

Interest rate reforms and firm performance in Bangladesh's manufacturing sector



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ABSTRACT

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The study investigates the effects of a single-digit (6%–9%) interest rate set by the Bangladesh Bank in 2020, involving 94 listed manufacturing companies across 10 industries from 2018 to 2023. The key objective of the research is to examine the impact of such interest rate reform on financial performance, proxied by Return on Assets (ROA), Return on Equity (ROE), and Market-to-Book (M/B) ratio. Fixed and random effects panel data analysis techniques and the system generalized method of moments (GMM) have been applied to address heteroskedasticity, autocorrelation, and endogeneity. The results show that lower interest rates improve ROA and ROE, especially for capital-intensive industries like textiles and engineering, because of reduced borrowing costs. Higher lending rates and debt leverage adversely affect the M/B ratio, indicating that investors are concerned about the increase in debt levels. Price fluctuations in the exchange rate affect firm performance, which relies on imports. Additionally, firms with larger sizes and higher GDP growth perform better in the market. The study highlights the need for a dynamic and sector-focused interest rate policy to improve the resilience of the manufacturing sector, as well as strategies like capacity building in financial management to ensure long-term sustainability. To address the limitations of this study, future research should use probability sampling together with unlisted firm data and combine primary and secondary data while expanding the study period after the post-pandemic period. Moreover, cross-industry analysis will help achieve a better understanding of long-term interest rate effects on manufacturing firm performance.

Contribution/ Originality: This is the first study in Bangladesh that investigates the role of single-digit interest rate reform in 2020 on the performance of listed manufacturing firms. This study demonstrates the interplay between macroeconomic policies and firm-specific factors for firm performance and has crucial policy implications and managerial recommendations for sustainable firm growth.

1. INTRODUCTION

Investment is a major pillar for promoting resilient and sustainable economic growth in any economy because it drives productivity and industrial development. The Bangladesh government enacted a single-digit interest rate policy (6%–9%) in 2020 to stimulate investment by decreasing firms' borrowing costs. Country regulatory quality and government efficacy have a significant impact on environmental and social performance, as well as firm performance (Handoyo & Anas, 2024). In a study conducted by Yahaya (2025), he examined the relationship between institutional ownership and firm performance, stressing the importance of firm performance. He stated that excellent firm

performance can boost investor confidence, credit access, employee morale, and stakeholder confidence, resulting in higher stock prices, ease of financing, engaged employees, and long-term credibility with regulators, customers, and the public. Interest rates, as a major element of the financial ecosystem, drive firms' operational strategies and expansion plans, as interest rates influence the costs of how firms acquire borrowed capital (Uddin & Yunus, 2022). In terms of borrowing for a firm growth-related investment, higher interest rates dissuade borrowing as per (Keynes, 1937) liquidity preference theory from the companies' point of view since they will undertake fewer growth opportunities and have less chances of increasing market valuation, while lower interest rates increase the attractiveness of borrowing (Rahman & Harun, 2024) which allows firms to raise funds for capital intensive ventures and more appealing to investors (Tarkom & Ujah, 2023). Nunow (2024) also concluded in his study on the impact of financial leverage and firm value of insurance companies listed on the Nairobi Securities Exchange, Kenya, that increases in short-term debt, long-term debt, and debt to equity lead to increased firm value, whereas increases in interest rates reduce firm value and thus recommend interest rate reduction. However, the single-digit interest rate system imposed by the Bangladesh government has yet to be studied to understand its actual impact on the listed manufacturing companies in Bangladesh.

Global studies have examined the relationship between macroeconomic factors and firm performance (Hossain & Islam, 2015; Ionescu, Toma, & Founanou, 2022; McNamara & Duncan, 1995; Mugambi, 2020) but little research has empirically examined the impacts on the manufacturing sector in Bangladesh within the context of this policy. Therefore, this study seeks to analyze the dynamic effects of the single-digit interest rate policy on financial performance through leveraged financial support, capital expenditures, exchange rate changes, and heterogeneity among industries. These results may provide information that is actionable for manufacturing firms to manage interest rate risks, guide financial institutions in lending strategies, contribute to academic research and discussion regarding financial performance and lending decisions, and provide policymakers with elements of stability around macroeconomic frameworks that strengthen the economy through resilience and growth.

2. REVIEW OF LITERATURE

2.1. Theories of Interest

According to the productivity theory, Clark (1899) and Knight (1921), interest represents payment for the productive utilization of capital. Interest functions to increase production when labor joins capital in this way. The time-preference theory of Bohm-Bawerk (1891) considers interest to be an additional payment given for present consumption preference over future consumption preference to reduce or discount consumption. There exists a monetary advantage that makes future consumption more valuable because of delayed present consumption. According to Fisher's (1930) theory, the Fisher Equation separates nominal interest rate from real interest rate while also explaining how inflation expectations affect the equation. The classical theory of interest rate (Ricardo, 1817; Smith, 1776) and the loanable funds theory (Ohlin, 1937; Robertson, 1934; Wicksell, 1936) explain interest rate determination through the supply-demand relationships between capital and loanable funds. According to Keynes (1937), liquidity preference theory, the money demand and supply dynamics, which involve transitional, precautionary, and speculative motives, affect interest rates in addition to other factors.

2.2. Financial Theories Explaining Firm Performance

The Modigliani and Miller (1958) proposition describes how firm value is invulnerable to capital structure in ideal capital markets; however, low interest rates allow for desirable debt financing opportunities. The trade-off theory, Brigham and Ehrhardt (2017), examines debt in terms of the tax benefits a firm receives, compared to bankruptcy risks, indicating that managers will be more likely to use debt with low borrowing costs. The pecking order theory, Brealey, Myers, Allen, and Edmans (2022), posits that firms would prefer internal financing but will resort to debt in order to utilize leverage in low-interest-rate environments. Finally, agency cost theory, Jensen and

Meckling (1976) note that the usage of debt reduces borrowing costs, which also aligns the incentives of management, increasing efficiency in the firm.

2.3. Empirical Review of Literature

This review of the literature collects and artfully compiles global research on the impact of factors like interest rates, leverage, capital expenditure (CAPEX), and exchange rate volatility on firm performance, with a focus on the arrival of single-digit interest rates (6%–9%) in Bangladesh in 2020. The review provides a synthesis of research from varying contexts to provide a foundation for the hypotheses, which include assumptions or statements about some relationship between these variables and the financial performance of Bangladeshi manufacturing firms that the study examines using Return on Assets (ROA), Return on Equity (ROE), and Market-to-Book ratios (M/B). The study findings provide a relevant backdrop for discussing our understanding of how monetary policy action influences firm-level performance outputs.

