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Research Article

Macroeconomic Factors Driving the Emergence of Financial Derivatives Market in Bangladesh

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Abstract

This study explores the macroeconomic factors influencing stock market volatility in Bangladesh to assess the necessity of introducing a financial derivatives market. Using annual data spanning 26 years, from 1998 to 2023, the research employs descriptive statistics, factor analysis, correlation, and regression techniques to identify significant determinants of volatility in the capital market. The analysis reveals that fluctuations in the real interest rate have a statistically significant impact on stock market volatility, while other variables such as GDP growth, inflation, budget size, and export and import growth exhibit moderate to weak influence. Factor analysis extracted three uncorrelated components, with the second factor-driven primarily by real interest rates-emerging as the most influential. The findings suggest that macroeconomic instability underscores the urgent need to introduce financial derivatives such as interest rate swaps and currency futures to provide effective risk management tools. The study recommends that policymakers establish a supportive regulatory framework, strengthen financial infrastructure, and enhance market awareness to ensure the successful inception of a financial derivatives market in Bangladesh.

I. INTRODUCTION

In the global financial landscape, derivatives markets are widely recognized as essential mechanisms for managing financial risk, deepening market liquidity, and enhancing efficiency (Iqbal, 2018). Although the notional outstanding value of global derivatives markets exceeds USD 540 trillion (Shamim Iqbal, 2018), Bangladesh-a rapidly growing emerging economy-has yet to establish a formal financial derivatives market. This gap exposes domestic investors, firms, and the economy to unhedged macroeconomic risks, such as exchange rate swings, inflation surprises, interest rate fluctuations, and stock market volatility (Hasibul Islam et al., 2020; Molla, 2018). The financial sector in Bangladesh has experienced significant growth in recent years, driven by various economic reforms and policy changes. The sector's contribution to the country's GDP has increased from 2.9% in 1980 to 11.02% in 2024 (Bangladesh Economic Review, 2024). Despite this growth, there is currently no derivatives market in Bangladesh. A derivatives market would enable investors to manage risk efficiently, increase liquidity, and improve price discovery in the financial sector (Chowdhury & Bhuiya, 2023). Derivatives are financial instruments whose value is derived from underlying assets such as stocks, bonds, currencies, indices, or commodities (Hull, 2018). They can be used to hedge against price fluctuations in underlying assets, speculate on future price movements, or manage the overall risk profile of a portfolio. In recent years, there has been increasing interest in the development of a

derivatives market in Bangladesh. The country's financial regulators have expressed a desire to introduce derivatives trading, and several market participants have indicated their willingness to participate in such a market. The Bangladesh Securities and Exchange Commission (BSEC) has drafted guidelines for the introduction of derivatives trading and has sought feedback from market participants (Chowdhury, 2022). However, the inception of a derivatives market in Bangladesh requires a favorable macroeconomic environment. The emergence of a derivatives market is closely linked to the level of economic development and stability in a country. A derivatives market can operate efficiently only if there is a transparent and predictable legal framework, stable economic conditions, and a robust financial infrastructure (Chowdhury, 2021).

The absence of a derivatives market in Bangladesh limits the financial sector's ability to manage risk and hinders the growth of the overall economy. This study seeks to identify the macroeconomic factors driving the emergence of a derivatives market in Bangladesh. Specifically, the research aims to explore the relationship between macroeconomic variables-such as GDP growth, inflation rate, real interest rates, exchange rate growth, unemployment rate, budget size growth, export growth, and import growth-and average stock market volatility as a representative indicator. Understanding the macroeconomic factors driving the need for a derivatives market is crucial for policymakers, investors, and market participants. This study contributes to ongoing discussions on the development of a derivatives market in Bangladesh and provides valuable insights for stakeholders interested in participating in such a market.

