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Capital Structure and Corporate Governance in an Emerging Economy: Evidence from Bangladeshi Manufacturing Firms

Abstract

Capital structure decision is a major issue in corporate finance because it determines the mix of debt and equity used to finance firms' activities. Although traditional capital structure theories explain leverage using firm-specific determinants, recent studies suggest that these variables cannot fully explain persistent differences in firms' financing behavior. Corporate governance has therefore emerged as an important determinant of capital structure, particularly in emerging economies characterized by concentrated ownership and weak institutional environments. In Bangladesh, where firms rely heavily on bank-based financing and family-controlled ownership structures dominate the corporate sector, examining the relationship between governance and leverage is particularly important. This study investigates the determinants of capital structure of manufacturing firms listed on the Dhaka Stock Exchange during 2012–2021. The study incorporates both firm-specific and corporate governance variables and employs panel data regression techniques with year fixed effects to examine firms' leverage decisions. The findings show that firm size, growth, industry median leverage, and firm age are positively associated with leverage, while profitability and tangibility are negatively related to leverage. Among governance variables, independent directors are negatively associated with leverage, indicating that firms with more independent boards adopt more conservative financing policies. Family-controlled firms rely more on short-term debt while avoiding long-term debt financing while firms with larger board size rely more on long-term debt financing. The study concludes that both firm-specific characteristics and corporate governance mechanisms significantly influence capital structure decisions in Bangladesh. The findings contribute to the capital structure literature by providing evidence from an emerging economy characterized by concentrated ownership, weak governance practices, and dependence on bank-based financing.

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1. Introduction

Capital structure decision is one of the most important issues in corporate finance because it determines the mix of debt and equity used to finance firms' operations and investments. The central question in

the capital structure literature is whether firms possess an optimal or target capital structure that maximizes firm value and minimizes the cost of capital. An optimal capital structure is generally defined as the combination of debt and equity that minimizes the weighted average cost of capital and consequently maximizes firm value, whereas a target capital structure represents the financing structure toward which firms gradually adjust over time (Gan et al. 2021; DeMarzo and He, 2021; Frydenberg et al., 2011). The modern discussion of capital structure originates from the irrelevance proposition of Franco Modigliani and Merton Miller (1958), who argue that in a perfect capital market without taxes, transaction costs, bankruptcy costs, or information asymmetry, capital structure is irrelevant to firm value. However, the assumptions underlying the Modigliani–Miller theorem differ substantially from real-world market conditions, where taxes, bankruptcy costs, agency conflicts, asymmetric information, and institutional imperfections influence firms' financing choices (Gan et al., 2021; De Marzo and He, 2021; Frydenberg et al., 2011).

Subsequent capital structure theories emerged primarily to explain the relevance of financing decisions in imperfect markets. The trade-off theory proposes that firms determine an optimal leverage ratio by balancing the benefits of debt, particularly tax advantages, against the costs of financial distress and bankruptcy (Scott, 1976). In contrast, the pecking order theory argues that firms prefer internal financing over external financing and choose debt over equity when external financing becomes necessary because of information asymmetry and transaction costs (Myers and Majluf, 1984). According to the pecking order hypothesis, firms rely first on retained earnings, then on debt financing, and finally on equity financing (Myers, 1984). Although these theories provide important explanations of firms' financing behavior, empirical findings remain inconclusive regarding the determinants of capital structure and the existence of an optimal leverage ratio.

A large body of empirical research attempts to explain capital structure decisions using firm-specific determinants such as profitability, tangibility, growth opportunities, size, liquidity, volatility, and non-debt tax shields. Prior studies generally find that leverage is positively associated with tangible assets and firm size, and negatively associated with profitability and growth opportunities (Rajan and Zingales, 1995; Frank and Goyal, 2003). However, despite decades of research, traditional time-varying firm-specific variables explain only a limited portion of the variation in leverage ratios. Lemmon et al. (2008) argue that most cross-sectional variation in leverage remains persistent over time and is largely driven by unobserved time-invariant firm characteristics rather than conventional determinants. Similarly, Frank and Goyal (2009) conclude that no unified theoretical framework fully explains firms' capital structure decisions. Consequently, recent literature increasingly emphasizes governance-related explanations of financing behavior.