Numerous studies demonstrate how macroeconomic variables affect firm efficiency in businesses. Tarkom and Ujah (2023) examined 12,207 US firms to establish that rising interest rates decrease firm efficiency, but inflation elevates efficiency while policy uncertainty strengthens these outcomes. Larger companies capitalize on uncertain situations to achieve improved results. Issah and Antwi (2017) examined 116 UK-listed firms (2002–2014) to demonstrate how unemployment, along with GDP and exchange rates, play crucial roles in determining performance. They insist on incorporating the effect of macroeconomic variables when assessing firm performance. Chollom, Dung, Ibrahim, and Okpanachi (2021) determined that interest rates maintain a strong connection with manufacturing value added in Nigeria from 1981 to 2018, which led to their suggestion of single-digit interest rates. Yeboah and Takacs (2019) observed that interest rates show a favorable influence on ROA measurement of South African firms, while Olweny and Omondi (2011) demonstrated that stock volatility in Kenya (2001–2010) responds to changes in exchange rates, together with interest rates and inflation. Ndiritu, Iraya, Okiro, and Nyandemo (2025) investigated how interest rate spread, liquidity creation, and firm characteristics affect Kenyan bank performance for the period 2008–2018, concluding that interest rate spread is significant, liquidity creation is non-intervening, and firm characteristics are non-moderating, while all three influence performance and guide competitive banking strategies. The level of financial stability within firms also influences the relationship between intellectual capital investment and firm performance, market value, and bankruptcy risk (Ahmad, 2025). The research results confirm H1(a), H1(b), and H1(c), which establish that Bangladesh's single-digit interest rate system produces important effects on manufacturing firm ROA and ROE, together with M/B ratios.

H1(a), H1(b), H1(c): The single-digit interest rate regime (6%–9%) significantly affects ROA, ROE, and M/B ratios.

Firm performance is affected by leverage because it increases borrowing costs and financial risks. According to Iqbal and Usman (2018), Pakistani textile firms experienced negative effects on their ROE from leverage, but their ROA showed positive effects due to high interest rates and debt, which lowered equity value. Bint Raza, Sheikh, and Rahman (2024) investigated the mediating effect of corporate governance on the financial performance of companies listed on the Pakistan Stock Exchange 100 index. The findings confirm that leverage, board size, and CEO have a positive correlation with ROE. Piro and Tran (2022) studied 30 Swedish manufacturing companies to determine how capital structure responded to interest rate changes, which also included taxes as a mediating factor. The study of 257 Japanese firms by Arhinful and Radmehr (2023) from 2000 until 2021 showed that debt servicing had adverse effects on performance. Rising interest rates can reduce the favorable impact of leverage on profitability by increasing debt payment costs, especially for enterprises with large short-term debt (Blessing, 2025). During the 2013–2023 study period, which included both low and high-interest rate periods, the researcher found that when interest rates are low, leverage correlates with higher profitability due to lower financing costs. Islam, Rahman, Tanchangya, and Islam (2023) revealed no meaningful association between leverage levels and ROA in Bangladesh, but the researchers recommended that further examination should be undertaken. Ahmed et al. (2024) studied 78 DSE-listed

manufacturing companies in Bangladesh over the period of 2017-2021 and found that all debt ratios are significant and negatively impact ROA, and that short-term debt and total debt-to-assets ratios are significantly and positively related to ROE. Long-term debt's effect on ROE is insignificant. They controlled for liquidity, inflation, growth, tax rate, and firm size, with liquidity being non-significant, showing the complex nature of capital structure–performance relations. Odhiambo, Murori, and Aringo (2025) examined how leverage affects firm performance and value, considering the debt–equity trade-offs involved. They found that leverage can positively influence firm performance with increased risk of financial distress in developing countries. They emphasized the need to provide a balance of debt that will allow firms to operate sustainably going forward and to conduct more research into the effects of leverage with respect to the size, industry, and economic context of a firm. The above studies provide evidence for H2(a), H2(b), and H2(c), which state that leverage may affect ROA, ROE, and M/B ratios for Bangladeshi manufacturing firms during low-interest rate periods.

H2(a), H2(b), H2(c): Leverage significantly influences ROA, ROE, and M/B ratios.

CAPEX serves as a crucial element for firm development since it directly affects financial results. Mwangi (2014) identified that Nairobi firms show positive financial performance when they increase CAPEX alongside leverage and firm size. The research by Hamidi, Mansor, and Asid (2013) demonstrated that internal cash flows lead Malaysian firms to make CAPEX decisions, yet insider ownership and investment opportunities reduce these decisions. Jaisinghani, Tandon, and Batra (2018) discovered that Indian auto firms experience negative long-term effects between CAPEX and performance, but, as per the research of Majanga (2018), CAPEX drives future stock prices and profitability in Malawi. These research studies confirm the relationships stated in H3(a), H3(b), and H3(c) regarding the significant impact of CAPEX on ROA, ROE, and M/B ratios in Bangladesh manufacturing firms since low interest rates enable investment.

H3(a), H3(b), H3(c): CAPEX has a significant effect on ROA, ROE, and M/B ratios.

Movements in exchange rates affect firms that engage in international trade. Changing exchange rates influence profitability by impacting sales, pricing competition, and expenses, as well as the level of local interest rates (Khalilov, 2025). Hakkio (1986) established a negative connection between nominal interest rates and exchange rates, which can be explained by inflation shocks. Baggs, Beaulieu, and Fung (2009) showed that an appreciation of the Canadian dollar negatively affected firm sales and firm survival, with an even lesser weight applied to productive firms. Christian, Francis, and Greg (2018) suggested making import restrictions a specific policy initiative to foster Nigerian manufacturing, and Setiawanta, Utomo, Ghozali, and Jumanto (2020) reported that in Indonesian firms, exchange rates influenced capital structure, with no effect on profitability. Yeboah and Takacs (2019) demonstrated a negative relationship between exchange rate volatility and ROA in South African firms, while Hossin and Mondol (2020) showed there was a negative relationship between exchange rate volatility and ROA, and that inflation had a complementary role in helping earn higher returns in Bangladeshi banks. The findings of these studies help form H4(a), H4(b), and H4(c), which establish that exchange rate volatility substantially influences ROA, ROE, and M/B ratios in the manufacturing sector in Bangladesh.

