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IMPACT OF MACRO-ECONOMIC VARIABLES ON STOCK MARKET CAPITALIZATION AND VOLATILITY: EVIDENCE FROM THE CAPITAL MARKET OF BANGLADESH

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Abstract
This paper explores the factors affecting Stock Market Volatility (SMV) and Stock Market Capitalization (SMC) through Ordinary Least Squares (OLS) regression analysis from 2001 to 2022. The analysis indicates that trade volume and market return (MR) have a significant impact on SMV, while market capitalization, trade openness, and inflation do not show notable effects. In terms of SMC, trade openness and domestic credit to the private sector are identified as significant positive determinants. In contrast, gross fixed capital formation is found to have a negative relationship with SMC. These insights improve the understanding of stock market dynamics and could inform policy measures aimed at enhancing market stability and growth.

Keywords: Stock Market Volatilities, Stock Market Capitalization, Trade Volume, Market Return, Trade Openness

1. Introduction

A healthy capital market is vital for a country's financial system. Bangladesh's capital market, with the Dhaka Stock Exchange as the primary trading platform, has grown significantly in recent years (Akter & Rahman, 2023). Research indicates a positive correlation between capital market growth and GDP expansion (Beck, Lundberg, & Majnoni, 2006). However, this growth has not aligned with the real sector, raising concerns about market volatility. Changes in macroeconomic factors can lead to excessive volatility, increasing market risk and driving investors toward government securities and other risk-free assets (Khan & Billah, 2023). Understanding market volatility can mitigate risks for investors and positively impact the financial sector.

Numerous studies have examined macroeconomic factors affecting stock market capitalization and volatility (Alam, et al., 2020; Ghimire, 2022; Awadzie & Garr, 2020; Gopinathan & Durai, 2019; Durğut & Arici, 2022; Muzaffar & Malik, 2024; Assagaf, et al., 2019; Dayıoğlu & Aydin, 2019; Ali, et al., 2020; Rathnayaka & Seneviratna, 2018; Shah, et al., 2018; Anne & Samuel, 2024; Syakira, 2020; Matadeen, 2017; Damiran et al., 2022; Nazir, et al., 2010; Wang, 2010; Walid, et al., 2011; Beetsma & Giuliodori, 2012; Abdul-Rahman, et al., 2009). These studies confirm that industrial production, domestic savings, money supply, interest rates, inflation, GDP growth, financial openness, trade volume, stock return, domestic credit, and exchange rates significantly influence stock market capitalization and volatility in developed countries. Some literature also focuses on South Asian countries, including Bangladesh (Alam, et al., 2020; Rahman & Moazzem, 2011; Nisha, 2016; Hasan et al., 2023; Hasan, 2019; Hossain, 2020; Khan & Billah, 2023; Matin, 2023; Jamil & Naima, 2019). However, other studies found no significant correlation between macroeconomic variables and stock market performance

(Nusrat, et al., 2024; Tania, et al., 2022; Akter, et al., 2020; Mostafa, 2020; Rahman, 2019).

Given these conflicting findings and the importance of the issue, this study aims to investigate the impact of macroeconomic variables on stock market capitalization and volatility in Bangladesh. There are four primary reasons for this focus: (a) **Economic Development Goals**: Bangladesh, recently classified as a "Developing Country" by the UN, aims to become "Developed" by 2041. To fund major infrastructure projects, a stronger stock market is essential. Currently, the capital market accounts for only 14.5 percent of GDP significantly lower than in other emerging economies (CEIC Data, 2023); (b) **Market Inefficiency**: The Bangladeshi stock market suffers from inefficiencies and a lack of expertise (Islam, et al., 2020); (c) **Financial Sector Challenges**: The financial sector faces issues such as weak banking soundness and difficulties in capital raising through stock markets (Islam et al., 2020) and (d) **Historical Market Crashes**: The stock market experienced severe crashes in 1996 and 2010 due to various factors, including market manipulation and poor regulatory practices (Choudhury, 2013). Following these crashes, investors have increasingly favored safer investment options. Studying the Bangladeshi stock market could provide valuable insights into how macroeconomic factors influence market capitalization and volatility, offering useful information for both domestic and foreign investors.

2. Theoretical Background

Studies reveal that factors such as inflation, GDP growth rate, interest rates, and foreign direct investment significantly influence stock market volatility and capitalization (Nusrat, et al., 2024; Mugendi, 2024; Phuong, et al., 2023). Additionally, the efficiency of Bangladesh's capital market, characterized by high market capitalization and liquidity, can significantly contribute to the country's economic growth (Fakrul, et al., 2024). Inflation affects stock market volatility by influencing investor behavior, monetary policies, and economic stability. High inflation increases uncertainty and market fluctuations, reduces corporate earnings, and lowers market capitalization (Otieno, et al., 2019; Liu and Zhang, 2015; Dahal, et al., 2021; Apergis and Eleftheriou, 2002; Bekaert and Engstrom, 2010).