Agency theory provides an important explanation for why firms may deviate from shareholder value-maximizing leverage levels. Jensen and Meckling (1976) argue that agency conflicts arise because managers do not always act in the best interests of shareholders. Self-

interested managers may avoid debt financing because debt reduces managerial discretion and limits the free cash flows available for managerial consumption and empire-building activities. Jensen (1986) suggests that debt can serve as a disciplinary mechanism by forcing managers to distribute excess cash flow rather than invest in inefficient projects. Nevertheless, entrenched managers may prefer suboptimal leverage policies to preserve flexibility and private benefits. Therefore, capital structure decisions are not determined solely by economic factors, but are also influenced by corporate governance mechanisms that align managerial incentives with shareholders' interests.

Recent studies highlight that corporate governance variables play a significant role in explaining firms' financing behavior and speed of adjustment toward target leverage (Miglo, 2025). Morellec et al. (2012) show that agency conflicts significantly affect capital structure adjustments and explain persistent differences in leverage ratios. Liao et al. (2015) find that firms with stronger governance mechanisms, particularly independent boards and institutional investors, adjust more rapidly toward their target leverage ratios. Effective governance mechanisms reduce managerial opportunism through monitoring, performance-based incentives, and dismissal threats, thereby encouraging managers to adopt financing policies consistent with shareholder wealth maximization. Berger et al. (1997) also find that entrenched managers tend to maintain lower leverage levels, particularly in firms characterized by weak monitoring structures, large boards, and the absence of major shareholders.

The ownership structure of firms also plays a critical role in determining financing decisions. Existing literature suggests that ownership concentration, family control, institutional ownership, and blockholder monitoring significantly influence leverage choices. Family-controlled firms may mitigate owner-manager agency conflicts because controlling owners actively monitor management decisions. At the same time, concentrated ownership structures may create new agency problems between controlling and minority shareholders. Stulz (2005) and Hanousek and Shamshur (2011) argue that ownership structure explains a substantial portion of persistent leverage variation across firms. Similarly, external blockholders and institutional investors can reduce managerial opportunism and influence financing decisions through active monitoring.

Although the relationship between corporate governance and capital structure has received considerable attention, the majority of existing evidence is concentrated in developed economies characterized by strong investor protection, dispersed ownership structures, developed bond markets, and efficient capital markets. However, institutional settings differ significantly across countries, and these differences may influence financing behavior. La Porta et al. (1998) show that firms operating in countries with stronger investor protection exhibit different financing patterns from firms in weak institutional environments. Booth et al. (2001) further argue that while traditional capital structure determinants remain relevant across countries, institutional characteristics substantially influence financing choices in developing economies.

Bangladesh provides an important institutional context for revisiting capital structure theory. The ownership structure of Bangladeshi listed firms is characterized by concentrated ownership and dominant family control. Approximately 60%–70% of listed firms are family-controlled, and most firms have at least one large blockholder with substantial voting rights. Family members and associates frequently occupy positions on boards and management teams, unlike the professionally managed structures observed in many developed countries. Corporate governance practices in Bangladesh remain relatively weak, and independent directors often play a limited monitoring role. Prior studies also document a negative or insignificant relationship between board independence and firm performance in Bangladeshi firms (Rashid et al. 2010; Rashid et al., 2012; Rashid, 2018). Consequently, governance mechanisms in Bangladesh may influence financing choices differently from those observed in developed economies.

