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Exploring the Convergence of Macroeconomic Variables and Market Capitalization in an Emerging Economy: An Empirical Analysis Using Arbitrage Pricing Theory

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Abstract

This study delves into the interaction between macroeconomic variables and market capitalization in Emerging Capital Markets, i.e., Bangladesh. We examine the effects of the invest-to-deposit ratio (IDR) by financial institutions, market interest rate (MKTINT), and Consumer Price Index (CPI) on market capitalization (MAKTCAP). This study utilizes a dataset spanning 83 months, encompassing the period from 2015 to 2021. The macroeconomic influence is examined empirically by using the Arellano–Bover/Blundell–Bond generalized method of moments (GMM) estimator, supplemented by the ordinary least squares (OLS) and weighted least squares regression (WLS). Also, use Breusch-Pagan and Cook-Weisberg tests to measure heteroskedasticity in the model. The findings show a strong correlation between IDR and MAKTCAP, pointing to IDR as the most important yet overlooked factor influencing capital market returns. However, MKTINT and CPI results address a negative relationship with MAKTCAP. Higher IDR indicates that the capital market receives more cash flow to enhance market capitalization. At the same time, lowering MKTINT and CPI enables the capital market to get more money flow.

Keywords: Market Capitalization, Arbitrage Pricing Theory, Interest Rate, Consumer Price Index, Investment-to-Deposit Ratio.

Introduction

Over the last several years, as scholars and analysts have devoted considerable efforts to this important area of research, there has been a surge of interest in exploring and understanding macroeconomic variables' influence on capital market returns. The world of finance is a difficult and constantly evolving area, requiring an in-depth understanding of numerous factors that may affect the market's outcome. The effect of macroeconomic factors on market capitalization is one such aspect. Developing markets like Bangladesh have attracted the attention of investors and researchers seeking to better understand the complex and dynamic nature of capital market returns, as they offer a unique and valuable perspective on

the multifaceted interplay between macroeconomic variables and market outcomes. The capital market facilitates the exchange of long-term funds between investors and corporations/government institutions through various instruments (Rioyaldi et al., 2022). The productivity of businesses in the real economy determines the supply of capital market returns, which is then divided among various claimants. An important factor affecting projected returns in a straightforward asset pricing model is real economic performance, as determined by GNP (Diermeier, Ibbotson, & Siegel, 2018). Integrated capital markets with comparable risk factors have equivalent expected returns. Segmented markets with barriers to arbitrage can result in different returns (CAMPBELL & HAMAO, 1992). Capital markets serve as a fundamental yardstick or criterion to evaluate an economy. Worldwide capital markets remain incompletely fused with nascent stock markets (Phuyal, 2016). The capital market is deemed a pivotal economic barometer as it assumes a critical function in aggregating resources and catalyzing investment.

Numerous academics have highlighted that there exists a robust correlation between macroeconomic variables and market capitalization. Many studies have revealed that inflation, interest rates, and GDP growth rates exert a momentous influence on market capitalization. Gan et al. (2006) carried out a study on the interrelationships among the NZSE Index and a collection of macroeconomic variables spanning from January 1990 to January 2003 and uncovered the presence of a long-term nexus between the NZSE40 and the macroeconomic variables that were scrutinized. Nonetheless, the evidence from previous studies suggests that macroeconomic variables play a crucial role in determining capital market returns in Bangladesh. As such, investors and policymakers alike must continue to pay close attention to these factors and work to develop a deeper understanding of their impact on market outcomes. Numerous pricing theories are available for gauging the influence of macroeconomic variables on capital market returns, with CAPM and APT being the most frequently used. We will proceed with APT as it emphasizes risk factors rather than assets, providing an edge over CAPM as there is no need to create a comparable portfolio for risk evaluation. Unlike CAPM, which assumes a simplistic relationship between assets, APT assumes a linear correlation between risk factors. The Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) are formal demand-side theories used to derive asset expected returns. They, however, rely on perfect capital markets and assume that all costs are borne by risk. While the CAPM deals with market risk, APT considers multiple risk factors, and other research addresses non-risk factors in isolation (Ibbotson, Diermeier, & Siegel, 2018).

