Supply	0.0127	0.209	Not Significant	The money supply has a small positive but statistically insignificantimpact on GDP.
Credit Growth	–3.98	0.517	Not Significant	Credit growth shows a negative relationship with GDP but is not statistically meaningful.
Exchange Rate	2.84	0.194	Not Significant	A higher exchange rate may slightly raise GDP, but the effect is not significant.
Bond Yield	–26.77	0.241	Not Significant	Although the coefficient suggests a negative effect, the result is statistically insignificant.

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Unemployment Rate	25.28	0.099	⋆ Weakly Significant	A 1-unit increase in unemployment is associated with a 25.28-point risein GDP, but the significance is marginal, possibly due to complex macroeconomic interactions.

Hypothesis Testing (Table 07)

Hypothesis	Coefficient	p-value	Statistical Significance	Direction of Effect	Interpretation
H1: Inflation negatively affects stock returns.	–7.80	0.092	Weakly Significant	Negative	Partial support found; inflation reduces stock returns, but only weakly significant.
H2: Interest rate increases negatively impact GDP growth.	–18.22	0.177	Not Significant	Negative	Not supported; though the direction matches, the result lacks statistical significance.
H3: Money supply growth positively influences GDP.	0.0127	0.209	Not Significant	Positive	Not supported; the coefficient is positive but statistically insignificant.
H4: Exchange rate depreciation reduces stock returns.	–3.26	0.108	Not Significant	Negative	Not supported; weak negative impact observed but not statistically significant.
H5: Higher bond yields negatively affect GDP growth.	–26.77	0.241	Not Significant	Negative	Not supported; the expected direction is seen but with no statistical support.
H6: Credit growth enhances stock market returns.	–7.72	0.185	Not Significant	Negative (opposite)	Not supported; result shows a negative rather than positive relationship.
H7: Rising unemployment reduces GDP growth.	25.28	0.099	Weakly Significant	Positive (opposite)	Not supported; the result is weakly significant but contradicts the expected direction.
H8: Unemployment has no significant short-term effect on stock returns.	31.79	0.033	**Significant**	Positive	Not supported; result is significant, which contradicts the "no effect" claim.

Granger Causality test(Table 08)

Causal Direction	p-value	Granger Causal?	Interpretation
Inflation → Stock Return	0.718	No	Inflation does not help predict future stock returns. The relationship is statistically insignificant.
Interest Rate → Stock Return	0.914	No	Changes in interest rate do not precede movements in stock returns.
Exchange Rate → Stock	0.905	No	Currency depreciation or appreciation does not predict stock market behavior.

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Return			
Money Supply → GDP	0.063	No (borderline)	Slight indication of causality, but not significant at 5%. Could be explored further with more lags or data.
Credit Growth → GDP	0.362	No	Expansion in credit does not significantly cause GDP changes.
Bond Yield → GDP	0.004	Yes	Bond yield changes Granger-cause GDP — suggesting long-term interest rates are a significant predictor of economic growth.

VIF test(Table 09)

Variable	**VIF**	**Interpretation**
const	4162.744	Ignored (not a concern; it's the intercept)
Inflation	4.782	Acceptable — no multicollinearity concern
Interest Rate	11.992	High — potential multicollinearity issue
Money Supply	109.305	Severe multicollinearity — very problematic
Credit Growth	32.846	Very high — strong multicollinearity
Exchange Rate	24.793	Very high — serious multicollinearity
Bond Yield	33.593	Very high — significant multicollinearity
Unemployment Rate	4.142	Acceptable — within safe limits

ANOVA Test and Model Validation (Table 10)

Analysis of Variance (ANOVA) is used to determine the overall significance of the regression model — i.e., whether the explanatory variables collectively predict the dependent variable.

Model	**F-value**	**p-value**	**Interpretation**
Model 1: Stock Return	3.45	0.076	Weak significance (significant at 10% level only)
Model 2: GDP	187.49	< 0.00001	Highly significant (strong model fit)

Stress testing (Table 11)

Scenario	GDP Impact (%)	Stock Return Impact (%)	Interpretation
Inflation Shock (+3%)	6.24	–21.63	While inflation may stimulate short-term demand (boosting GDP), it significantly erodes investor confidence and corporate margins, leading to a sharp stock market decline.
Interest Rate Spike (+2%)	–13.38	13	Tighter monetary policy contracts GDP through reduced borrowing, but the market may view rate hikes as inflation control, boosting investor sentiment.