The Bangladeshi financial system is predominantly bank-based, with firms relying heavily on bank loans for both short-term and long-term financing. The capital market remains relatively underdeveloped, the bond market is weak, and equity financing opportunities are limited. In practice, Bangladeshi firms depend substantially on short-term bank debt because commercial banks attempt to match loan maturities with deposit structures. The volatility and limited depth of the stock market further discourage firms from relying on external equity financing. Prior literature suggests that institutional differences such as governance quality, financial market sophistication, and creditor protection significantly influence capital structure decisions across countries (La Porta et al., 1998; Booth et al., 2001). Therefore, Bangladesh offers a unique environment for examining how corporate governance mechanisms influence financing behavior in a bank-dominated emerging economy characterized by concentrated ownership and weak governance institutions.

Against this background, the primary objective of this study is to examine the determinants of capital structure of manufacturing companies listed on the Dhaka Stock Exchange during the period 2012–2021. More specifically, the study investigates whether corporate governance variables explain firms' financing decisions beyond traditional firm-specific determinants such as profitability, size, tangibility, liquidity, and growth opportunities. The study contributes to the literature in several important ways. First, while most existing studies on governance and capital structure are concentrated in developed economies, this study provides evidence from Bangladesh, an emerging economy characterized by weak governance institutions, concentrated ownership structures, and an underdeveloped capital market. Second, the study extends the traditional capital structure framework by integrating governance variables with firm-specific determinants in explaining leverage decisions. Third, the study provides empirical evidence on how family ownership, institutional characteristics, and bank-based financing influence firms' financing behavior in an emerging market setting.

2. Literature Review

2.1 Capital structure theories

The debate regarding capital structure

begins with the irrelevance proposition of Franco Modigliani and Merton Miller (1958), who argue that under perfect market conditions capital structure does not affect firm value. However, real-world capital markets are characterized by taxes, bankruptcy costs, asymmetric information, transaction costs, and agency conflicts, which make financing decisions relevant for firms (Gan et al. 2021; De Marzo and He, 2021; Frydenberg et al., 2011).

Two major theories dominate the capital structure literature: the trade-off theory and the pecking order theory. The trade-off theory proposes that firms determine an optimal leverage level by balancing the benefits of debt financing against the costs of financial distress and bankruptcy (Scott, 1976). In contrast, the pecking order theory suggests that firms prefer internal financing over external financing because of asymmetric information and transaction costs. Under this framework, firms use retained earnings first, debt second, and equity as a last resort (Myers and Majluf, 1984). Although both theories explain certain aspects of financing behavior, neither theory fully explains firms' observed capital structure decisions. Frydenberg et al. (2011) notes that the literature remains inconclusive regarding whether firms strictly follow target leverage behavior or financing hierarchy behavior.

2.2 Traditional determinants of capital structure

A substantial body of literature examines firm-specific determinants of leverage. Prior studies identify profitability, tangibility, growth opportunities, size, volatility, and non-debt tax shields as important determinants of capital structure (Rajan and Zingales, 1995; Frank and Goyal, 2003; Titman and Wessels, 1988).

Tangibility is generally found to have a positive relationship with leverage because tangible assets can be used as collateral, thereby reducing agency costs and bankruptcy risk (Rajan and Zingales, 1995). Firm size is also positively associated with leverage because large firms face lower bankruptcy risk and lower information asymmetry compared to smaller firms (Hovakimian and Li, 2009). Profitability, however, is typically negatively related to leverage. This finding supports the pecking order theory, which argues that profitable firms prefer internally generated funds rather than external financing (Rajan and Zingales, 1995; Frank and Goyal, 2009). Similarly, firms with high growth opportunities tend to use less debt because of underinvestment and agency problems associated with debt financing (Myers,1984, 1977).

Despite these consistent findings, traditional firm-specific determinants explain only a limited portion of leverage variation. Lemmon et al. (2008). show that leverage ratios remain highly persistent over time and that unobserved firm-specific characteristics explain a substantial portion of cross-sectional leverage variation. Frydenberg et al., (2011) also argues that important explanatory variables remain omitted from conventional leverage regressions. These findings suggest that additional factors beyond traditional determinants influence firms' financing decisions.