H4(a), H4(b), H4(c): Exchange rate volatility significantly impacts ROA, ROE, and M/B ratios.

This review underlines the chemistry of macroeconomic and firm-specific factors, providing a robust framework for analyzing Bangladesh's manufacturing sector under the single-digit interest rate policy.

3. RESEARCH METHODOLOGY

3.1. Research Design

This research employs empirical and qualitative techniques to analyze Bangladesh's single-digit interest rate regime and its outcomes on the financial performance of listed manufacturing firms. The research utilizes rigorous analysis to fulfill the research objectives.

3.2. Target Population

The target population includes all stocks listed on the Dhaka Stock Exchange (DSE) as of December 2023, providing a comprehensive market overview for evaluating the policy's effects.

3.3. Sources and Sampling of Data

The research employs a non-probability sampling technique to acquire data on 94 manufacturing firms that had debt over BDT 100 crore in 2023. The period of study spans from 2018 to 2023. The sample represents approximately 46% of the market capitalization in equity, excluding financial firms, which accounts for 60%. Data for 2024 has not been included, as 2024 has limited relevance given the market-driven interest rate regime. Qualitative and quantitative analyses and discussions are based on favorable secondary data sources across multiple domains (Table 1).

Table 1. Data sources used in the study.

Source name	Types of data provided	Website
Company annual reports	Financial statements, notes, and company info	Collected from company websites
Dhaka Stock Exchange (DSE)	Stock prices, market data, and firm listings	www.dsebd.org
Investing.com	Historical exchange rates, macro indicators	www.investing.com
Bangladesh bank	Interest rates, monetary policy data	www.bb.org.bd
Bangladesh Bureau of Statistics (BBS)	GDP, inflation, trade data	www.bbs.gov.bd
Daily newspapers (e.g., the Daily Star, The Financial Express, Observer Online Desk, etc.)	Policy announcements, economic news, market events	www.thedailystar.net, www.thefinancialexpress.com.bd www.observerbd.com

3.4. Description of Variables

Variables used in this study, and their calculation formula/description, are listed in Table 2.

Table 2. Detailed list of variables.

Variables	Formula/Description	Source
Dependent variable	1. Return on assets (ROA)= Net profit/Total assets 2. Return on equity (ROE)= Net profit/ Total Equity 3. Market-to-book ratio (M/B) = Market capitalization / Book value of equity	Islam et al. (2023); Yeboah and Takacs (2019); Mugambi (2020); Kim (2023) and Albulescu (2022).
Independent variable	Weighted Average Lending Interest Rate (LR)	Uddin and Younus (2022) and Chollom et al. (2021)
Mediating Variable	Leverage (L)= Total debt/total assets	Islam et al. (2023) and Yeboah and Takacs (2019)
Moderating variables	Capital Expenditure (CE)= $TFA_t - TFA_{t-1}$ Change in Exchange Rate (ΔER) = (Current year's Foreign Exchange Rate – previous year's Foreign Exchange Rate)/Previous year's Foreign Exchange Rate *100	Hamidi et al. (2013) and Mwangi (2014) Yeboah and Takacs (2019)
Control variables	Firm size (LnTA)= Ln (Total Asset) GDP growth rate (GR) Inflation Rate (IR)	Islam et al. (2023) and Yeboah and Takacs (2019) (Bangladesh Bureau of Statistics, 2023) and Hossain and Islam (2015)

3.5. Model Specification and the Conceptual Framework

This study investigates the effect through a regression equation: $Y = f(I, M, C, \varepsilon)$, where Y is the financial performance (based on ROA, ROE, M/B ratio), I is the interest rate variable, M are moderating/mediating variables, C are control variables, and ε is the error term. Three equations are estimated as follows:

$$ROA_{it} = \alpha + \beta_1 LR_{it} + \beta_2 L_{it} + \beta_3 CE_{it} + \beta_4 \Delta ER_{it} + \beta_5 LnTA_{it} + \beta_6 GR_{it} + \beta_7 IR_{it} + \varepsilon_{it} \quad (1)$$

$$ROE_{it} = \alpha + \beta_1 LR_{it} + \beta_2 L_{it} + \beta_3 CE_{it} + \beta_4 \Delta ER_{it} + \beta_5 LnTA_{it} + \beta_6 GR_{it} + \beta_7 IR_{it} + \varepsilon_{it} \quad (2)$$

$$M/B_{it} = \alpha + \beta_1 LR_{it} + \beta_2 L_{it} + \beta_3 CE_{it} + \beta_4 \Delta ER_{it} + \beta_5 LnTA_{it} + \beta_6 GR_{it} + \beta_7 IR_{it} + \varepsilon_{it} \quad (3)$$

In this case, LR_{it} represents the lending rate, L_{it} represents leverage, CE_{it} represents capital expenditure, ΔER_{it} represents a change in exchange rate, $LnTA_{it}$ is firm size, GR_{it} is GDP growth, and IR_{it} is the inflation rate for firm i at time t . Figure 1 depicts the conceptual framework that enables readers to quickly understand the relationships postulated by the study between its variables.