II. LITERATURE REVIEW

Derivatives are defined as financial instruments whose value is based on underlying assets, and they serve a critical role in risk management (Rao, 2012), especially in managing risks arising from fluctuations in inflation rates, interest rates, exchange rates, and commodity prices (Chowdhury, 2022; Chowdhury & Bhuiya, 2023). These instruments-including forwards, futures, options, and swaps-are commonly used to hedge against uncertainties in financial markets (Malleswari, 2013). Hull (2018) explains hedging as a strategic trade aimed at minimizing exposure to market volatility. Since no financial market is entirely free from risk, derivatives markets offer a platform to manage and absorb such vulnerabilities. Islam and Chakraborti (2015) emphasize that the emergence of derivatives is a notable achievement of financial engineering, providing effective solutions to price instability. During periods of financial crisis, the role of derivatives becomes even more significant (Kozaric & Fabris, 2012). Additionally, derivatives facilitate financial integration and economic development, particularly in advanced economies where forward markets are well established (Embrechts & Furrer, 2006; Djenic *et al.,* 2012; Malleswari, 2013).

Building upon the role of derivatives in risk mitigation, scholars have increasingly explored the relationship between derivatives markets and stock markets. Several studies suggest that the development of derivatives markets significantly influences stock market efficiency and stability. According to Antoniou *et al.* (1998), the introduction of derivatives can improve the informational efficiency of the underlying stock market by enhancing price discovery. Derivatives such as index futures and options provide investors with opportunities to express market views or hedge positions, often leading to increased liquidity and reduced volatility in the cash market (Brailsford & Hodgson, 1997). Furthermore, derivatives trading allows for better risk allocation, which contributes to overall market development and investor confidence (Kamara, 1982).

Stock market volatility is influenced by a wide range of macroeconomic factors that reflect the broader health and expectations of an economy. According to Fama (1981), stock prices are sensitive to economic fundamentals, and macroeconomic variables such as interest rates, inflation, and GDP growth significantly affect investor behavior and market dynamics. Fluctuations in these indicators often lead to changes in expected returns, thereby increasing or decreasing stock market volatility. Chen *et al.* (1986) emphasize that variables such as industrial production, changes in risk premia, and market interest rates are strong predictors of stock return variations. Similarly, Schwert (1989) finds that macroeconomic volatility-particularly from inflation and monetary policy changes-contributes directly to stock market volatility. Moreover, inflation creates uncertainty about future purchasing power and corporate profits, thereby leading to heightened market fluctuations (Geske & Roll, 1983).

In emerging markets, the sensitivity of stock markets to macroeconomic shocks is even more pronounced. Maysami *et al.* (2004) demonstrate a significant relationship between macroeconomic indicators-such as exchange rates, interest rates, and money supply-and stock market volatility in Singapore, suggesting that changes in government policies or external economic shocks can have disproportionate effects. Furthermore, in developing economies, unstable inflation, fluctuating exchange rates, and weak fiscal positions can magnify market responses, increasing volatility and reducing investor confidence (Mukherjee & Naka, 1995).

Studies demonstrate a bidirectional link between GDP growth and stock market volatility. Karunanayake *et al*. (2012) reveal that GDP fluctuations both drive and respond to equity market volatility. Kennedy and Nourzad (2016) also show that macroeconomic shifts, including GDP growth, intensify stock return volatility in their GARCH model. These findings underscore robust spillover effects between real economic output and financial markets. Interest rate dynamics are another major driver of market volatility. Latha *et al.* (2017), employing a GARCH(1,1) model on the Indian S&P CNX 500 index (1996–2014), conclude that interest rate volatility-not merely the level-significantly amplifies conditional stock return volatility, especially for non-

financial firms. Supporting this, Hussain *et al.* (2021) find in Pakistan that ARCH/GARCH-detected interest rate variability significantly forecasts stock volatility, validating a strong statistical link. Hajilee and Al Nasser (2017) analyze 12 emerging markets (1980–2011) and reveal that interest rate uncertainty, captured through interest rate volatility, negatively affects stock market development and stability. They demonstrate both long-run and short-run adverse effects using cointegration and error-correction models. Muktadir-al-Mukit (2013) finds that a 1% increase in the real interest rate reduces market index values by approximately 1.7% in Bangladesh, indicating a clear negative association between interest rates and stock returns. Marozva (2020), examining South Africa (1995–2019), finds through GARCH analysis that interest rate increases correspond with heightened stock return volatility. The study highlights that monetary tightening raises discount rates, diminishes corporate earnings, and provokes equity instability.