Trade openness influences stock market volatility and capitalization, with some arguing it heightens volatility due to global price sensitivity, while others believe it stabilizes markets by reducing vulnerability to domestic shocks (Bejan, 2006; Cavallo and Frankel, 2008). Financial openness can enhance capital inflows and corporate growth, but it may also result in capital flight and decreased profitability due to foreign competition (Levine and Zervos, 1998; Pástor and Stambaugh, 2003). The relationship between stock returns and volatility is complex and has yielded mixed results; however, higher market capitalization can improve stock returns by increasing liquidity (Theodossiou and Lee, 1995; Glosten, et al., 1993; Brasoveanu, et al., 2008). The relationship between GDP growth rate and stock market volatility is mixed. Higher GDP growth often correlates with larger stock markets, but the effect varies based on economic context (Schwert, 1989; Beltratti and Morana, 2006; Diebold and Yilmaz, 2008; Levine and Zervos, 1998; Cherif and Gazdar, 2010).

Domestic savings and gross fixed capital formation (GFCF) affect stock market volatility and capitalization. Household savings reduce volatility, while corporate savings increase it. Higher domestic savings and GFCF boost stock market capitalization by providing investment funds and fostering economic growth (Caporale, et al., 2015; Emara

et al., 2021; Aduda, Masila, and Onsongo, 2012; El-Wassal, 2005). Additionally, higher domestic credit to the private sector and broad money supply (M2) are linked to more active markets and increased stock market capitalization, although the impact varies by income level (Demirgüç et al., 1996; Billmeier and Massa, 2009; Yartey, 2008). Based on the review of existing literature, the following conceptual framework is developed:

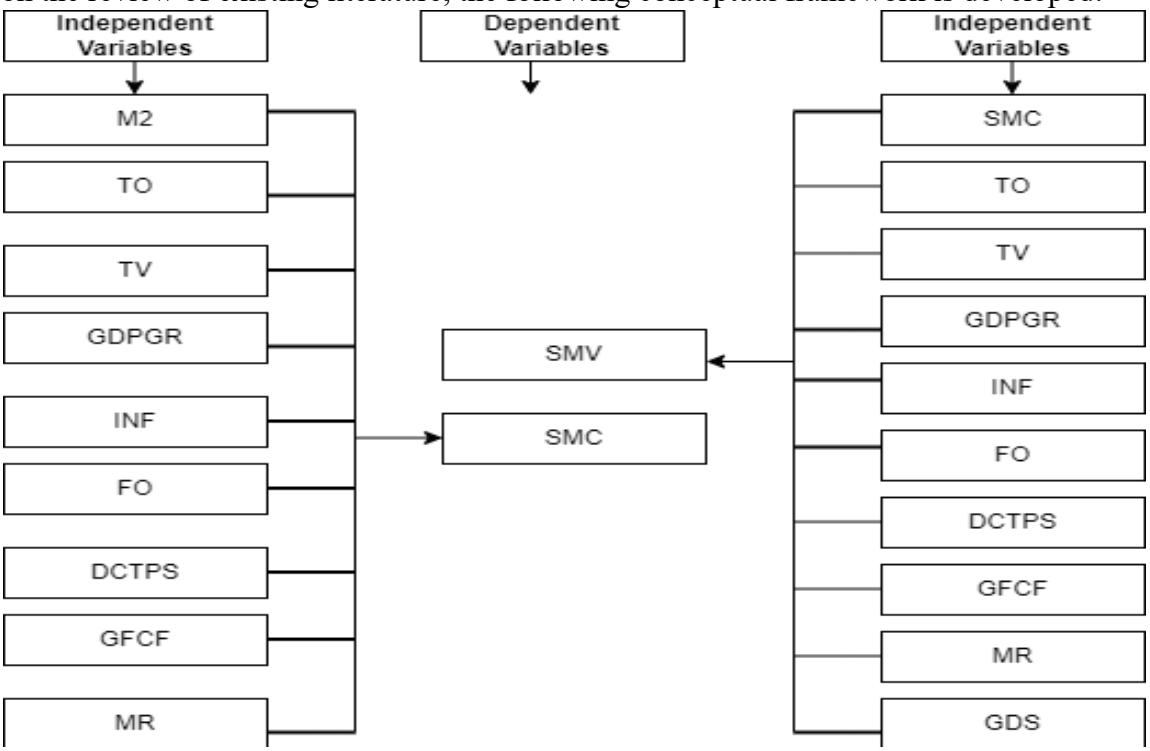

Figure 1: Conceptual Framework

Where:

SMV = Stock market volatility, which is usually calculated by taking highest value and lowest value estimate or by calculating the square of the standard deviation of the stock prices (Nazir et al., 2010).