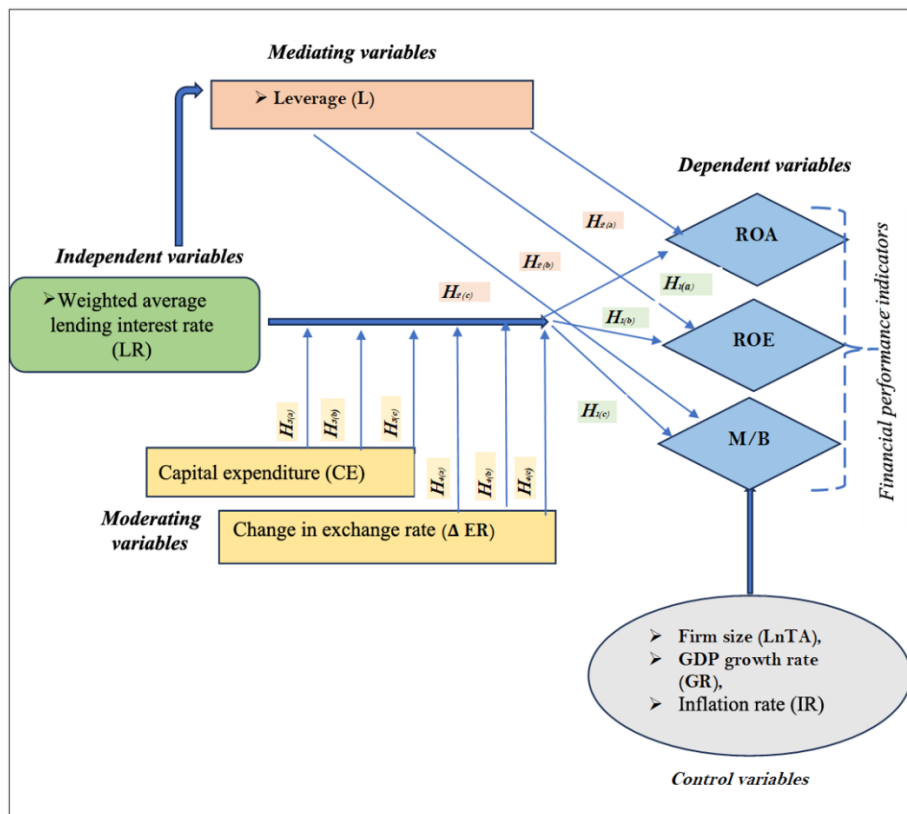


Figure 1. An illustration of the conceptual framework.

4. ANALYSIS OF DATA AND RESULT DISCUSSION

4.1. Qualitative Analysis

4.1.1. Aggregated Debt Level in Relation to Weighted Average Lending Rate (WALR)

Figure 2 shows the relation between total corporate debt and the Weighted Average Lending Rate (WALR) for firms in the manufacturing sector in Bangladesh from 2018 to 2023 is analyzed. From 2018 to 2020, WALR decreased from over 10% to nearly 8%, while the total debt for firms rose as firms took advantage of the lower lending rates to borrow money for investment. During the period 2020–2022, the WALR decreased significantly to approximately 7%, largely due to low-interest lending programs run by Bangladesh Bank and borrowings made by corporates to support operations and recovery during the COVID-related economic crisis, which pushed total corporate debt in Bangladesh to more than one trillion Taka. In 2023, while WALR increased slightly, total borrowing also increased as inflation, exchange rate fluctuations, and demand for production kept firms borrowing. This suggests the potential

evolution of different financial strategies, highlighting the significance of credit in supporting the resilience of the sector.

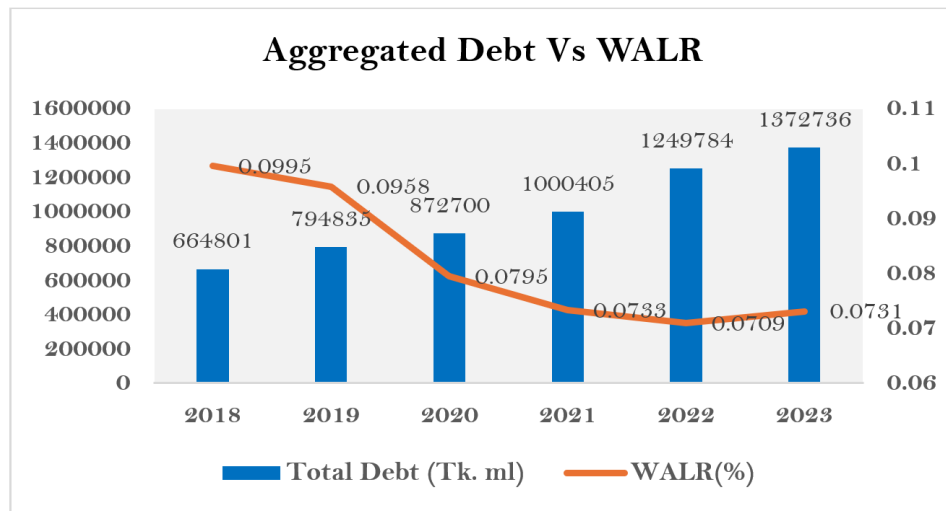


Figure 2. Trend analysis between the aggregated Debt level and WALR.

4.1.2. Aggregate Capital Expenditure Nature of Manufacturing Firms in Bangladesh

Figure 3 shows capital expenditure (CAPEX) trends in Bangladesh's manufacturing sector from 2018 to 2023 (Author's own computation). CAPEX fell sharply from Tk. 210,000 million in 2018 to Tk. 145,000 million in 2020, driven by global trade tensions, policy shifts, and COVID-19 uncertainties. From 2021, CAPEX recovered, reaching Tk. 190,000 million by 2023, fueled by post-pandemic reopening, fiscal stimulus, and growing domestic and export demand. Government support and private sector optimism spurred investments in automation, capacity, and sustainability, reflecting renewed confidence and competitiveness.

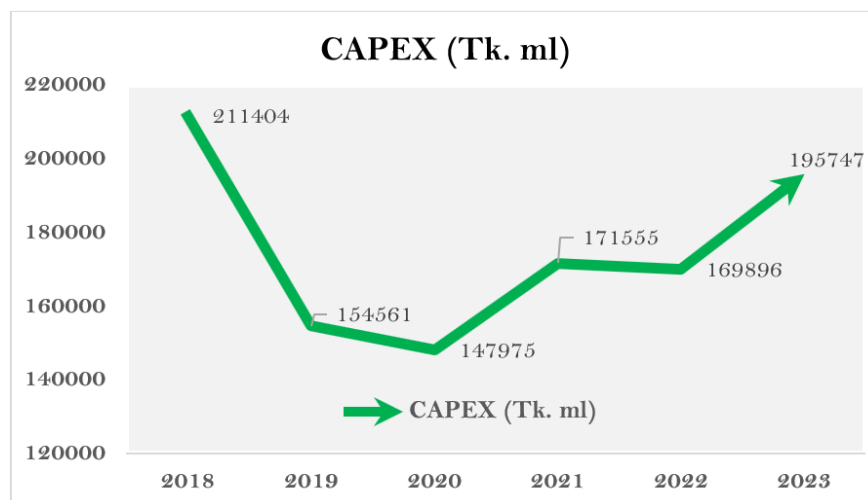


Figure 3. Capex trend of Bangladesh's manufacturing sector.