Exchange rate fluctuations also influence stock market volatility. Agrawal *et al.* (2010) report a negative correlation between exchange rate changes and Indian stock index returns. In the United States, Kennedy and Nourzad (2016) find statistically significant positive effects of exchange rate volatility on stock volatility. Cross-country studies, including Walid *et al*. (2011), confirm regime-dependent spillovers between exchange rate regimes and stock market returns. Inflationary pressures play a significant role among macroeconomic factors influencing financial markets. As stated by the Fisher Hypothesis, nominal interest rates tend to rise in response to anticipated inflation, which in turn impacts stock valuations (Hossain, 2024). Elevated inflation levels can diminish real equity returns, reducing their attractiveness to investors (Isibor *et al.,* 2024). However, the relationship between inflation and stock market behavior is not always straightforward; while moderate inflation may signal economic expansion, excessive inflation can create financial instability. Judson and Orphanides (1999) find that inflation uncertainty fuels equity market instability.

International and Bangladeshi studies consistently show that stock market volatility is strongly driven by macroeconomic uncertainty. In Bangladesh, empirical research using GARCH models finds that volatility in exchange rates, inflation, and other macroeconomic indicators significantly influences Dhaka Stock Exchange (DSE) volatility (Hasan, 2017; Ali & Chowdhury, 2021; Hasan & Zaman, 2017). Similarly, Chowdhury and Rahman (2004) highlight that macroeconomic volatility leads stock market fluctuations, reinforcing the need for risk management instruments. Recent empirical studies underscore the vital role of macroeconomic forces in shaping stock market behavior and financial stability across emerging economies. Islam and Chowdhury (2024) demonstrate that exchange rate fluctuations significantly influence stock price movements in Bangladesh, emphasizing the sensitivity of capital markets to currency volatility. Earlier, these authors highlighted the predictive power of time-series models such as ARIMA in forecasting exchange rate behavior, suggesting that unstable exchange rate dynamics may exacerbate financial market uncertainty (Islam & Chowdhury, 2022). Credit market conditions also contribute to market stability, as shown by Bhuiya *et al.* (2023), who identify a strong link between rising credit risk and declining profitability in the banking sector-an outcome that indirectly affects investor confidence and market volatility. International evidence further supports the importance of external macroeconomic shocks; Dutta and Bhunia (2021) find that foreign fund flows heighten volatility in India's stock market, demonstrating the sensitivity of emerging markets to global capital movements. Similarly, Kaur (2024) reports that exchange rate fluctuations in China affect trade conditions, credit availability, and overall financial stability. Collectively, these studies highlight that exchange rate instability, credit risk, and external financial flows play a crucial role in shaping market volatility, reinforcing the importance of developing financial instruments such as derivatives to hedge against macroeconomic uncertainties.

Given that Bangladesh has no active derivatives market, average stock market volatility can serve as a proxy for the "need" for derivatives, that is, the demand for risk-hedging tools. Higher volatility implies greater uncertainty and, consequently, stronger demand for derivatives such as futures, options, and swaps. Although several studies-including Rahman and Hasan (2011), Rahman and Das (2015), Molla (2018), Chowdhury (2021), Rahaman (2022), and Bhuiya and Chowdhury (2023)-explain why a derivatives market is necessary in Bangladesh, none of these studies focus on the macroeconomic variables that drive the emergence or inception of a derivatives market in the country.

III. RESEARCH GAP AND OBJECTIVES OF THE STUDY

Despite its economic growth, Bangladesh lacks the institutional and regulatory infrastructure, market depth, and investor literacy required for derivatives trading (Hossain, 2024; Molla, 2018). While existing literature examines volatility transmission and macroeconomic impacts, few studies explore the drivers of volatility in the context of developing a derivatives market.

This study fills this gap by examining the following questions:

1. Which macroeconomic variables explain stock market volatility in Bangladesh?
2. How strongly do GDP growth, the real interest rate, exchange rate growth, unemployment, inflation, budget size growth, and export and import growth correlate with volatility?
3. What are the policy implications for developing a derivatives market?