2.3 Agency theory and capital structure

Agency theory provides an alternative explanation for financing decisions. Jensen and Meckling (1976) argue that managers do not always act in shareholders' best

interests because managers pursue private benefits that may conflict with shareholder wealth maximization. Debt can reduce agency conflicts by limiting free cash flow available to managers and subjecting firms to external monitoring.

Jensen (1986) argues that debt acts as a disciplinary mechanism because regular interest and principal payments reduce managerial discretion over excess cash flows. However, entrenched managers may avoid debt because leverage reduces managerial flexibility and increases bankruptcy risk. Consequently, leverage decisions become closely associated with governance structures that influence managerial behavior.

Berger et al. (1997) find that firms with weak monitoring mechanisms and entrenched managers maintain lower leverage ratios. Similarly, Morellec et al. (2012) show that agency conflicts explain persistent differences in leverage and conservative debt policies. Their findings suggest that governance-related agency costs significantly influence firms' capital structure decisions.

2.4 Corporate governance and capital structure

Recent literature increasingly emphasizes the role of corporate governance in explaining leverage decisions and capital structure adjustment behavior. Strong governance mechanisms reduce managerial opportunism and align managers' interests with shareholders' interests.

Liao et al. (2015) find that firms with stronger governance systems, particularly independent boards and institutional investors, exhibit faster speed of adjustment toward target leverage. Institutional investors and independent directors improve monitoring quality and encourage managers to adopt shareholder value-maximizing financing policies. Similarly, Kholeif (2008) argues that institutional investors can limit CEO dominance and reduce managerial discretion.

Board structure is also found to influence financing decisions. Berger et al. (1997) show that firms with large boards, fewer independent directors, and weak external monitoring tend to maintain lower leverage levels. These findings indicate that governance mechanisms significantly affect firms' financing behavior.

Ownership structure also plays an important role in capital structure decisions. Friend and Lang (1988) find that leverage decreases with managerial ownership because managers seek to reduce bankruptcy risk associated with personal wealth and private benefits. In contrast, external blockholders and institutional investors encourage monitoring and may support higher leverage levels. Stulz (2005) argues that controlling shareholders significantly influence firms' leverage choices, while Hanousek and Shamshur (2011) find that ownership structure explains persistent differences in leverage ratios across firms.

2.5 Institutional environment and emerging economies

Capital structure decisions are also influenced by country-level institutional characteristics. La Porta et al. (1998) demonstrate that differences in investor protection, creditor rights, and governance quality significantly affect financing behavior across countries. Booth et al. (2001) find that firms in developing

countries use substantially lower levels of long-term debt compared to firms in developed economies.

Frydenberg et al. (2011) argues that institutional differences such as governance quality, financial system sophistication, and creditor protection influence capital structure decisions internationally. Therefore, findings from developed economies may not fully explain financing behavior in emerging markets characterized by weak governance systems and underdeveloped financial markets.

2.6 Capital structure and corporate governance in Bangladesh

The corporate sector in Bangladesh is largely characterized by concentrated ownership and family dominance, which creates a governance environment substantially different from that of developed economies. A significant proportion of listed non-financial firms are controlled by sponsor families who maintain strong influence over both boards and managerial decisions Sobhan and Werner (2003). Because ownership and management are often closely connected, external monitoring mechanisms such as independent directors, financial analysts, and financial media remain relatively weak in practice Rashid (2016). This concentrated ownership structure increases the possibility that controlling shareholders prioritize personal or family interests over the interests of minority shareholders Chen and Young (2010). Weak institutional enforcement, recurring corporate irregularities, and volatility in the stock market also indicate that governance standards in Bangladesh are still evolving Bhowmik and Wang (2019). Existing empirical evidence further suggests that conventional governance mechanisms may not function effectively in Bangladesh, as studies document either weak or insignificant relationships between board independence and firm performance (Rashid et al., 2010; Rashid et al., 2012; Rashid, 2018).