4.1.3. Aggregated Asset Growth of Bangladesh's Manufacturing Sector

Figure 4 presents variable asset growth figures for Bangladesh's manufacturing industry throughout the years 2018 to 2023. The industrial sector experienced strong growth in 2019 because of government policies and increased export requirements. The manufacturing sector experienced a significant decline in asset growth during 2020 due to COVID-19 pandemic-related disruptions and supply chain interruptions. The manufacturing industry experienced an upturn during 2021–2022 because of economic reopening, together with governmental assistance. The sector

experienced an asset growth decline during 2023 because of inflationary pressures, together with currency instability and escalating production costs.

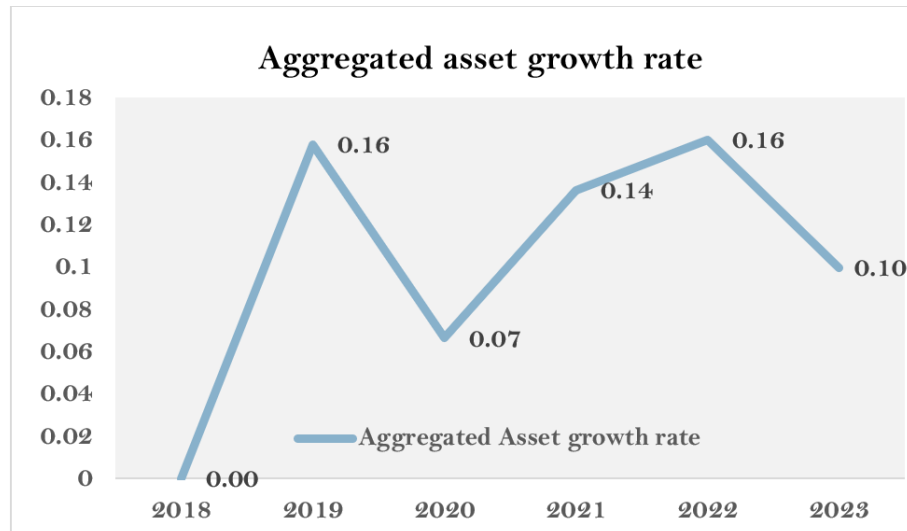


Figure 4. Aggregate asset growth rate trend of Bangladesh's manufacturing sector.

4.1.4. Study of Macroeconomic Environment

The graphic in Figure 5 shows how GDP growth, alongside inflation, WALR, and exchange rate changes, occurred in Bangladesh from 2018 to 2023. The economic growth of Bangladesh experienced a significant drop in 2020 because industrial operations and worldwide demand declined due to COVID-19. Inflation remained stable because domestic demand continued to be weak. The taka experienced a steady exchange rate movement until 2021, when it started to depreciate because of import dependency, together with reserve depletion. The weighted average lending rate decreased until 2021 to support manufacturer credit availability before rising again to fight inflation and exchange rate instability. The economic patterns of 2022–2023 demonstrate the need for combined industrial policies because energy scarcity creates significant risks for the sector.

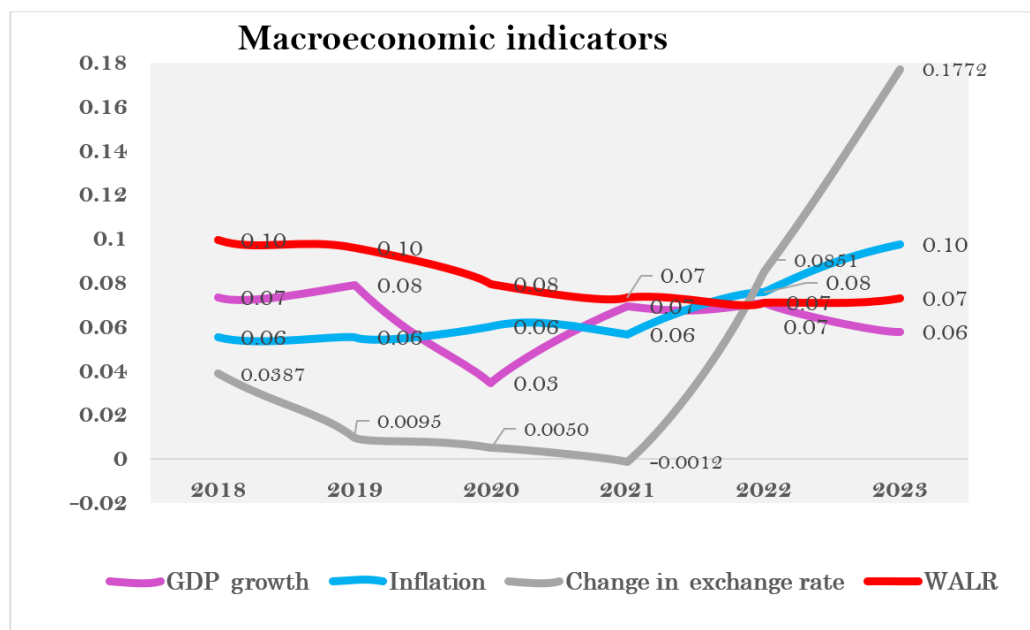


Figure 5. Trend of the macroeconomic environment.

4.1.5. Overview of Capital Market Performance During 2018–2023

The capital market in Bangladesh was volatile from 2018 to 2023, influenced by economic cycles and global shocks. Several issues affected governance, including the lack of high-value IPOs and the downward trend of the DSEX index, which limited growth in 2019. The COVID-19 pandemic in 2020 disrupted this downward trend, prompting the Bangladesh Securities and Exchange Commission (BSEC) to set a floor price and reduce trading hours for the equity market. During this period, interest rates declined, and stimulus funds flowed into the market. In 2021, the DSEX index crossed over 7000 points. However, in 2022, the Russian-Ukrainian conflict and inflationary pressures increased market volatility, leading the BSEC to establish a floor price guideline for the second time (Table 3).

Table 3. Summary of key policy measures (2018–2023).

Year	Policy Measure	Purpose
2018–2019	Governance reforms, tighter disclosure norms. (Bangladesh Securities and Exchange Commission) [BSEC])	Improve transparency
2020	Floor price mechanism, trading restrictions (New Age, 2022)	Market stabilization during COVID
2021	IPO push, liquidity enhancement (The Daily Star, 2021)	Capital market expansion
2022	Reimposed floor price, margin lending caps (Observer Online Desk, 2023; The Financial Express, 2021)	Prevent sharp corrections
2023	Interest rate hike, IMF-backed reforms (International Monetary Fund, 2023)	Macroeconomic stabilization

4.2. Empirical Analysis

4.2.1. Summary of Descriptive Statistics

Table 4 summarizes descriptive statistics for key variables, detailing central tendency and dispersion for 94 manufacturing firms from 2018 to 2023.