IV. METHODOLOGY

A. Research Design and Approach

This study employs a quantitative research design. The research aims to identify the key macroeconomic factors driving the need for a financial derivatives market in

Bangladesh. It adopts a time-series research design, which involves analyzing data collected at multiple points in time.

B. Data Collection and Sources

The data for this study have been collected from secondary sources. The majority of the data were obtained from the websites of Bangladesh Bank, the Bangladesh Bureau of Statistics, and other relevant government agencies. Additional data sources include published reports, academic journals, and government publications. These sources provide information on macroeconomic factors such as GDP growth rate, inflation, interest rates, and exchange rates.

C. The Model

The regression model specified for the study is as follow:

Need for Inception of Derivatives Market = β_0 + β_1 (GDP Growth) + β_2 (Real Interest Rate) + β_3 (growth of Exchange Rate) + β_4 (Unemployment Rate) + β_5 (Inflation Rate) + β_6 (growth in the Budget Size) + β_7 (Growth rate of Export) + β_8 (Growth rate of Import) + ε

Where,

1. β0 represents the intercept or constant term;
2. β1 to β8 are the coefficients of the independent variables;
3. ε represents the error term.

D. Data Analysis Techniques and Tools

The study employs multiple regression analysis to identify the significant factors influencing the need for a derivatives market. The dependent variable is the need for the inception of a derivatives market, measured by stock market volatility. The independent variables include GDP growth rate, real interest rate, exchange rate growth, unemployment rate, inflation rate, growth in budget size, and growth of exports and imports. The study also assesses the model's goodness of fit by examining the R-squared and adjusted R-squared values. SPSS version 27 is used for data analysis, and the statistical significance level is set at 0.05. The study also conducts hypothesis testing to examine the significance of the coefficients of the independent variables. Overall, this study provides insights into the significant factors influencing the need for a derivatives market in Bangladesh. The findings may benefit policymakers, market regulators, and investors in making informed decisions related to the development of a derivatives market in Bangladesh.

V. EMPIRICAL RESULTS AND ANALYSIS

A. Descriptive Analysis

Following table (Table I) shows the result of descriptive statistics:

TABLE I DESCRIPTIVE STATISTICS

Variable	Macroeconomic Indicators	N	Min.	Max.	Mean	Std. Deviation
01	GDP Growth	26	3.45	7.88	5.9500	1.09256
02	Real Interest Rate	26	-13.64	9.26	4.8542	4.29277
03	Growth of Exchange Rate	26	-4.59	15.87	3.1273	4.54808
04	Unemployment Rate	26	2.89	5.44	4.1775	.61881
05	Inflation	26	2.01	11.40	6.5458	2.13773
06	Growth of Budget Size	26	-4.94	35.91	9.0727	7.35491
07	Growth rate of Export	26	-15.09	38.71	10.6415	12.03989
08	Growth Rate of Import	26	-18.92	40.86	10.1658	14.14608
	Valid N (list-wise)	26	-	-	-	-

Source: Authors' Calculation

The descriptive statistics for the selected macroeconomic indicators of Bangladesh over the last 26 years provide critical insights into the country's economic environment. The GDP growth rate, with a mean of 5.95% and a standard deviation of 1.09, suggests that Bangladesh has experienced relatively stable and moderate economic growth. The range spans from a low of 3.45% to a high of 7.88%, indicating occasional downturns and upturns without extreme volatility. This moderate variability reflects a steadily expanding economy, which provides an essential backdrop for introducing complex financial instruments such as derivatives. The real interest rate, which averaged 4.85%, displayed significantly greater volatility, with a standard deviation of 4.29 and a wide range from −13.64% to 9.26%. The negative minimum value reveals that in at least one year, the real cost of borrowing turned negative, likely due to high inflation or artificially low nominal interest rates. Such interest rate unpredictability is a key source of financial risk, reinforcing the potential utility of interest rate derivatives to hedge exposure in the financial sector. Exchange rate growth, which captures currency depreciation or appreciation, had a mean of 3.13% and a standard deviation of 4.55. The range