The school of thought on APT states that it’s a flexible alternative to CAPM, assuming that an asset's expected return is influenced by various factors such as macroeconomic, industry, and company-specific variables. The APT has undergone significant empirical testing since its inception and has been determined to have substantial support in scholarly literature. Wahyuni et al. (2020) study results of data analysis show that the CAPM model is more precise than the APT model in predicting stock returns. Conversely, according to Connor et al. (1988), the APT provides a better description of the expected returns on assets than the capital asset pricing model (CAPM).

The extensive literature on market capitalization and macroeconomic variables exists but primarily focuses on developed markets such as the USA, UK, and so on. However, research in emerging markets and/or less developed areas, like the DSE in Bangladesh, is unrecognized. Understanding the market structure, efficiency, and determinants of capital market returns in Bangladesh is imperative (Mobarek, Mollah, & Bhuyan, 2008). Macroeconomic variables, including interest rate,

GDP, exchange rate, inflation, money supply, consumer price index, and unemployment, exert a substantial influence on market capitalization. Among them, interest rates, GDP, exchange rates, inflation, and CPI have been extensively researched. Surprisingly, a large body of research neglects the impact of the Invest-to-Deposit Ratio (IDR) on market capitalization, despite its significance. The correlation between IDR and capital market returns is intricate. Their relationship can vary across different markets and periods, with positive, negative, or insignificant correlations documented. Research on the IDR in Bangladesh's capital market has received little or no attention. Thus, our study aims to investigate the effects of IDR and two other macroeconomic factors, namely interest rate and CPI, on market capitalization. This study makes a significant contribution by identifying the overlooked macroeconomic factor IDR and examining its impact on capital market returns.

2. Literature Review

2.1. Capital Market Returns and Macroeconomic Variables

The capital market is an irreplaceable linchpin of the economy and provides a flawless channel for the smooth movement of cash from savvy investors to aspirational borrowers. Acting as an eminent intermediary, the capital market establishes an intricate nexus between discerning investors with significant financial resources and government institutions or corporations with a voracious appetite for long-term trading instruments like stocks, bonds, and right issues. The public enthusiastically partakes in investment activities within the capital market because they see it as an important economic endeavor. At its core, investing represents the profound act of entrusting one's valuable assets or funds to esteemed financial institutions, fueled by the steadfast expectation of reaping highly favorable returns or seeing their value soar dramatically over time. A country's increased capacity for investment begets a commensurate escalation in the magnitude of production and services rendered, thus sparking a significant step toward economic development (Rioyaldi et al., 2022). For assessment of an economy, capital markets are often considered to be the epitome of evaluating an economy. Emerging stock markets are not fully integrated into global capital markets (Phuyal, 2016). A significant development in financial history has been the explosive growth of capital markets in emerging nations. Given its pivotal position as a dynamic platform that promotes interactions between surplus and deficit economic entities within an economy, the size of the capital market's activities as a financial intermediary and its substantial effects on market returns must be adequately acknowledged (Abugri, 2008) and (Godfrey et al., 2020). According to Fama and French (2010), the long-term prosperity of investors is predominantly derived from the returns yielded by capital markets. Stock returns and market capitalization are mostly affected by macroeconomic factors like economic growth, inflation, and interest rates rather than characteristics unique to firms. A competent capital market is necessary to develop a robust financial system both domestically and globally.

Numerous pivotal elements wield the potential to influence the capital market return, where macroeconomic variables remain determined as one of the most formidable competitors. Rioyaldi et al. (2022) assert that macroeconomic and microeconomic variables have a significant impact on market return variations. In the macroeconomic realm, which

includes crucial factors like interest rates, inflation, economic cycles, exchange rates, government regulations, tax laws, budget deficits, interest rates for foreign loans, international economic conditions, economic outlook, money supply, private investment, trade balance, and payments, profoundly impacts a company's performance, stock value, and the entire capital market return. The capital market is increasingly influenced by the sway of macro forces, such as inflation, interest rates, GDP, exchange rates, government policies, and world events. Empirical evidence underscores their commanding impact on capital market returns, propelling the relationship between the two to the forefront of domestic and international studies. A fascinating study conducted by Saeed Samadi in 2012 on the interplay of macroeconomic variables and stock returns at the Tehran Stock Exchange unveiled that significant factors such as foreign exchange rates, inflation trends, or more have a decisive impact on capital market yields.