SMC = Stock market capitalization ratio is chosen as the dependent variable for stock market development (Yartey, 2008; Garcia et al., 1999; Ben et al., 2007).

GDPGR = Represents the GDP growth rate (Manali, et al., 2024; Carp and L, 2012).

FO = Financial openness as percentage of GDP (Yartey, 2008; Garcia et al., 1999)

INF = Inflation (Moldir, et al., 2024; Manali, et al., 2024; Swati, et al., 2023; Rashidatu, et al., 2023).

TO = Represents the trade openness, measured by the ratio (Exports+Imports) and GDP (Swati, et al., 2023; El-Wassal, 2005).

M2 = Represents the money supply M2 as percentage of GDP (Manali, et al., 2024; Swati, et al., 2023).

DCTPS = Banking development is captured through domestic credit to private sector expressed as a percentage of GDP (Yartey, 2008; Garcia, et al., 1999; Ben, et al., 2007 and Cherif, et al., 2010).

MR = Market return (Cherif, et al., 2010).

GFCF = Gross fixed capital formation as percentage of GDP (Swati, et al., 2023; Matadeen and S, 2017).

TV = Represents the total number of tradable securities as percentage of GDP (Garcia, et al., 1999; Billmeier and Massa, 2009).

Hypothesis of the study; as per the outcome of related literature, following alternative hypotheses are developed:
H1: Macro- economic determinants significantly affect stock market volatility.
H2: Macro-economic determinants significantly affect stock market development.

3. Methods

This study utilized secondary data from 2001 to 2022, derived from the annual reports of the Dhaka Stock Exchange (DSE), the Bangladesh Securities and Exchange Commission (BSEC), the Bangladesh Bank, and the World Bank database. The researcher conducted an extensive review of relevant literature, both domestic and international, pertaining to the current study. Consistent with prior research (Ranjith, et al., 2023; Lala, et al., 2023; Dhingra and Kapil, 2021; Swati, et al., 2023; and Moldir, et al., 2024), a multiple regression model was employed to investigate the influence of macroeconomic factors on stock market capitalization and volatility. The analysis utilized a multivariate ordinary least squares (OLS) regression technique, specified as follows:

$$Model\ 1: SMVt = \alpha + \beta1(SMCt) + \beta2(TOt) + \beta3(TVt) + \beta4GDPGRt) + \beta5(INFt) + \beta6(FOt) + \beta7(DCTPSt) + \beta8(GFCFt) + \beta9(MRt) + \beta10(GDSt) + \varepsilon t$$

$$Model\ 2: SMCt = \alpha + \beta1(M2t) + \beta2(TOt) + \beta3(TVt) + \beta4\ (GDPGRt) + \beta5(INFt) + \beta6(FOt) + \beta7(DCTPSt) + \beta8(GFCFt) + \beta9(MRt) + \varepsilon t$$

Where:
α = the constant term,
β = the slope or coefficient estimates of the explanatory variables,
εt = the standard error and the other variables are described in an earlier section of the study.

4. Results and Discussion

4.1 Descriptive Statistics

The descriptive statistics (Table 1) reveal key economic and financial indicators. Stock Market Volatility (SMV) has a mean of 0.070 and a standard deviation of 0.124, indicating low but variable volatility. Stock Market Capitalization (SMC) averages 14.241 with a standard deviation of 8.941, showing significant variation. GDP Growth Rate (GDPGR) is stable at 0.060 with a low deviation of 0.011. Inflation (INF) averages 6.526 with a deviation of 1.960. Trade Volume (TV) has moderate variability with a mean of 0.201. Market Return (MR) is highly variable with a mean of 14.507. Other indicators, such as Domestic Credit (DCTPS), Gross Fixed Capital Formation (GFCF), Trade Openness (TO), Money Supply (M2), Gross Domestic Savings (GDS), and Foreign Ownership (FO), show consistent or moderate variability.