extended from −4.59% (appreciation) to 15.87% (sharp depreciation), indicating significant fluctuations in currency value. Such variability exposes importers, exporters, and investors to exchange rate risk, further strengthening the case for currency derivatives. The unemployment rate, with a mean of 4.18% and a low standard deviation of 0.62, has been relatively stable. The minimum of 2.89% and maximum of 5.44% imply that the labor market has not experienced substantial shocks over the years. Although not highly volatile, persistent unemployment levels reflect underlying structural issues and can indirectly influence market sentiment and investment decisions. The inflation rate, averaging 6.55%, also shows moderate to high variability, with a standard deviation of 2.14. The highest inflation rate was 11.40%, while the lowest was 2.01%, indicating significant price-level volatility across years. This suggests that inflation-linked derivatives, such as inflation swaps or indexed instruments, could serve as valuable tools for both institutional and retail investors to hedge against purchasing power erosion. Growth in budget size, with a mean of 9.07% and a relatively high standard deviation of 7.35, reflects active fiscal policy maneuvers, including both expansionary budgets and periods of austerity. The data range from a maximum growth of 35.91%-possibly linked to stimulus measures or large development projects-to a contraction of −4.94%, indicating contractionary fiscal stances in certain periods. Such fluctuations may increase risk associated with government bonds and long-term investment planning, creating a rationale for derivative tools to manage fiscal and interest rate uncertainties. Both export and import growth rates exhibit high volatility. Export growth had a mean of 10.64% with a standard deviation of 12.04, ranging from −15.09% to 38.71%. Similarly, import growth averaged 10.17% with even greater volatility, reflected by a standard deviation of 14.15 and a minimum of −18.92%. Such extreme variation in trade performance highlights Bangladesh's vulnerability to global market conditions, commodity price shocks, and geopolitical risks. Derivative instruments such as commodity futures or foreign exchange options could help traders and businesses manage these fluctuations more effectively.

B. Principal Component Analysis

To identify the underlying dimensions among the selected macroeconomic variables influencing stock market volatility in Bangladesh, a Principal Component Analysis (PCA) was conducted using eight variables. Before proceeding with factor extraction, data adequacy was tested using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity. The test results are presented in the following table:

TABLE II KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.500
Bartlett's Test of Sphericity	Approx. Chi-Square	99.216
	Df	28
	Sig.	.000

Source: Authors' calculation

According to Kaiser (1960), a KMO value between 0.5 and 1.0 indicates sampling adequacy for factor analysis. In this study, the KMO value is 0.500, which is at the threshold, suggesting that factor analysis is marginally appropriate (Hadi & Islam, 2015). Additionally, Bartlett's Test of Sphericity yields a chi-square value of 99.216 ($df = 28$, $p < 0.001$), indicating that the correlation matrix is not an identity matrix and that the variables are sufficiently correlated for factor analysis (Bartlett, 1950). Therefore, the prerequisites for performing PCA are fulfilled.

TABLE III TOTAL VARIANCE EXPLAINED

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.726	34.070	34.070	2.726	34.070	34.070
2	2.021	25.268	59.338	2.021	25.268	59.338
3	1.122	14.026	73.364	1.122	14.026	73.364
4	.800	10.006	83.370	-	-	-
5	.772	9.647	93.017	-	-	-
6	.386	4.824	97.841	-	-	-
7	.113	1.418	99.260	-	-	-
8	.059	.740	100.000	-	-	-

Source: Authors' calculation

Table III presents the eigenvalues and the percentage of variance explained by each principal component (or factor) before and after extraction. The purpose is to identify how many components (factors) should be retained to effectively summarize the data. Initially, all eight macroeconomic variables were included in the analysis to identify latent dimensions influencing stock market volatility in Bangladesh. The extraction method was based on the Kaiser criterion, which suggests retaining only components with eigenvalues greater than 1. Based on this criterion, three components were retained.

The table shows that the first component has an eigenvalue of 2.726, accounting for 34.07% of the total variance. This indicates that a significant portion of the variation among the original variables is captured by this single factor. The second component explains an additional 25.27% of the variance, with an eigenvalue of 2.021, bringing the cumulative variance explained to 59.34%. The third component contributes another 14.03% (eigenvalue = 1.122), resulting in a total of 73.36% of the variance being explained by these three components combined. This suggests a strong and meaningful dimensional reduction, as more than 70% of the variability in the original data is retained using only three factors. The remaining five components each have eigenvalues less than 1 and individually contribute minimal variance (less than 10% each), indicating that they do not offer substantial explanatory power.