An utterly gripping study of Pakistan's stock exchange by Akhtar and Ali (2018) found that inflation had severe negative effects on the return on the capital market. It is clear from their analysis that a dreadful 0.53% fall in stock price returns has been triggered by only an insignificant 1% increase in inflation. On the other hand, Balagobei's (2017) research on the Colombo Stock Exchange was equally fascinating. This incisive research divulged that interest rates unleashed a considerable negative impact, while inflation rates and exchange rates had a significant beneficial impact on capital market returns. In developed nations, economic growth is expected to impact stock market returns positively (Bekaert, 1998). A study conducted on relationships between the NZSE Index and a comprehensive array of macroeconomic variables from January 1990 to January 2003 unveils a consistent long-term correlation between the NZSE40 and the examined macroeconomic determinants (Gan, Lee, Yong, & Zhang, 2006). Liu et al. (2020)’s influential study discovered a substantial inverse association between interest rates and Chinese stock market returns, while inflation correlated positively with the return of stocks. A rigorous study implementing the Johansen cointegration method and Vector Error Correction Model analysis revealed a robust long-term correlation between macroeconomic indicators and Nigeria's capital market. The research accentuates that macroeconomic factors had a significant impact on Nigeria's capital market (Dr. K. S. Ogbonna, 2021).

An array of potent macroeconomic factors holds the power to have a significant influence on capital market results. One of them is the investment-to-deposit ratio (IDR), which is a powerful metric that measures the level of investment made in relation to a bank's deposits. IDR serves as a crucial barometer, not only monitoring the economy's overall health but also assessing the robustness of the financial sector. Numerous studies on capital markets reveal varied outcomes regarding the effect of IDR on returns. Al Shboul et al. (2016) demonstrated that the UAE market was favorably correlated, while Barua et al. (2019) showed that an increase in IDRs led to a rise in Indian share prices. Given factors such as economic developments and market structures, the correlation between IDRs and capital market returns is complex. This correlation has varied between markets and periods, with studies showing a wide range of results such as favorable, unfavorable, or negligible correlations.

2.2. Arbitrage Pricing Theory, CAPM, and other pricing models

To gauge how macroeconomic variables impact capital market returns, different methods and pricing models such as CAPM, Fama French, Carhart, or APT have been extensively used. These models offer insightful information about the

connection, yet researchers continually refine them for a deeper understanding of the intricacies of capital markets.

The revolutionary APT seeks to identify unobservable factors affecting returns on securities and the capital markets, revolutionizing asset pricing. Its bedrock rests upon the law of one price, asserting that equivalent goods must hold uniform market prices. Equity risks are produced by both distinctive asset characteristics and market-wide macroeconomic variables. Pricing theory can increase portfolio diversity by utilizing arbitrage. Risk is only connected to systematic (macroeconomic) elements in efficient markets (Masoud Karimkhani, 2012). Their argument draws attention to a significant obstacle in researching APT theory: the dearth of analysis encompassing events and factors impacting all assets homogeneously. In line with other studies that explain various macroeconomic influences on stock prices in developing economies, robust testing across many nations attests to the macroeconomic influence on capital market returns (Gunardi, 2023). The CAPM & APT theories stand tall with the Fama and French factor models as the two most well-known theories for asset pricing in today's capital market (Swanto Sirait, 2019). In the 1960s, CAPM, pioneered by Sharpe, Lintner, and Mossin, was used to anchor asset prices to market price risk. In an efficient market, asset value aligns with the market price. Although CAPM assumes consistent investor expectations, its single-factor approach is unable to capture complicated return swings that result from a variety of variables other than the market index (Kisman et al., 2015). Statistics reveal that independent factors have a considerable influence on both CAPM and APT models. The improved R2 demonstrates that APT is more accurate and dependable and has a greater capacity to account for more fluctuation in stock returns. As per Dada et al. (2021), APT’s core justification is to eliminate market inefficiencies and prevent arbitrage possibilities that emerge when investors take advantage of changing the asset weight of their portfolios based on static risk variables. APT considers individual-specific portfolios, unlike CAPM, which depends on a market portfolio (Samuel et al., 2021). Insufficient CAPM analysis of data from 2009 to 2013 from the Athens Stock Exchange was shown by Mustafakulov et al. (2015). Nonetheless, it's vital to acknowledge that the CAPM model isn't entirely debunked by this evidence.