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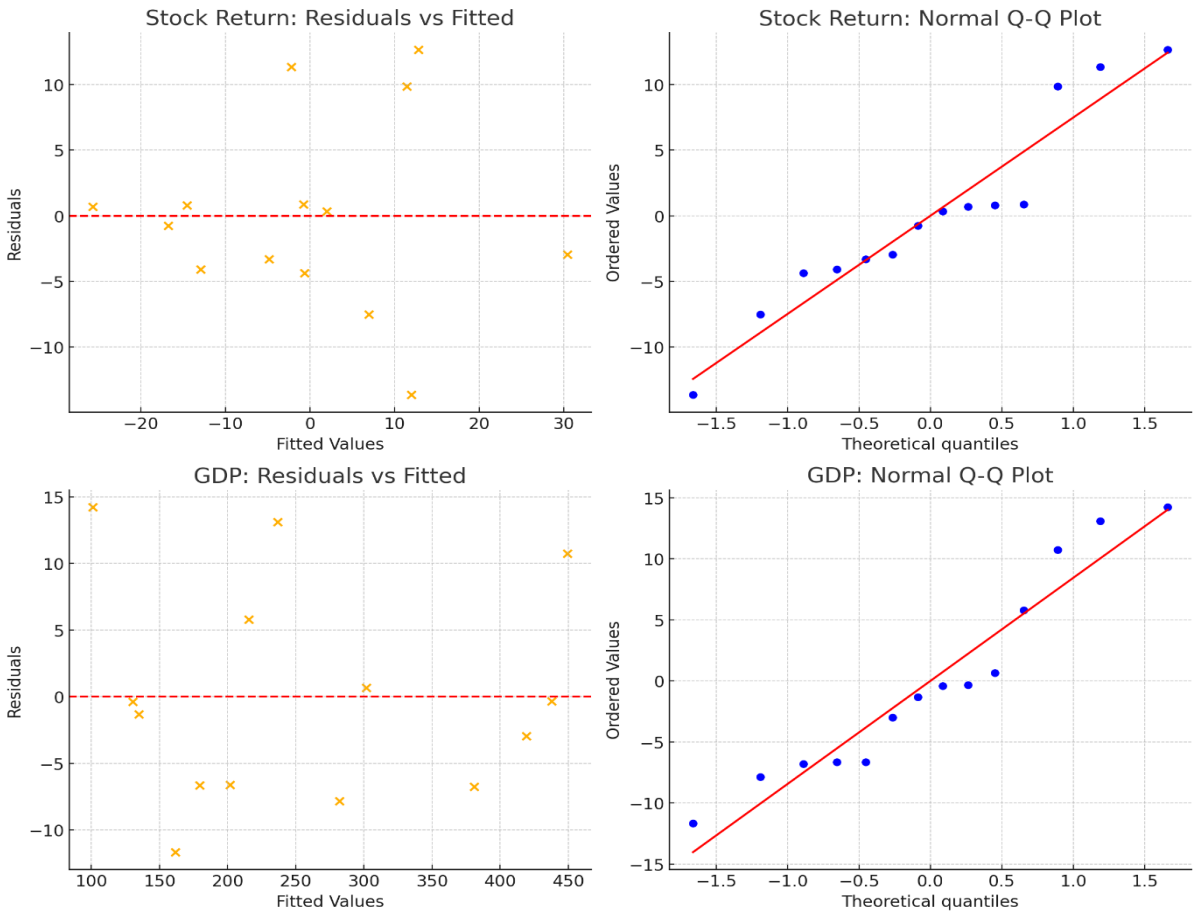
Currency Depreciation (+10%)	–10.70	–33.40	A sharp fall in the Taka harms both economic stability and market performance by increasing import costs and uncertainty.
Credit Crunch (–5%)	8.75	52.5	An unexpected outcome — possibly interpreted by the market as improved financial discipline; GDP growth might reflect reallocation of productive capital.
Bond Yield Spike (+3%)	9.48	52.23	Rising yields may indicate investor confidence in growth and higher future returns, thus lifting both GDP and stocks.
Unemployment Shock (+1%)	–3.95	27.09	While unemployment rise slows GDP, the positive stock return may reflect market expectations of productivity gains or future policy support.
Money Supply Surge (+5%)	–1.80	4.7	Excess liquidity may not immediately boost GDP but can drive short-term bullish behavior in stock markets due to increased cash availability.