Hence, they were excluded from the final solution. This result confirms the robustness and appropriateness of the factor extraction process, effectively reducing the dataset into a smaller set of interpretable and impactful dimensions. These retained components are instrumental in understanding the macroeconomic drivers of stock market volatility and support the rationale for introducing financial derivatives as a hedging mechanism in Bangladesh.

TABLE IV COMPONENT MATRIX

Variables	Component		
	1	2	3
Variable-01	.807	-.008	.192
Variable-02	-.476	.661	-.451
Variable-03	-.044	.502	.837
Variable-04	.160	-.574	.219
Variable-05	.544	.201	.032
Variable-06	.589	-.705	-.224
Variable-07	.803	.505	-.062
Variable-08	.730	.458	-.279

Source: Authors' calculation

Table IV presents the three important factors (Factor 1, Factor 2, and Factor 3) categorized according to the magnitude of their initial eigenvalues. The table shows the component matrix extracted from the PCA, which displays the factor loadings of each variable on the three retained components. Factor loadings represent the correlations between the variables and the extracted components and help in interpreting the nature of each factor. A higher absolute loading value (typically above 0.5) indicates a strong association between a variable and the corresponding component.

In Component 1, several variables load strongly and positively, including Variable 01 (0.807), Variable 07 (0.803), and Variable 08 (0.730). These variables likely share a common underlying dimension, possibly related to macroeconomic performance or fiscal dynamics, given the nature of the data. Variable 06 (0.589) and Variable 05 (0.544) also exhibit moderate loadings, suggesting a secondary influence on this component. Collectively, these associations imply that Component 1 reflects broader economic activity or market fundamentals influencing stock market volatility.

Component 2 is characterized by strong positive loadings from Variable 02 (0.661) and Variable 03 (0.502), while Variable 06 shows a strong negative loading (−0.705). Variable 08 also displays a moderate positive loading (0.458). This pattern suggests that Component 2 may capture monetary or exchange rate dynamics, where opposing loadings reflect policy trade-offs or structural adjustments.

Component 3 is dominated by a high positive loading from Variable 03 (0.837), along with a moderate negative loading from Variable 02 (−0.451). These results suggest that Component 3 may reflect external sector shocks or trade-related volatility, potentially involving exchange rate growth and import–export fluctuations. The clear distinction in loadings highlights the uniqueness of this component, which captures aspects not explained by the first two components.

TABLE V UNCORRELATED FACTOR

Factor Name	Loaded factors	Initial Eigen Values	% of Variance	Cumulative (%)
1st important factor	Variable-01 (GDP Growth), Variable-05 (Inflation), Variable-06 (Budget growth), Variable-07 (Export growth), and Variable-08 (Import growth).	2.726	34.070	34.070
2nd important factor	Variable-02 (Real Interest Rate),	2.021	25.268	59.338
3rd important factor	Variable-03 (growth of Exchange Rate), and Variable-04 (Unemployment rate),	1.122	14.026	73.364

Source: Authors' calculation

Table V summarizes the results of the uncorrelated factor extraction, highlighting the three principal components (factors) retained based on eigenvalues greater than 1. These factors explain the underlying structure of the macroeconomic variables used in the analysis, with the objective of identifying latent dimensions influencing stock market volatility in Bangladesh-ultimately justifying the need for financial derivatives to manage such volatility. The first major factor includes five variables-GDP growth, inflation rate, budget growth, export growth, and import growth-and accounts for the largest proportion of total variance (34.07%). Collectively, these variables represent the macro-fiscal and external trade performance of the economy. The second major factor is primarily driven by the real interest rate, with an eigenvalue of 2.021, explaining 25.27% of the total variance. This factor is closely associated with monetary policy and investment decisions, as real interest rates affect capital flows, investor sentiment, and corporate financing costs. The third major factor is characterized by exchange rate growth and the unemployment rate, accounting for an additional 14.03% of the variance and bringing the cumulative explained variance to 73.36%. These variables relate to external sector risk and labor market dynamics, collectively capturing structural or supply-side vulnerabilities.