In response to the shortcomings of the CAPM, Stephen Ross created arbitrage pricing in 1976. The one-factor CAPM model may not accurately predict the returns of an effective portfolio. To affect real returns, APT considers a variety of market-wide factors, such as interest rate, currency rate, inflation, and production change (Godfrey & Agwu, 2020). With comprehensive research revealing various patterns of macroeconomic effects in developed and emerging economies, APT forges a strong link between macroeconomics and stock movements (Gunardi et al., 2023). In APT, the study favors PCA over FA. APT is relevant in four markets, and CAPM in six. Finding elements for APT with a strong economic foundation is difficult. The test risk premium, industrial production, and factors related to products and financial institutions in future studies (French, 2017).

Ross' (1976) APT had the upper hand until lately. The study by Chen et al. (1986) showed that APT has a systematic effect on economic variables on stock returns using APT (Azeez & Yonezawa, 2006). Empirical evidence suggests APT outperforms CAPM when it comes to characterizing the expected returns of riskier assets. Chen (1983) uses factor analysis to estimate APT and finds that it outperforms CAPM in the US market (Priestley, 1996). Fama's test is passed by APT using a special return procedure that explains variations in extra security returns without reducing return explanation

(Antoniou et al., 1998). Contrary to CAPM, which only considers systematic risk, APT theory anticipates capital market returns utilizing a variety of factors. Multifactor analysis is used by APT to explain returns (Gul and Khan, 2013). A study on the Jordanian Stock Market which found 84% of return variance connected to macroeconomic factors and market indices supported the validity of APT (Ramadan, 2012). APT is validated for the Indian market; excess returns across beta values are influenced by macro factors (such as inflation and indexes). While the APT hypothesis fits, it does not account for all excess returns (Basu & Chawla, 2012). In addition, APT is better than CAPM by experienced economists such as Dhankar et al., (2005) for integrating multiple economic factors in return estimates. This makes APT more realistic compared to CAPM's sole reliance on the excess market premium (Julianto, 2013).

3. Research Design

3.1. Data Collection

This research attempts to assess the influence of selected macroeconomic variables, namely INT, CPI, and IDR, on the market capitalization of DSE. The data utilized here comprise information obtained from relevant sources, including Bangladesh Bank and the DSE data repository. The study utilizes a dataset spanning 83 months, encompassing the period from 2015 to 2021. To ensure the integrity and generalizability of the findings, a rigorous initial screening process is employed to eliminate any data observations that may introduce bias. The variables considered include the monthly total BDT value of DSE's market capitalization, month-wise CPI based on point-to-point measurements, and IDR. In this study, macroeconomic influence is examined empirically by using the Arellano–Bover/Blundell–Bond generalized method of moments (GMM) estimator, supplemented by the ordinary least squares (OLS) and weighted least squares regression (WLS) methods, an extension of OLS. To correct for endogeneity, we applied total least squares (TLS). We focused on APT theory and, based on that, we developed three main hypotheses.

3.2. Econometrics model

To validate this correlation and evaluate hypotheses H1, H2, and H3, the present study examines the effect of the Interest Rate, Consumer Price Index (CPI), and Investment to Deposit Ratio (IDR) on Market Capitalization, utilizing the subsequent model.

$$\Delta MAKTCAP = \alpha + \sum_{i=1}^{n} \beta_1 \Delta MKTINT_{t+1} + \sum_{i=1}^{n} \beta_2 \Delta IDR_{t+1} + \sum_{i=1}^{n} \beta_3 \Delta CPI_{t+1} + \sum_{i=1}^{n} + \beta_4 \Delta MKTIN * \Delta IDR_{t+1} + \varepsilon \quad (1)$$

The equation demonstrates that the three independent variables influence the change in market capitalization, where *β1, β2, and β3 are* the coefficients associated with the linear terms, and *β4* is the coefficient associated with the interaction term ΔMKTINT and ΔIDR. The subscript (t+1) indicates that the independent variables are measured at time t+1, as shown by the subscript (t+1), and are thus anticipated to have an effect on market capitalization in the future.