Table 4. Descriptive statistics.

Variables	N	Minimum	Maximum	Mean	Std. Deviation
ROA	564	-0.190	0.214	0.029	0.049
ROE	564	-6.098	0.519	0.030	0.350
M/B Ratio	564	-9.005	18.235	1.700	1.749
LR	564	0.071	0.100	0.082	0.011
L	564	0.000	0.919	0.410	0.203
CE	564	-900.00	91756.00	1863.72	7212.42
GR	564	0.035	0.079	0.064	0.015
IR	564	0.055	0.097	0.067	0.015
ΔER	564	-0.001	0.177	0.052	0.063
Total Asset	564	1290.00	546910.00	25787.67	48284.18
Valid N (Listwise)	564				

Return on assets (ROA) is low across 94 firms, with some negative returns and a high of 21%. Return on equity (ROE) has a greater range and many outliers or distressed firms, while both average ROA and ROE were less than 3%. The market-to-book (M/B) ratio exhibits more variability than returns. For the overall return example, debt policy is very different: the leverage ratio (L) is reported at a fixed weighted average lending rate of 8.2%, with values ranging from 0% to 92%. Capital expenditures vary significantly from firm to firm, and in some cases, they are negative, indicating asset disposals. The three macroeconomic variables—weighted average lending rate (LR), GDP growth (GR), and inflation rate (IR)—are consistent, while firm size varies substantially. The logarithmic

transformations of asset returns are more suitable for the analysis of models. The variability of change in exchange rates (ΔER) is also quite wide, ranging from 0.1% appreciation to 17.7% depreciation rates.

4.2.2. Correlation Analysis

Table 5 shows complex relationships between financial and economic variables. ROA and ROE have a strong positive relationship of 45.1%. ROA and ROE have a mixed relationship with the M/B ratio. ROA = 36.3% and ROE = -8.5%. The lending rate (LR) shows a positive relationship with ROA = 14.1%, indicating debt reliance. On the other hand, leverage (L) negatively affects all firm financial ratios (-47.54% ROA, -26.2% ROE, -7.8% M/B). The capital expenditure (CE) variable has a strong relationship with firm size = 60.6%, and CE has a weak, insignificant relationship with leverage, with = 3.7%. Both GDP growth and inflation show weak relationships with the firm variables.

Table 5. Correlation analysis.

Variables	ROA	ROE	M/B Ratio	LR	L	CE	IR	ΔER	LnTA	GR
ROA	1									
ROE	0.451**	1								
M/B Ratio	0.363**	-0.085*	1							
LR	0.141**	0.040	-0.041	1						
L	-0.474**	-0.262**	-0.078	-0.113**	1					
CE	0.231**	0.089*	-0.053	0.032	0.037	1				
IR	-0.186**	-0.094*	0.004	-0.589**	0.126**	-0.025	1			
ΔER	-0.159**	-0.085*	0.003	-0.399**	0.109**	-0.019	0.965**	1		
LnTA	0.256**	0.133**	-0.141**	-0.121**	0.003	0.606**	0.109**	0.090*	1	
GR	0.118**	0.025	0.030	0.368**	-0.032	0.048	-0.196**	-0.035	-0.022	1

Note: ** Result is significant at the 0.01 level and * Result is significant at the 0.05 level

Exchange rate change (ΔER) and inflation (IR) are highly correlated (96.5%), indicating potential multicollinearity. This issue is addressed in revised regression models by excluding the inflation rate for a more robust analysis.

4.2.3. Outcome from Random and Fixed Effect Model

The results from Random and Fixed Effect regressions, with diagnostic tests, are shown in Table 6.

ROA – Equation 1: The random effects model, as selected by the Hausman test (Prob > chi² = 0.9122), indicates that the Weighted Average Lending Rate (WALR) has an insignificant effect on ROA. Leverage and exchange rate changes negatively impact ROA (~10% & ~8.7% impact, respectively), while GDP growth positively influences it. Diagnostics reveal heteroscedasticity, autocorrelation, cross-sectional dependence, and endogeneity, but no multicollinearity, necessitating model refinement.

ROE - Equation 2: The random effects model, which is supported by the Hausman test (Prob > chi² = 0.6354), indicates that WALR does not significantly impact ROE. However, leverage levels and exchange rates negatively influence ROE, with reductions of 48% and 39%, respectively. Firm size is a positive predictor of ROE. The model exhibits issues with heteroscedasticity and autocorrelation, and it also suffers from cross-sectional dependence and endogeneity, although there are no problems of multicollinearity.

M/B Ratio – Equation 3: The random effects model, confirmed by the Hausman test (Prob > chi² = 0.8805), indicates that WALR has a negative effect on the M/B ratio, and leverage and firm size have an insignificant negative effect. As in the case of all models above, the random effects model shows there is no autocorrelation and no multicollinearity, but there is heterogeneous error of loss in the M/B ratio, endogeneity, as well as cross-sectional dependence, requiring further corrections.

Table 6. Summary results from the random and fixed effect models with diagnostic tests.