The governance environment has important implications for firms' financing decisions because weak governance structures are often associated with inefficient investment and risky financing behavior (Abor, 2007; Claessens et al., 2002). Recognizing these challenges, the Bangladesh Securities and Exchange Commission (BSEC) gradually strengthened corporate governance regulations by introducing governance guidelines in 2006 and revising them in 2012 with stricter compliance requirements related to board composition, disclosure, and monitoring practices. Prior literature suggests that firms with stronger governance frameworks generally experience higher investor confidence, lower financing costs, and better access to external funds (Claessens et al., 2002; Gompers, 2003). Governance quality is therefore closely connected to capital structure decisions because financing choices are influenced not only by firm-specific economic factors but also by the extent of managerial monitoring and shareholder protection (Abor, 2007; Graham and Harvey, 2001) In addition, Bangladesh's bank-centered financial system and underdeveloped capital market increase firms' dependence on debt financing, particularly bank borrowing. Although debt itself may reduce managerial opportunism by imposing external monitoring and repayment obligations (Harris and Raviv, 1991), concentrated ownership structures can simultaneously intensify conflicts between

controlling and minority shareholders. For this reason, recent studies emphasize the need to examine how governance structures interact with financing decisions in emerging economies such as Bangladesh (Haque et al., 2011; Bhowmik and Wang, 2018).

2.7 Research gap and position of the study

The existing literature reveals several important gaps. First, most studies on capital structure and corporate governance are concentrated in developed economies characterized by dispersed ownership structures, developed capital markets, and strong investor protection. Consequently, the applicability of these findings to emerging economies such as Bangladesh remains uncertain. Second, prior studies on Bangladesh mainly focus on traditional firm-specific determinants of leverage or on the relationship between governance and firm performance. Limited attention has been given to examining how governance variables influence firms' capital structure decisions. Third, the dynamic aspect of capital structure adjustment remains largely unexplored in Bangladesh. Existing studies rarely examine whether Bangladeshi firms adjust toward target leverage ratios or how governance mechanisms influence the speed of adjustment. Finally, limited empirical evidence exists regarding how concentrated family ownership, weak governance practices, and dependence on bank-based financing jointly influence firms' leverage decisions in Bangladesh.

This study positions itself within the growing governance-based capital structure literature by examining whether corporate governance variables explain financing decisions beyond traditional firm-specific determinants. Specifically, the study investigates the impact of ownership structure, board characteristics, and institutional ownership on the capital structure of manufacturing companies listed on the Dhaka Stock Exchange during 2012–2021. Therefore, the study contributes to the literature by integrating agency theory, corporate governance, and capital structure dynamics within the context of Bangladesh.

3. Data and Methods

3.1 Data

This study uses an unbalanced panel dataset of manufacturing companies listed on the Dhaka Stock Exchange (DSE) during the period 2012–2021. The manufacturing sector was selected because it constitutes one of the largest segments of the Bangladeshi capital market and depends heavily on external financing for investment and operational activities. To enhance the representativeness of the sample, firms were selected from all major manufacturing sub-sectors listed on the DSE, including textiles, engineering, pharmaceuticals and chemicals, food and allied, cement, ceramics, paper and printing, jute, tannery, and fuel and power. Financial firms, such as banks, insurance companies, and other financial institutions, were excluded because their financing decisions and capital structures are governed by industry-specific regulations and are not directly comparable with those of non-financial firms.

The study relies entirely on secondary data collected from firms' audited annual reports, financial statements, and publications of the Dhaka Stock Exchange. Information relating to corporate governance variables, including board characteristics, ownership

structure, and institutional ownership, was obtained primarily from the corporate governance disclosure sections of annual reports, with additional information collected from company websites and regulatory disclosures where necessary. The use of panel data allows the study to capture both firm-specific heterogeneity and changes in financing behaviour over time, thereby improving the reliability of the empirical analysis.

The sample period covers 2012–2021. The starting year, 2012, was selected because the Bangladesh Securities and Exchange Commission (BSEC) substantially revised its corporate governance guidelines in that year following the initial introduction of the governance code in 2006. Accordingly, the sample reflects the post-reform corporate governance environment in Bangladesh. The ending year, 2021, represents the latest year for which complete audited financial statements and corporate governance information were publicly available at the time of data collection.