ΔMAKTCAP represents a change in the market capitalization value of the Dhaka Stock Exchange (DSE)’s all listed companies over the period, which reflects the market's perception of the country’s financial health and growth prospects.

Simply, it measures the entire worth of all the listed firms on the DSE and is an essential indication of the overall health and performance of the Bangladeshi stock market. A study by Yartey (2008) reveals that emerging market countries' stock market development is influenced by significant macroeconomic factors.

$\Delta MKTINT_{t+1}$ represents the market interest rates. The subscript (t+1) indicates that the interest rate is measured at time t+1, which means that it is expected to have an impact on the market capitalization of a company in the future. Here, we considered Bangladesh's average market bank deposit rate from 2015 to 2021. We considered all 47 banks currently operating in Bangladesh. Toraman et al.'s (2014) research reveals a strong correlation between interest rates and market capitalization. Whereas another study on the interest rate and inflation has insignificant negative associations with the market capitalization in Nigeria (Etale & Tabowei, 2019).

ΔCPI_{t+1} represents the average price changes over time of the basket of goods and services consumed by households and shall be measured under the Consumer Price Index. It serves as a barometer for economic inflation or deflation. The variable "CPI"_(t+1) in the provided model relates to the CPI at time t+1, i.e., it shows the anticipated rate of change in future goods and services prices. The coefficient of the CPI can be found in the econometric model to tell you how much influence a predicted rate of price change will have on market capitalization. Usman et al.'s (2013) study reveals an inverse relationship between inflation and capital market performance. The performance of the capital market can be greatly impacted by inflation rates, according to research on the Egyptian stock market (Omran & Pointon, 2001).

ΔIDR_{t+1} indicates the investment-to-deposit ratio. It is a crucial sign of understanding funds flow in the capital market because when IDR rises, it implies that a higher proportion of deposited funds is being invested and cash flow in the market, which signals that banks and financial institutions are investing more. Conversely, a lower IDR indicates that fewer funds are being invested and the institution may have liquidity constraints or limited investment opportunities. In this case, the coefficient of IDR shows how much impact the IDR ratio has on the dependent variable market capitalization. ε represents the error term in this econometrics model.

Table 1. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
MAKTCAP (BDT)	83	327833.0	67207.91	241767.6	526908.1
MKTINT(percentage)	83	0.050259	0.007476	0.0328	0.0625
CPI (weighted on 100)	83	253.8786	28.02409	208.77	307.49
IDR (percentage)	83	0.751087	0.030109	0.7098	0.7933

Overall, 4 scalable variables are considered at the top of the table, among which the natural log value of market capitalization of DSE is considered as the dependent variable, and the other three independent variables are MKTINT, CPI, and IDR, respectively. According to the above statistics, the number of observations examined is a total of 83 months of data. Here, the mean value of monthly market capitalization is 3,278.0 billion in BDT (USD 29.8 billion)[1] in DSE during the years 2015 to 2021; at the same time, the maximum monthly market capitalization of DSE was BDT 5269.1 billion

(USD 47.9 billion), whereas the minimum MAKTCAP is 2417.6 billion BDT (21.9 billion USD). The standard deviation of MAKTCAP was 67207.91 billion BDT (51 billion USD) during the period. The statistical measures indicate the high volatility of MAKTCAP, which enhances the overall market risk.

The other three variables are also examined, and among them, INT has also 83 observations. The mean value of 0.050259 indicates that, on average, the value of the market interest rate is around 5%, whereas the standard deviation of 0.0074756 suggests a relatively low amount of variation in the data, representing that during these 83 months, the interest rate was not highly fluctuated. From 2015 to 2021, 3.28% is observed as the lowest interest rate, whereas 6.25% is observed as the highest one. The other variable, CPI, has a mean of 253.8786, indicating consumer prices have increased significantly by about 53.8786% since the base year. The minimum CPI was 5.02%, whereas the maximum CPI of 6.44% has been observed during this time. Here, the standard deviation of 0.00323 suggests a relatively low amount of dispersion in the data. Considering the IDR as the third independent variable, the mean value of 0.7510867 suggests that, on average, the value of IDR is around 75.10%. However, the standard deviation of 0.0301094 indicates a moderate amount of variation in the data. Moreover, the minimum and maximum values observed were 70.98% and 79.33%.