C. Correlation Analysis

Table VI displays the correlation matrix between stock market volatility and the three extracted uncorrelated factors from the factor analysis. The objective of this matrix is to examine how these latent macroeconomic dimensions individually relate to stock market volatility-the dependent variable representing the need for financial derivatives in Bangladesh.

TABLE VI CORRELATIONS MATRIX

Correlation		Stock volatility	Factor 1	Factor 2	Factor 3
Stock volatility	Pearson Correlation	1	-.132	-.371	-.013
	Sig. (2-tailed)	-	.519	.062	.949
	N	26	26	26	26
factor1	Pearson Correlation	-.132	1	-.166	-.044
	Sig. (2-tailed)	.519	-	.418	.831
	N	26	26	26	26
factor2	Pearson Correlation	-.371	-.166	1	-.078
	Sig. (2-tailed)	.062	.418	-	.703
	N	26	26	26	26
factor3	Pearson Correlation	-.013	-.044	-.078	1
	Sig. (2-tailed)	.949	.831	.703	-
	N	26	26	26	26

Source: Authors' Calculation

The correlation between Factor 1-which includes GDP growth, inflation, budget growth, export growth, and import growth-and stock market volatility is −0.132, indicating a very weak negative relationship. The associated p-value is 0.519, which is not statistically significant at the conventional 5% level. This implies that macroeconomic growth and trade-related activities, while important, do not directly or linearly predict changes in stock market volatility on their own, possibly due to intervening market dynamics or investor sentiment.

Factor 2, representing the real interest rate, shows a moderate negative correlation of −0.371 with stock market volatility. Although this relationship is stronger than those of the other factors, the p-value is 0.062, which is marginally above the 5% threshold. This suggests that the real interest rate may influence stock market volatility, albeit not at a statistically

significant level. Nevertheless, the marginal significance highlights the importance of interest rate risk, reinforcing the potential utility of interest rate derivatives as a stabilizing tool. Factor 3, which reflects exchange rate growth and the unemployment rate, has an almost negligible correlation (−0.013) with stock market volatility and a very high p-value (0.949), indicating no statistical significance. This suggests that, within this dataset and time frame, these structural variables may not have a direct linear impact on volatility, or their effects may be mediated through other macroeconomic conditions.

D. Multiple Regression Analysis

Three independent components emerged from the factor analysis: the first factor, the second factor, and the third factor. For the multiple regression analysis, these components were used as independent variables, while the dependent variable was stock market volatility in Bangladesh, which serves as a proxy for the need for financial derivatives. The regression analysis was conducted using 26 observations spanning from 1998 to 2023.

TABLE VII SUMMARY OF REGRESSION ANALYSIS

Variables	Beta Coefficients	't' Value	Sig
First factor	-.245	-1.033	.313
Second factor	-.665	-2.080	.049
Third factor	-.168	-.279	.783
Observation=26, R Square=0.179 Adjusted R Square=0.067, Probability=0.008			

Source: Authors' Calculation

Table VII shows that the second factor, which represents the real interest rate, emerges as the only statistically significant predictor of stock market volatility. It has a negative beta coefficient of −0.665 and a corresponding t-value of −2.080, with a p-value of 0.049, which is statistically significant at the 5% level. This result implies that increases in the real interest rate are strongly associated with decreases in market volatility. In other words, higher real interest rates may help stabilize markets, possibly by attracting more risk-averse, fixed-income investors or by reducing speculative trading. This finding supports the argument for introducing interest rate derivatives as a tool to manage monetary policy–related risks in Bangladesh's financial system.