Table 1. Descriptive Statistics Result

Variables	Mean	Std. deviation
SMV	.070	.124
SMC	14.241	8.941
GDPGR	.060	.011
INF	6.526	1.960
TV	.201	.144
MR	14.507	32.035
DCTPS	36.268	6.337
GFCF	28.003	2.704
TO	35.917	7.085

M2	53.801	6.677
GDS	22.715	2.740
FO	.826	.449

Source: processed data (2024)

4.2 Correlation Matrix

The correlation matrix (Table 2) reveals several significant relationships among economic and financial indicators. Stock Market Capitalization (MC) is strongly positively correlated with Money Supply (M2) and Domestic Credit to Private Sector (DCTPS). SMV shows a strong positive correlation with Gross Domestic Savings (GDS) and Gross Fixed Capital Formation (GFCF). M2 is highly correlated with DCTPS and Trade Volume (TV). Trade Openness (TO) is negatively correlated with SMV but positively with Foreign Ownership (FO). Inflation (INF) and FO show moderate positive correlations with various indicators. Market Return (MR) shows no strong correlations, while GDS is positively correlated with GFCF. These relationships highlight key interactions in the economic environment.

Table 2. Correlation Matrix

	MC	SMV	M2	TO	TV	GDPGR	INF	FO	DCTPS	GFCF	MR
MC	1										
SMV	-.1	1									
M2	.8**	.1	1								
TO	.6**	-.5**	.6*	1							
TV	.8**	.1	.9**	.4*	1						
GDPGR	.2	.03	.3	.2	.3	1					
INF	.5*	-.2	.4	.5*	.2	.3	1				
FO	.6**	-.4	.6**	.8**	.5*	.3	.5*	1			
DCTPS	.8**	.2	.1**	.5*	.9**	.4	.3	.5*	1		
GFCF	.3	.7**	.6**	-.1	.6**	.5*	.01	-.01	.7**	1	
MR	.2	-.2	-.1	-.1	-.2	-.1	.2	.01	-.1	-.3	1
GDS	.05	.8**	.2	-.5*	.4	.3	-.2	-.2	.4	.9**	-.2

Source: processed data (2024)

4.3 Heteroskedasticity Test

Before performing the regression analysis, several assumptions were assessed, including linearity, normality, homoscedasticity, independence of errors, and absence of multicollinearity among predictors.

The Heteroskedasticity Test results (Table 3) show no significant evidence of heteroscedasticity in both models, indicating that the variance of the residuals is constant.

Table 3. Heteroskedasticity Test: Breusch-Pagan-Godfrey

	F-statistic	p-value	Interpretation
Model 1	1.067	0.455	No significant evidence of heteroscedacity
Model 2	0.693	0.704	No significant evidence of heteroscedacity

Source: processed data (2024)

4.4 Autocorrelation Test

The Autocorrelation Test results (Table 4) indicate no significant evidence of autocorrelation in both models, suggesting that the residuals are independent.

Table 4. Autocorrelation test: Breusch-Godfrey Serial Correlation LM Test

	F-statistic	p-value	Interpretation
Model 1	1.950	0.192	No significant evidence of autocorrelation in the regression
Model 2	0.280	0.762	No significant evidence of autocorrelation in the regression

Source: processed data (2024)

4.5 Multicollinearity Test

The Multicollinearity Test results (Table 5) show that most variables have acceptable tolerance levels and VIFs, though some variables (e.g., DCTPS, GFCF) exhibit high VIF values, indicating potential multicollinearity. Despite this, the overall assumption of no severe multicollinearity is reasonably met. In summary, all necessary assumptions for conducting reliable OLS regression analysis have been satisfied, supporting the robustness and reliability of the regression results.

Table 5. Multicollinearity Test Results

Variables	Model 1		Model 2	
	Collinearity Statistics		Collinearity Statistics	
	Tolerance	VIF	Tolerance	VIF
MC	0.097	10.306	-	-
TO	0.080	11.563	0.105	9.520
TV	0.091	10.953	0.103	9.665
GDPGR	0.364	2.747	0.376	2.657
INF	0.495	2.020	0.520	1.925
FO	0.312	3.203	0.251	3.990
DCTPS	0.020	28.722	0.012	13.750
GFCF	0.027	23.509	0.059	17.073
MR	0.376	2.660	0.385	2.598
GDS	0.0521	17.721	-	-
M2	-	-	.024	21.927

Source: processed data (2024)

4.6 OLS Regression Result Model 1

The OLS regression model presented in Table 6 evaluates the impact of various factors on stock market volatility. The analysis identifies Trade Volume and Market Return as significant predictors, corroborating the findings of prior studies such as Chan and Fong (2000), Hugida (2011), Damiran, et al. (2022), and Sutrisno, (2020). In contrast, variables like Stock Market Capitalization and Trade Openness do not show significant effects. The model explains 75.2% of the variance in SMV, as indicated by the R^2 value of 0.752, and has an adjusted R^2 of 0.527, suggesting moderate explanatory power. The overall significance of the model is confirmed by the F-statistic, and the Durbin-Watson statistic of 1.626 suggests the absence of severe autocorrelation issues. In summary, the regression results partially support hypothesis 1, highlighting the critical role of Trade Volume and Market Return in influencing stock market volatility, while other factors such as Stock Market Capitalization and Trade Openness appear less significant.