4. OLS and GMMregression results and analysis

Table 2. Regression analysis of OLS and GMM

	(OLS)	(GMM)
VARIABLES	**log_maktcap**	**log_maktcap**
log_CPI	-0.290	-0.290
	(0.125)	(0.122)
log_MKTINT	-0.442*	-0.442*
	(0.0750)	(0.0732)
log_IDR	2.544***	2.544***
	(0.332)	(0.324)
Constant	10.48***	10.48***
	(0.724)	(0.707)
Observations	83	83
R-squared	0.799	0.799

Standard errors in parentheses

**** p<0.01, ** p<0.05, * p<0.1*

The result presents the findings of two regression models estimated using OLS and GMM methods, wherein the dependent variable is the natural log of market capitalization (log_maktcap), and the independent variables are interest

rate, consumer price index, and investment-to-deposit ratio.

The estimated coefficients in the OLS and GMM models are consistent with each other, and both models show that the coefficients for the interest rate, consumer price index, and investment-to-deposit ratio are statistically significant at the 1% level, 5%, and 10%, respectively, in explaining the variation in market capitalization. Specifically, the coefficient for log_MKTINT (-0.442) is negatively significant with MAKTCAP, which indicates that an increase of one unit in the log_MKTINT is correlated with a decrease of -0.442 units in the dependent variable, "log_maktcap". According to Stoica et al. (2014), a study examines the impact of domestic and international short-term interest rate shocks on Central and Eastern European capital markets using a structural vector error correction model and finds that interest rates have a significant impact on the stock market indexes in the Czech Republic, Hungary, Poland, and Romania. According to Pilinkus (2010), short-term interest rates have a statistically significant impact on the Latvian capital market. Additionally, the use of cointegration equations suggests a long-term relationship between the macroeconomic indicators and the stock market index. Nevertheless, Balagobei (2017) mentioned in his research that the inflation rate and exchange rate have a significant positive influence on the capital market return in the Colombo Stock Exchange.

Log_CPI now has a coefficient of around -0.29, which means that a unit increase in log_CPI is associated with a 0.29 unit decrease in log_maktcap when all other variables are maintained constant. According to a study on the Pakistani stock market by Akhtar and Ali (2018), the pernicious impact of inflation on capital market returns cannot be ignored. Their findings show that even a 1% increase in inflation results in a substantial drop of 0.53% in stock market performance. The coefficient and standard error of IDR are 2.544 and 0.33, respectively, indicating that IDR is positively highly significant with 'log_maktcap'. With every unit rise in the IDR, 2.544 additional units are added to the "log_maktcap," according to this statistical significance. A greater investment-to-deposit ratio would appear to suggest that banks are devoting greater percentages of their investment to capital markets with constant rates of return, implying that market capitalization is increasing.

The constant term in both models is statistically significant and positive, suggesting that other unaccounted factors may be contributing to the level of market capitalization. Despite explaining 24% of the total variation in market capitalization, as indicated by the R-squared value for both models, a significant proportion of the variation remains unexplained, implying limited explanatory power.

It presents the results of three different regression models: ordinary least squares (OLS), weighted least squares (WLS), and total least squares (TLS). The dependent variable in all three models is the natural log of market capitalization, and the independent variables are Interest Rate, Consumer Price Index, and Investment to Deposit Ratio.

The findings indicate that the interest rate is negatively correlated in all three models (OLS, WLS, and TLS). IDR is significant at a 1% level, and CPI is significant at a 5% level in OLS and WLS, and a 1% level in TLS, respectively. The magnitude of the coefficients for the interest rate in the OLS, WLS, and TLS models is -0.442*, -0.442*, and -3.0485***, respectively. The coefficients for the CPI are negatively correlated with MAKTCAP. The magnitude of the coefficients for CPI is -0.290, -0.290, and -1.2808**. On the other hand, IDR is positively significant, which indicates that an increase in

these variables is associated with an increase in market capitalization, while the