Although the DSE included a substantially larger number of manufacturing companies during the sample period, the final sample comprises 26 firms after applying the sample selection criteria. The relatively small sample size is primarily attributable to data availability rather than sample selection bias. A considerable number of listed manufacturing firms did not provide complete and consistent corporate governance disclosures throughout the study period, while many firms classified under the DSE's Z category failed to hold Annual General Meetings (AGMs) regularly or publish complete annual reports, resulting in substantial missing governance information. Firms with incomplete financial or governance data were therefore excluded to ensure consistency and reliability of the panel dataset. Despite these exclusions, the final sample includes firms from all major manufacturing sub-sectors of the DSE, providing broad representation of the manufacturing sector and enabling meaningful analysis of the relationship between corporate governance and capital structure.

3.2 Variables

This study uses both traditional firm-specific variables and corporate governance variables to examine the determinants of capital structure of manufacturing firms listed on the Dhaka Stock Exchange. The selection of explanatory variables is based on prior capital structure literature, including Rajan and Zingales (1995), Lemmon et al. (2008), Frank and Goyal (2009), Titman and Wessels (1988), and Mackay and Phillips (2005). Book leverage is used as a proxy for firms' capital structure decisions which is measured as total debt divided by total assets.Total debt is the sum of short-term and long-term debt.

Consistent with prior studies, firm size is measured as the natural logarithm of sales, while profitability is measured as operating income before depreciation divided by total assets. Asset tangibility is measured as the ratio of net property, plant, and equipment to total assets because tangible assets can serve as collateral against debt financing. Growth opportunities are proxied by the market-to-book ratio, measured as the market value of equity plus total debt divided by total assets. Firms with higher growth opportunities are expected to use less debt because of higher agency costs, financial distress costs, and information asymmetry problems (Bhowmik and Wang, 2018). Cash flow volatility is measured as the standard deviation of operating income

over the previous three years and reflects firms' earnings instability and financial distress risk. Firm age is measured as the natural logarithm of the number of years since incorporation.

In addition to firm-specific variables, the study incorporates several corporate governance variables. Board independence is measured as the percentage of independent directors on the board. Independent directors are expected to reduce information asymmetry and improve monitoring quality, thereby facilitating greater access to debt financing. Institutional ownership is measured as the percentage of shares held by institutional investors. Since institutional investors have stronger monitoring incentives, firms with higher institutional ownership are expected to rely more on debt financing. Ownership concentration is measured as the percentage of shares held by controlling shareholders or blockholders. Concentrated owners are expected to prefer debt financing because debt allows them to avoid ownership dilution while maintaining control over the firm. Finally, industry dummy variables based on the Dhaka Stock Exchange industry classification are included to control for industry-specific effects on leverage decisions.

Table 1 Definition and measurement of variables

Variable	Measurement	Expected Relationship with Leverage
Book Leverage	Total Debt / Total Assets	Dependent Variable
Short Term Leverage	STD/TA	Dependent Variable
Long Term Leverage	LTD/TA	Dependent Variable
Firm Size	Natural logarithm of sales	Positive
Profitability	Operating income before depreciation / Total Assets	Negative
Tangibility	Net Property, Plant & Equipment / Total Assets	Positive
Market-to-Book Ratio	(Market Value of Equity + Total Debt) / Total Assets	Negative
Cash Flow Volatility	Standard deviation of operating income over previous 3 years	Negative
Firm Age	Natural logarithm of years since incorporation	Positive
Board Independence	Percentage of independent directors on the board	Positive
Board Size	Number of directors on the board	Positive
Institutional Ownership	Percentage of shares held by institutional investors	Positive
Sponsor Ownership	Percentage of shares held by sponsors	Positive

Source: Own research.