Dependent variable:	ROA (Equation 1)			ROE (Equation 2)			M/B ratio (Equation 3)		
Independent variable	Random	Fixed	Hausman Test	Random	Fixed	Hausman Test	Random	Fixed	Hausman Test
LR	0.18	0.25	Prob> chi2= 0.9122	-0.27	1.21	Prob> chi2 =0.6354	-13.79*	-10.95	Prob> chi2= 0.8805
Mediating variable									
L	-0.10**	-0.09**		-0.48**	-0.69**		-0.32	0.164	
Moderating variable									
CE	0.0014	0.0012	Random is accepted	0.00135	-0.0019	Random is accepted	0.011	-0.001	Random is accepted
ΔER	-0.087**	-0.093**		-0.394*	-0.483*		-0.367	-0.65	
Control variables									
LnTA	0.01**	0.015		0.045*	0.201*		-0.212	-0.03	
GR	0.29**	0.28**		0.464	0.23		6.843	6.63	
Constant	-0.06*	-0.11		-0.18	-1.63*		4.45**	2.43	
Prob > chi2	0.00			0.00			0.00		
Prob > F		0.00			0.00			0.00	
Diagnostic Tests	Results		Remarks	Results		Remarks	Results		Remarks
Breusch-Pagan/Cook-Weisberg test for heteroskedasticity									
	chi2(1) =34.35, Prob>chi2 =0.000		Present	chi2(1) = 1026.33, Prob > chi2 = 0.0000		Present	chi2(1) = 12.33, Prob > chi2 = 0.0004		Present
Wooldridge test for autocorrelation in panel data									
	Wooldridge: F (1, 93) = 17.942, Prob > F= 0.0001		Present	Wooldridge: F (1, 93) = 18.921, Prob > F = 0.0001		Present	Wooldridge: F (1, 93) = 1.023, Prob > F = 0.3143		Absent
Pesaran's test of cross-sectional dependency									
	Pesaran: CD = 5.512, Prob = 0.0000		Present	Pesaran: CD=18.677, Prob = 0.0000		Present	Pesaran: CD=29.686, Prob = 0.0000		Present
Multicollinearity Test									
	VIF=1.35		Absent	VIF=1.35		Absent	VIF=1.35		Absent
Durbin-Wu-Hausman Test for Endogeneity									
Variables	ROA (Eq-1)			ROE(Eq-2)			M/B ratio (Eq-3)		
	Prob > F			Prob > F			Prob > F		
LR	0.3971	Exogenous		0.836	Exogenous		0.0448	Endogenous	
L	0.000	Endogenous		0.000	Endogenous		0.0501	Endogenous	
CE	0.0775	Exogenous		0.558	Exogenous		0.5627	Exogenous	
ΔER	0.000	Endogenous		0.0208	Endogenous		0.6863	Exogenous	
LnTA	0.000	Endogenous		0.0015	Endogenous		0.5215	Exogenous	
GR	0.0051	Endogenous		0.5566	Exogenous		0.4786	Exogenous	

Note: ** Result is significant at the 0.01 level and * Result is significant at the 0.05 level.

4.2.4. Robust Model Selection and Interpretation

The research utilizes system-GMM estimation as an enhancement to difference GMM to address endogeneity, which is based on [Arellano and Bond \(1991\)](#) and [Blundell and Bond \(1998\)](#). Difference GMM employs lagged levels to serve as instruments for first-differenced equations, but persistent variables lead to weak instruments, which decrease efficiency. System GMM merges both difference and level equations to improve both efficiency and reliability levels. To maintain instrument validity, only the first lag, “Lag (1),” is used as an instrument ([Roodman, 2009](#)). This choice is theoretically sufficient, as Lag (1) is far enough to avoid endogeneity with the dependent variable, and provides more efficient, reliable estimates, especially with short panels (few years, many firms) ([Ahmed et al., 2024](#); [Baltagi, 2021](#)).

GMM for Equation 1: Difference and System GMM address endogeneity in Equation 1 (ROA). Lagged ROA is substantively and significantly positive, indicating some degree of persistence in performance. The Weighted Average Lending Rate (LR) and exchange rate change (ΔER) both negatively affect ROA (22.56%, 12.19%), and their negative influence on the ROA is larger for System GMM. Leverage (L) reduces ROA (4.82%). Capital expenditure (CE) is weakly negatively significant (0.14%), while firm size (LnTA) and GDP growth (GR) positively affect ROA (1.88%, 27.48%) in System GMM. Diagnostics [Sargan: 0.5625, AR(1): 0.0001, AR(2): 0.1120] confirm valid instruments and no second-order correlation (Table 7).

$$ROA = -0.1326 - 0.2256LR_t - 0.0482L_t - 0.00141CE_t - 0.122\Delta ER_t + 0.0188LnTA_t + 0.275GR_t + \varepsilon$$

Table 7. GMM regression results with diagnostic tests.

GMM for Equation 1			GMM for Equation 2			GMM for Equation 3		
	Difference	System		Difference	System		Difference	System
ROA			ROE			M/B Ratio		
L1.	0.486**	0.561**	L1.	-0.147**	-0.014**	L1.	0.028	0.2644**
LR	-0.762*	-0.225**	LR	5.743	-1.293**	LR	-42.351**	-14.81**
L	-0.066*	-0.0482**	L	-1.188**	-0.808**	L	2.625	-2.161**
CE	-0.0006	-0.0014*	CE	-0.011	0.006**	CE	-0.126	0.0469**
ΔER	-0.054	-0.1219**	ΔER	-1.426**	-0.405**	ΔER	2.493*	-1.291**
LnTA	-0.046	0.0188**	LnTA	1.107**	0.123**	LnTA	-3.608**	0.515**
GR	0.426**	0.274**	GR	-1.007	0.268**	GR	9.983**	3.466**
Constant	0.514	-0.133**	Constant	-10.112**	-0.736**	Constant	37.80**	-2.051**
Sargan Stat.	0.0023	0.5625	Sargan Stat.	0.00	0.1147	Sargan Stat.	0.7979	0.1891
AR (1) Stat.	0.0019	0.0001	AR (1) Stat.	0.2739	0.3571	AR (1) Stat.	0.419	0.0845
AR (2) Stat.	0.0843	0.112	AR (2) Stat.	0.1941	0.2708	AR (2) Stat.	0.2367	0.2039
No. of obv.	376	470	No. of obv.	376	470	No. of obv.	376	470
Prob> chi2	0.00	0.00	Prob> chi2	0.00	0.00	Prob> chi2	0.00	0.00

Note: ** Result is significant at the 0.01 level.
* Result is significant at the 0.05 level

GMM for Eq-2: Difference and System GMM address endogeneity in Equation 2 (ROE). The negative sign of lagged ROE supports the hypothesis that firm performance is being normalized. System GMM indicates that the lending rate has a negative coefficient (-1.2936), and a change in exchange rate (ΔER) (-0.40464) reduces ROE. Leverage (L) exerts a strong negative effect on ROE (-0.8078), while firm size (LnTA) has a positive effect on ROE (12.3%). Capital expenditure (CE) and GDP growth (GR) are significantly positively associated with ROE (0.64% and 26.80%). Diagnostic tests, including Sargan (p=0.1147) and AR(2) (0.2708), confirm the validity of the instruments used in the study and indicate no second-order autocorrelation in the model (Table 7).