Table 3. Regression analysis of OLS, WLS, and TLS

	(1)	(2)	(3)
	ols	wls	tls
log_CPI	-0.290	-0.290	-1.2808**
	(0.125)	(0.125)	(.0810)
log_MKTINT	-0.442*	-0.442*	-3.0485***
	(0.0750)	(0.0750)	(.3316)
log_IDR	2.544***	2.544***	3.3435***
	(0.332)	(0.332)	(.3051)
one			28.4284***
			(4.7320)
_cons	10.48***	10.48***	1.8421***
	(0.724)	(0.724)	(1.620)
N	83	83	83
Standard errors	in parentheses		

** p<0.05, ** p<0.01, *** p<0.001*

The magnitude of the coefficients for IDR is 2.544***, 2.544***, and 3.3435*** for OLS, WLS, and TLS models, respectively. The constant term in both models is statistically significant, which implies that there are other factors not considered in the model that may be contributing to the level of market capitalization. However, there is no constant term in the TLS model, as it is utilized to correct for endogeneity. The number of observations is 83 in all three models, but the standard errors are reported in parentheses. We observe that the TLS model has slightly higher standard errors than the other two models. The TLS model is used to correct for endogeneity, which means that it addresses a potential source of bias in the estimation of the coefficients. IDR appears to be related to the dependent variable in statistically significant ways across all three regression models, while Interest Rate and CPI have a significant negative relationship only in the TLS model. The constant term is also significant in all models. The table shows that IDR has the strongest positive relationship with market capitalization across all three regression models, followed by the CPI, and IR has a significant negative relationship only in the TLS model.

The Breusch-Pagan and Cook-Weisberg tests to measure heteroskedasticity in a regression model

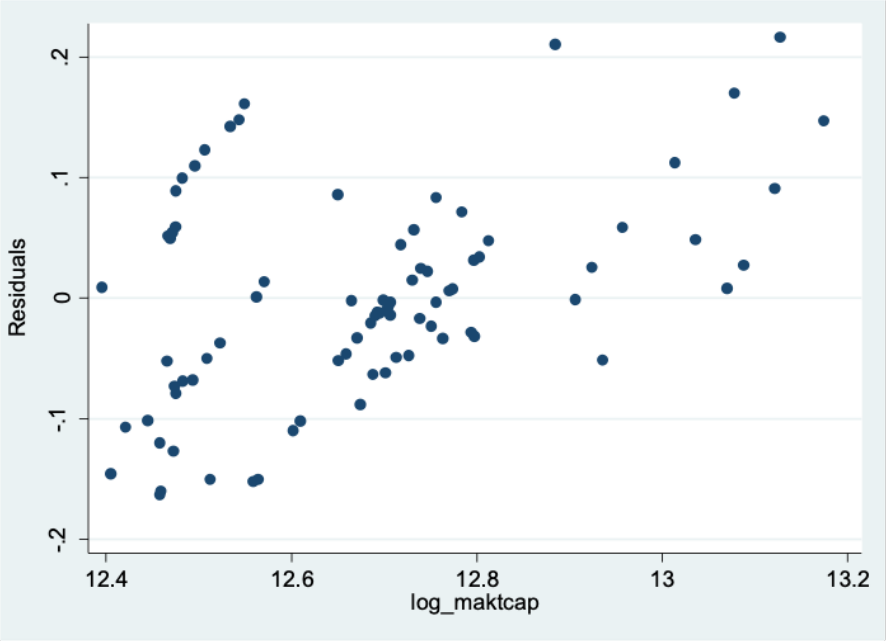
The test statistics provided are:

Null Hypothesis (H0): Constant variance (homoskedasticity).
Variables: log_CPI, log_MKTINT, log_IDR.
Test Statistic (chi2): 14.49.

Degrees of Freedom (df): 3 (the number of variables in the test).

Probability of chi-squared (Prob > chi2): 0.0023.

The null hypothesis (H0) in these tests is the presence of homoskedasticity or constant variance. Heteroskedasticity (changing variance) is the alternative hypothesis (Ha). The p-value (Prob > chi2) is 0.0023, which is less than the conventional significance level of 0.05. Therefore, the model rejects the null hypothesis at the 0.05 significance level. This implies that there may be evidence of heteroskedasticity in the model, which might undermine the validity of the constant variance of errors assumption. The presence of heteroskedasticity suggests that the variance of the errors is not constant across all levels of the independent variables.