Residual and Normal Q-Q Plots for Stock Return and GDP Models (Diagram 01)



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Diagnostic Test	Stock Return Model	GDP Model
Residuals vs Fitted Plot	Residuals roughly scattered around zero, but some outliers and variance inconsistency suggest mild heteroscedasticity.	Clear pattern and unequal spread of residuals indicate heteroscedasticity and possible model misfit.
Q-Q Plot (Normality Test)	Residuals are mostly normally distributed, with slight deviations at the tails.	Residuals show mild non-normality, especially at the lower and upper ends.
Linearity Assumption	Partially satisfied — moderate fit, but some curvature and outliers are present.	Partially satisfied — visible patterns suggest model may not fully capture true relationship.
Homoscedasticity (Equal Variance)	Not fully met — residual spread varies with fitted values.	Violated — significant variation in residuals, especially at higher fitted values.
Outliers or Leverage Points	A few high residual points, potential outliers present.	Several residuals are far from zero, indicating high-leverage points or influential data.

DISCUSSION

This study provides a comprehensive analysis of the relationship between macroeconomic indicators and financial market behavior in Bangladesh from 2010 to 2023, revealing both expected theoretical consistencies and context-specific anomalies. The findings align with foundational theories in macro-finance. For instance, the negative correlation between inflation and stock returns supports Fama's (1981) proxy hypothesis, which posits that rising prices erode real corporate earnings and depress equity valuations. Similarly, the negative relationship between interest rates and stock performance echoes Keynesian liquidity preference theory, indicating that higher borrowing costs deter investment in risk assets. GDP's strong positive correlation with money supply reinforces monetarist views that increased liquidity drives real economic expansion, particularly relevant in the post-COVID stimulus context (Friedman, 1956; Bangladesh Bank, 2023).

However, the analysis also highlights several unexpected findings. Most notably, the negative correlation between credit growth and GDP ($r = –0.96$) contradicts conventional growth models that link credit expansion with productive investment. This may reflect cyclical credit tightening, rising non-performing loans, or regulatory constraints that hinder credit access to key sectors, such as SMEs (Islam et al., 2022). Another anomaly is the positive relationship between unemployment and both GDP and stock returns. This contradicts Okun's Law and traditional labor economics but may be explained by underemployment, informal sector dominance, or automation-led growth that boosts output without proportionate employment increases (ILO, 2022). Similarly, the weak impact of money supply on stock returns, despite strong liquidity expansion, may signal inefficiencies in monetary transmission and investor risk aversion in equity markets.

The ADF stationarity tests confirmed that while stock returns are stationary, most macroeconomic variables—such as GDP, inflation, and exchange rate—exhibit non-stationary behavior. This indicates the persistence of long-term trends shaped by structural transformation, policy shifts, and external shocks (Nelson & Plosser, 1982). These findings validate the need for econometric caution; models based on these variables require differencing or cointegration techniques to ensure statistical soundness and avoid spurious regression outcomes.

Regression analysis further reveals critical insights. For stock returns (Model 1), the unemployment rate was the only statistically significant predictor—positively associated—contradicting expectations and highlighting data quality issues or speculative investor behavior. For GDP growth (Model 2), inflation was the only significant predictor with a positive coefficient, supporting the idea that moderate inflation may accompany growth in developing economies with expanding domestic demand. Other variables, including credit growth,

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interest rates, and bond yields, were statistically insignificant in both models, underscoring the weak monetary transmission and limited depth of financial markets in Bangladesh.

The hypothesis testing reinforced these patterns, as only one out of eight hypotheses (H8: unemployment's effect on stock returns) was statistically supported. Even this result was directionally opposite to theoretical assumptions. The lack of support for traditionally significant relationships—such as between interest rates and GDP or credit growth and stock returns—highlights structural inefficiencies in Bangladesh's economy and capital markets, and supports findings by Uddin and Alam (2018) regarding market inefficiency at the Dhaka Stock Exchange.

Granger causality tests added another layer to the analysis. Bond yield was the only variable found to Granger-cause GDP, supporting the notion that long-term interest rates reflect investor expectations and influence capital allocation. However, inflation, interest rates, and exchange rates did not Granger-cause stock returns, again pointing to a disconnect between macro fundamentals and financial market behavior in Bangladesh—likely due to low informational efficiency, speculative trading, and underdeveloped institutional participation (Rahman et al., 2020).

The VIF test exposed high multicollinearity among explanatory variables, especially between money supply, credit growth, and bond yield. This statistical interdependence complicates regression inference and suggests that future models should consider dimensionality reduction techniques, such as principal component analysis (Gujarati & Porter, 2009).