$$ROE = -0.7362 - 1.2936LR_t - 0.8078L_t + 0.0064CE_t - 0.405\Delta ER_t + 0.123LnTA_t + 0.268GR_t + \varepsilon$$

GMM for Eq-3: Difference GMM and System GMM account for endogeneity in Equation 3 (M/B ratio). The System GMM indicates that lagged M/B (L1) has a positive and strong impact on the current M/B ratio, suggesting valuation persistence. The lending rate (LR) (-14.81) and leverage (L) (-2.1615) negatively impact the M/B ratio, indicating challenges with credit constraints and risks stemming from debt. The firm's capital expenditure (CE) (0.04689) and firm size (LnTA) (0.5153) positively impact the M/B ratio, indicating firm growth potential. The exchange rate volatility (ΔER) (-1.291) negatively impacts the M/B ratio, while GDP growth (GR) (3.4659) positively impacts the M/B ratio. The diagnostics test [Sargan: 0.1891, AR (2): 0.2039] validates the model (Table 7).

$$M/B \text{ Ratio} = -2.0507 - 14.812LR_t - 2.1615L_t + 0.04689 CE_t - 1.291\Delta ER_t + 0.5153LnTA_t + 3.4659GR_t + \varepsilon$$

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

This research delineates some substantive linkages between the single-digit interest rate regime in Bangladesh (2020) and financial performance measures of publicly listed manufacturing firms, in line with earlier results. The weighted average lending rate is associated with decreased return on assets (ROA), return on equity (ROE), and market-to-book (M/B) ratio, in line with earlier studies by Tarkom and Ujah (2023); Chollom et al. (2021), and Yeboah and Takacs (2019). Increasing financial costs arising from increased lending rates decrease operational efficiency and market valuations by limiting the entity's ability to reinvest and decrease profit margins, particularly for capital-intensive industry segments.

Leverage posits a significant negative effect on ROA, ROE, and M/B ratio, supporting findings by Arhinful and Radmehr (2023), Piro and Tran (2022), and Iqbal and Usman (2018), but contrasting with Islam et al. (2023). High debt levels signal financial risk, especially in export-oriented industries like tannery, engineering, and fuel & power, lowering profitability and investor confidence. Capital expenditure (CAPEX) shows a weak negative impact on ROA, echoing (Jaisinghani et al., 2018). Yet it has a slightly positive effect on ROE and M/B ratio, as noted by Mwangi (2014) and Hamidi et al. (2013), suggesting limited equity and valuation gains from investments in sectors like textiles and ceramics. This suggests that while a firm may decide to invest in long-term assets, the immediate returns may be low or slow to materialize. Managers should balance desired capital expenditure with planned returns.

Exchange rate volatility has considerable adverse effects on ROA, ROE, and M/B ratio for industries that depend on imports, such as tannery, paper, and food industries, confirming the findings of Hossin and Mondol (2020) and Yeboah and Takacs (2019). Currency devaluation essentially diminishes profit and, in light of this, it would have a significant effect on total valuation. Firm size plays a positive role in ROE and M/B ratio, being a proxy for economies of scale (Issah & Antwi, 2017). However, there is no effect on ROA as it is weak, which can be caused by inefficiencies in larger firms. GDP growth increases ROA, ROE, and the M/B ratio by increasing demand, access to credit, and government policy stability as the economies expand.

Since the nation transitioned to a single-digit interest regime in 2020, the return on equity (ROE) and return on assets (ROA) ratios have significantly improved for businesses, particularly in industries like textiles, cement, and general engineering manufacturing. The Bangladesh Securities and Exchange Commission (BSEC) market design mechanism of a floor price (2020), which experienced lofty valuations in an illiquid stock market, may have contributed to the overvaluation of firms in the market, as evidenced by the noteworthy positive relationship between lending rates and the market-to-book (M/B) ratio. Along with the impact of policy interventions such as floor prices and exchange rate control on firm performance outcomes, the study has several limitations, including the non-selection of unlisted manufacturing firms, the deliberate sampling bias based on debt thresholds, the use of secondary data that may contain errors and missing values, and the study's six-year time frame, which may overlook significant underlying structural shifts. However, the study's findings can still highlight the interplay of macroeconomic policies and firm-specific factors in shaping manufacturing firm performance, which can be beneficial to policymakers, manufacturing firms, creditors, and academicians for a better understanding of the underlying impact.

5.2. Recommendations

The implementation of monetary policy needs to optimize inflation control against interest rate constraints in order to enhance policy execution effectiveness, which shows through low ROA rates. Lending rate sensitivity can be mitigated through specialized loan programs that target the engineering and textile industries. Manufacturing companies must reduce their exchange rate exposure while maximizing leverage because these factors negatively affect their ROA and ROE performance. Higher returns depend on efficient capital spending, particularly for the textile and ceramic industries. Investors should select companies with low leverage levels that operate in interest-sensitive sectors. BSEC floor pricing, along with macro-financial elements, needs to be evaluated by analysts because

speculative trends could push M/B ratios higher. Lower interest rates improve profitability primarily in heavily capitalized industries, while debt and exchange rate fluctuations reduce business performance. Capital spending effects differ, but firm size, together with GDP growth, helps increase valuations.

Research findings show that traditional monetary policies do not satisfy industry needs, so businesses must develop specific solutions for sustainable expansion, which serves as a useful direction for regulatory bodies and organizations. Alongside structural changes, policymakers need to support specific capacity-development initiatives within the manufacturing industry. Financial literacy significantly improves company performance, while management's knowledge and attitude have no substantial impact (Culebro-Martínez, Moreno-García, & Hernández-Mejía, 2024). Therefore, the implementation of advanced training programs, including interest rate risk calculations, hedging techniques, and scenario planning methods, would enable managers to establish appropriate borrowing arrangements during periods of monetary volatility. The implementation of these measures would lead to better firm capability in managing upcoming interest rate changes, enhanced capital distribution efficiency, and improved overall financial stability. Future research can be conducted by integrating unlisted companies with probability-based sampling methods that will enhance study representativeness and provide more comprehensive insights. Researchers can analyze policy and capture firm-specific shocks through data integration between primary and secondary sources. A complete evaluation of long-term interest rate effects on manufacturing performance requires the inclusion of changing regulatory distortions while extending observation periods beyond six years to capture post-pandemic dynamics. Through cross-industry analysis, researchers can determine the actual benefits that each industry receives.

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