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Table 6. OLS regression result of Model 1

Model 1: SMVt = α+ β1(SMCt) +β2(TOt) +β3(TVt)+ β4GDPGRt) + β5(INFt) + β6(FOt) + β7(DCTPSt)+ β8(GFCFt)+ β9(MRt)+ β10(GDSt) +εt				
	Coef.	Std. Error	t-Statistic	Prob.
(Constant)	0.959	0.559	1.715	0.114
SMC	0.001	0.007	0.147	0.456
TO	0.005	0.000	0.028	0.356
TV	1.166	0.427	1.388	0.041
GDPGR	4.441	2.729	1.628	0.132
INF	0.005	0.013	0.341	0.267
FO	0.033	0.074	0.452	0.550
DCTPS	-0.001	0.021	-0.070	0.527
GFCF	0.049	0.042	1.152	0.274
MR	2.756	0.001	2.029	0.025
GDS	0.002	0.030	0.066	0.289
R2	0.752			
Adj. R2	0.527			
F	3.341			
Prob. of F	0.030			
Durbin- Watson stat.	1.626			

Source: processed data (2024)

4.7 OLS Regression Result Model 2

In Table 7, Model 2 examines the determinants of Stock Market Capitalization. The results identify Trade Openness and Domestic Credit to the Private Sector as significant positive factors, consistent with previous research (Yartey, 2008; Billmeier and Massa, 2009; Chiad, 2022). Conversely, Gross Fixed Capital Formation shows a significant negative relationship with SMC, aligning with Matadeen's (2017) findings. The model exhibits strong explanatory power, with an adjusted R^2 of 0.877, indicating that 87.7% of the variance in SMC is explained by the model. The F-statistic's p-value of 0.000 highlights the model's overall significance, and the Durbin-Watson statistic of 2.362 suggests no severe autocorrelation issues. Other variables in the model are found to be insignificant. Overall, the regression results partially support hypothesis 2.

Table 7. OLS regression result of Model 2

Model 2: SMCt = α+ β1(M2t) +β2(TOt) +β3(TVt)+ β4 (GDPGRt) + β5(INFt) + β6(FOt) + β7(DCTPSt)+ β8(GFCFt)+ β9(MRt) +εt				
	Coef.	Std. Error	t-Statistic	Prob.
(Constant)	36.768	25.418	1.840	0.091
M2	1.521	0.664	2.292	0.041
TO	2.217	0.298	2.728	0.048
TV	2.276	14.745	0.154	0.380
GDPGR	59.719	98.686	0.605	0.556
INF	0.066	0.484	0.136	0.494
FO	1.083	3.038	0.356	0.328
DCTPS	3.595	0.988	3.638	0.003
GFCF	-2.820	1.046	-2.697	0.019
MR	0.020	0.034	0.586	0.569

R2	0.930
Adj. R2	0.877
F	12.635
Prob. of F	0.000
Durbin- Watson stat.	2.362

Source: processed data (2024)

The findings indicate that Trade Openness and Domestic Credit to the Private Sector are positively significant contributors to SMC, underscoring the importance of open markets and credit availability in stock market growth. In contrast, Gross Fixed Capital Formation exhibits a significant negative relationship with SMC, suggesting that higher physical investments might detract from stock market development.

5. Conclusion

This study investigated the impact of macroeconomic variables on stock market capitalization and volatility in the Bangladesh capital market. The analysis employed OLS regression to assess the influence of factors such as GDP growth, inflation, trade openness, money supply, domestic credit, and others on stock market indicators. The findings indicate that Trade Volume and Market Return are significant positive predictors of stock market volatility. At the same time, variables like Stock Market Capitalization and Trade Openness do not show significant effects. Regarding stock market capitalization, the results highlight Trade Openness and Domestic Credit to the Private Sector as significant positive factors, while Gross Fixed Capital Formation exhibits a significant negative relationship. The implications of these findings are relevant for policymakers and market participants. The significant influence of trade volume and market return on stock market volatility suggests that regulators should closely monitor trading activity and investor sentiment to mitigate excessive market fluctuations. The positive role of trade openness and domestic credit in stock market capitalization underscores the importance of fostering an open and well-functioning financial system to promote stock market development.

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