Graph 1. *Residuals plot against the predicted values (log_maktcap)*

5. Findings and Recommendations

After conducting a comprehensive analysis, our findings provide insightful information and shed light on key aspects within the research scope. Furthermore, the recommendations drawn from these findings offer practical advice for actionable strategies to enhance understanding and drive positive change in the capital market of Bangladesh.

Despite the revealed results of a significant positive correlation between IDR and MAKTCAP through analysis, the options for alternative investment opportunities remain limited. Other than the shares and capital market, individuals are considering either depositing funds in banks or investing in Government Savings Certificates. Therefore, regulators should take the necessary steps to increase the IDR, and IDR should be considered segment-wise, such as considering IDR for capital market investment separately.

The analysis showed a strong inverse relation between MKTINT and MAKTCAP, indicating that rising interest rates hurt

MAKTCAP. In light of these findings, we recommend that the Government and Bangladesh Bank implement appropriate measures to create a conducive environment for favorable interest rates.

Our analysis revealed a negative relationship between CPI and MAKTCAP, indicating that in an emerging market like Bangladesh, an increase in CPI leads to a negative impact on MAKTCAP as high inflation leads to higher prices of goods and services, dismissing the purchasing power of consumers and lessening the investment capacity of individuals and institutions. The capital market therefore experiences a low amount of cash flow, which raises the supply of shares relative to the demand. Consequently, the capital market loses its market capitalization due to a hike in CPI. But it needs to be controlled, and therefore we highly recommend the implementation of a proper market mechanism, and the government should take the necessary steps to strongly control market manipulation.

6. Conclusion

This study unveils a sophisticated relationship between the dependent variable, i.e., MAKTCAP, and the three independent variables, i.e., MKTINT, CPI, and IDR, to measure the influence of macro factors on the market capitalization of Bangladesh. The influence of the IDR, an overlooked macro component, on the MAKTCAP is also examined in this study. Employing the APT framework, OLS, and the GMM model, along with a battery of other comprehensive tests, revealed the existence of a substantial influence of selected macro factors on the MAKTCAP of DSE.

MKTINT has a significant negative influence on the MAKTCAP, indicating that rising interest rates decrease MAKTCAP. Many previous studies on MKTINT reveal the influence of MKTINT on MAKTCAP and capital market return (Fama and French (2010), Akhtar and Ali (2018), Balagobei (2017)). Our analysis also unveils the existence of a significant positive correlation between IDR and MAKTCAP, indicating that with increasing investment, the market capitalization will go up. In this study, another macro factor, CPI, is examined, revealing its noteworthy sway on MAKTCAP. This suggests that in an emerging market such as Bangladesh, a rise in CPI can also have positive effects. As inflation soars, prices of goods and services increase, also resulting in greater revenues and profits for companies. Consequently, investors anticipate amplified earnings and growth opportunities, leading to a rise in market capitalization. According to Boshkovska et al. (2016), CPI has a significant positive influence on market capitalization and can explain and have an impact on the development of the Macedonian capital market.

In conclusion, while the R-squared value suggests that our analysis accounts for 24% of the overall variance in market capitalization, there still exists a considerable portion of unexplained variation. Nonetheless, our analysis unveils a significant correlation between the selected macro factors and MAKTCAP. In this regard, we could say that creating more scope for investment, considering IDR separately, making a favorable interest rate range, and implying proper market mechanisms along with strong monitoring and control in the market to maintain CPI can lead the situation to the better side.

Limitations and Future Studies

This report's preparation ran against the following constraints:

- Since the report relies on secondary data sources, resulting in limited information.
- For the study, three chosen macroeconomic factors (INT, CPI, and IDR) are taken into account in this analysis, while there exist numerous other macro factors that might have large-scale influences.
- While conducting the analysis, we only looked at 7 years' worth of data, or a total of 83 months, whereas a larger number of observations could provide a clearer view.
- In this study, we solely focused on the capital market of Bangladesh (DSE); nevertheless, a comparative geographic analysis may have given us a more comprehensive perspective and accurate results of the actual scenario.
- To conduct the study, we simply considered the APT pricing theory; however, combining other tests and theories could yield more precise results.

Footnotes

[1] 1 USD = 110 BDT, where USD to BDT conversion is followed by Forbes currency converter: https://www.forbes.com/advisor/money-transfer/currency-converter/usd-bdt/?amount=1

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