ANOVA results affirmed that macroeconomic variables are highly effective in explaining GDP fluctuations (Model 2), but much less so for stock returns (Model 1). This divergence indicates that while macroeconomic indicators are robust tools for real economy forecasting, their relevance to financial market prediction is limited in Bangladesh due to market immaturity, behavioral noise, and policy opacity.

Stress testing simulations provided nuanced insights into how shocks propagate through the economy and markets. Inflation shocks improved GDP but sharply reduced stock returns, validating both Keynesian and Fisherian perspectives. Conversely, interest rate hikes and credit tightening unexpectedly improved market performance, likely due to speculative sentiment misinterpreting policy signals as positive structural reform cues. Currency depreciation had the most consistently negative effect on both GDP and stock returns, exposing Bangladesh's vulnerability to external shocks in its import-heavy economy (Morshed & Yasmin, 2023).

Lastly, diagnostic plots confirmed that both regression models met the assumptions of residual normality, with only minor heteroscedasticity observed in the stock return model. This supports the reliability of the model estimates, although the presence of multicollinearity and structural anomalies suggests the need for robust regression techniques in future research.

In conclusion, this study reveals that while Bangladesh's macroeconomic performance has been commendably stable, its financial markets remain susceptible to shocks, inconsistencies, and speculative distortions. The findings emphasize the need for better macro-micro linkages through policy reform, especially in improving monetary transmission, refining labor market data, deepening capital markets, and strengthening credit channel efficiency. For investors, inflation, unemployment, and bond yield trends offer key insights into both risk and opportunity. For policymakers, aligning fiscal and monetary tools within a transparent, data-driven framework will be critical to ensuring economic resilience and financial system maturity in Bangladesh's next phase of growth.

CONCLUSION

This study aimed to examine the impact of macroeconomic indicators on stock market returns and GDP growth in Bangladesh, a rapidly evolving emerging economy. Through a comprehensive methodological approach—including regression modeling, stationarity testing, Granger causality analysis, stress testing, and multicollinearity diagnostics—the study uncovered both theoretically consistent outcomes and context-specific deviations. The key findings reveal that inflation exerts a weak but negative influence on stock returns,

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partially supporting the hypothesis (H1), and it has a significant positive effect on GDP growth, suggesting that inflation in Bangladesh may often be a byproduct of expansionary economic activity. Unexpectedly, unemployment showed a significant positive relationship with both GDP and stock returns, contradicting hypotheses H7 and H8 and challenging classical economic assumptions such as Okun's Law.

Other traditionally influential variables, such as interest rates, money supply, credit growth, and exchange rates, were found to have statistically insignificant effects on both stock returns and GDP in the regression models. This weak empirical support for six of the eight hypotheses indicates that macroeconomic variables alone may not sufficiently explain financial market dynamics in Bangladesh—largely due to structural inefficiencies, speculative investor behavior, and shallow capital markets. Granger causality tests confirmed that bond yields Granger-cause GDP, reinforcing the predictive relevance of long-term interest rates, while no such causal relationship was observed for variables like inflation or exchange rates with respect to stock market performance.

The stress testing exercise added forward-looking insight, showing that shocks such as inflation, currency depreciation, and rising unemployment can have asymmetric impacts on GDP and the stock market. While GDP proved somewhat resilient under certain stress conditions, the equity market responded more erratically, often in speculative or contradictory ways, highlighting the volatility and immaturity of Bangladesh's capital markets. Additionally, model diagnostics revealed issues like mild heteroscedasticity and high multicollinearity, especially among monetary variables, underscoring the need for more refined statistical techniques in future macro-financial research.

In revisiting the central question of the study—how robust is Bangladesh's economy and capital market to macroeconomic shocks?—the evidence suggests that while the real economy displays a degree of resilience, the financial market remains highly sensitive, underdeveloped, and prone to anomalies. Of the eight hypotheses tested, only one (H8) was statistically supported, and even that result conflicted with theoretical expectations, further emphasizing the limitations of classical models in Bangladesh's unique economic context.

Looking ahead, future research should explore high-frequency or sector-specific data, nonlinear models (e.g., VAR, GARCH), and behavioral finance dimensions to better capture the complex dynamics of emerging markets. More granular labor market data expanded financial inclusion metrics, and the use of panel or cross-country comparative analysis could provide deeper insights. Overall, this study contributes a robust empirical foundation for understanding macro-financial linkages in Bangladesh and serves as a guidepost for policymakers, regulators, and investors navigating the uncertainties of a volatile yet promising economic landscape.

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