In contrast, the first factor-which includes GDP growth, inflation, budget growth, export growth, and import growth-has a negative beta coefficient of −0.245 and a t-value of −1.033, with a p-value of 0.313, indicating statistical insignificance. Similarly, the third factor, consisting of exchange rate growth and the unemployment rate, has a negative beta coefficient of −0.168 and a very low t-value of −0.279, with a non-significant p-value of 0.783. These results indicate a negligible and statistically insignificant effect of these structural variables on stock market volatility during the sample period. Regarding model fit, the R-squared value is 0.179, meaning that approximately 17.9% of the variation in stock market volatility is explained by the three macroeconomic factors included in the model. The adjusted R-squared is lower at 0.067, indicating that the explanatory power of the model is relatively weak after adjusting for the number of predictors. However, the overall model is statistically significant, with a probability value of 0.008, suggesting that at least one of the factors significantly predicts volatility. Accordingly, the estimated regression model is as follows:

Stock market volatility in Bangladesh = 11.434 − 0.245 (First Factor) − 0.665 (Second Factor) − 0.168 (Third Factor)

Overall, the results indicate that all three factors have an inverse relationship with stock market volatility in Bangladesh, although only the second factor is statistically significant.

VI. FINDINGS OF THE STUDY AND POLICY IMPLICATIONS

The study identified significant macroeconomic factors contributing to stock market volatility in Bangladesh, particularly highlighting the role of real interest rate fluctuations. Through factor analysis, three principal components were extracted; among them, the second factor-primarily influenced by real interest rates-showed a statistically significant impact on stock market volatility in the regression model. Meanwhile, other variables such as GDP growth, inflation, budget growth, and export and import growth, although relevant, did not exhibit significant direct impacts in isolation.

Overall, the findings suggest that macroeconomic instability, especially in monetary policy variables, heightens the need for effective financial risk management tools. Based on these findings, there is a clear policy imperative to introduce financial derivatives in Bangladesh to mitigate risks associated with interest rate and broader macroeconomic volatility. The government and regulatory bodies, particularly the Bangladesh Securities and Exchange Commission (BSEC), should prioritize the development of legal frameworks, risk management infrastructure, and market education to support the gradual introduction of derivatives products. Instruments such as interest rate swaps and currency futures can play a vital role in enhancing market depth, improving risk-sharing mechanisms, and stabilizing the financial system. Strategic planning and stakeholder engagement will be critical to ensuring the successful and sustainable implementation of a derivatives market.

VII. CONCLUSION AND SUGGESTIONS

The study set out to explore the key macroeconomic variables influencing stock market volatility in Bangladesh-an essential step in identifying the foundational need for introducing a financial derivatives market in the country. Using 25 years of historical data, the research employed a combination of descriptive statistics, factor analysis, correlation analysis, and regression modeling to uncover the

underlying macroeconomic dynamics contributing to instability in the capital market. The findings revealed that real interest rate volatility significantly contributes to fluctuations in stock market volatility, indicating a pressing need for interest rate derivatives as financial risk management tools. While GDP growth, inflation, budget size, and trade-related variables (export and import growth) also exhibit some association with stock volatility, their impacts appear to be less direct. Factor analysis grouped these variables into three uncorrelated components, with Factor 2-driven primarily by interest rates-emerging as the most significant in terms of its explanatory power over market volatility.

This insight clearly points to the need for the gradual and well-regulated introduction of derivative instruments within Bangladesh's financial system. Instruments such as interest rate swaps, currency futures, and commodity derivatives could serve as essential tools for hedging risks, improving price discovery, and deepening financial market infrastructure. Their introduction would align Bangladesh's financial markets with international practices and support greater economic stability. However, the development of a derivatives market is not merely a technical or institutional reform; it also necessitates regulatory readiness, financial literacy, and macroeconomic stability. The study underlines that, while some groundwork exists, a comprehensive effort is required to prepare market participants, build technological infrastructure, and formulate clear legal frameworks. While this study provides valuable insights into the macroeconomic factors driving the potential emergence of financial derivatives markets in Bangladesh, several avenues for future research remain. First, the study considers only a limited set of macroeconomic factors. Future research could examine additional variables, such as political stability, the regulatory environment, and technological advancements, which may also influence the development of financial derivatives markets. Second, this study focuses on the need for the inception of a derivatives market but does not evaluate the actual performance or impact of such a market once established. Future studies could assess the effectiveness of derivatives markets in hedging risk and promoting economic growth. Finally, because this study focuses exclusively on Bangladesh, the generalizability of the findings to other countries may be limited. Comparative studies involving other developing economies could help validate and extend these results. In conclusion, further research can enhance understanding of the factors driving the emergence of financial derivatives markets and their broader economic impacts.

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