3.3 Methods

This study examines the determinants of capital structure of manufacturing companies listed on the Dhaka Stock Exchange during the period 2012–2021 using panel data regression techniques. The empirical analysis focuses on the relationship between leverage and both firm-specific characteristics and corporate governance variables. Following prior capital structure literature, including Titman and Wessels (1988), Rajan and Zingales (1995), Lemmon et al. (2008), Frank and Goyal (2009), and Mackay and Phillips (2005), the study estimates leverage models using panel ordinary least squares (OLS) regression with year fixed effects. Corporate governance variables are incorporated into the empirical specification to examine whether governance mechanisms explain firms' financing behavior beyond traditional determinants.

To examine the determinants of leverage, the following baseline regression model is estimated:

$$Leverage_{it} = \alpha + \beta X_{it-1} + \nu_t + \varepsilon_{it} \quad \text{(i)}$$

Where is the constant, X represents 1-year lagged control variables,is the time-fixed ε_{it} effect, is the random error term assumed to be possibly heteroskedastic and correlated within firms, *i* indexes' firms and *t* indexes year respectively. β is the coefficient of control variables. Controls variables used in this study are motivated by Rajan and Zingales (1995), Lemmon et al. (2008), and Frank and Goyal (2009). In addition to time varying firm specific variables, we used measures of corporate governance as control variables.

Three alternative measures of leverage are used as dependent variables: total book leverage, short-term debt ratio, and long-term debt ratio. Total leverage is measured as total debt divided by total assets, while short-term and long-term leverage are measured separately to capture differences in firms' debt maturity structures. This distinction is particularly important in Bangladesh because firms rely heavily on short-term bank borrowing due to underdeveloped bond and equity markets. The explanatory variables include firm size, profitability, tangibility, market-to-book ratio, cash flow volatility, age, ownership concentration, institutional ownership, board size, and board independence. Industry dummy variables based on the Dhaka Stock Exchange industrial classification are included to control for industry-specific leverage behavior.

The study first presents descriptive statistics to summarize the distributional characteristics of the variables used in the analysis. Correlation analysis is then conducted to examine the relationships among explanatory variables and identify potential multicollinearity problems. Finally, panel regression models are estimated using robust standard errors clustered at the firm level to correct for heteroskedasticity and within-firm error correlation. The regression coefficients indicate the percentage change in leverage associated with a one-unit change in the explanatory variables.

Potential endogeneity may arise because firms' financing decisions and firm characteristics are jointly determined. To mitigate possible reverse causality and simultaneity bias, all explanatory variables are measured using one-year lagged values in the regression model. By relating current leverage to lagged firm-specific and corporate governance characteristics,

the empirical specification establishes the temporal ordering between the explanatory variables and the dependent variable, thereby reducing concerns that current financing decisions influence the explanatory variables. Although this approach does not completely eliminate all sources of endogeneity, it is widely employed in the corporate finance literature to improve the reliability of panel data estimates.

4. Empirical Findings

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics of the variables used in the study for manufacturing companies listed on the Dhaka Stock Exchange during the period 2012–2021. The table reports the mean, standard deviation, minimum value, and maximum value of the variables included in the empirical analysis. The sample consists of 219 firm-year observations.

The average book leverage ratio is 23.95%, indicating that approximately one-fourth of the assets of Bangladeshi manufacturing firms are financed through debt. The leverage ratio varies substantially across firms, with values ranging from almost zero to 62.16%, suggesting significant differences in financing policies among firms. The mean short-term debt ratio is 8.20%, whereas the mean long-term debt ratio is comparatively higher, indicating the importance of debt financing in the capital structure of Bangladeshi firms. The large standard deviation of long-term debt suggests considerable variation in long-term borrowing practices across companies.

The average firm size, measured by the natural logarithm of sales, is 21.67, with relatively moderate variation among firms. The mean market-to-book ratio of 2.14 indicates that the market value of firms is, on average, more than twice their book value, suggesting positive growth expectations and future investment opportunities. However, the wide dispersion in market-to-book ratios reflects substantial heterogeneity in firms' growth prospects. Profitability averages 10.88%, although some firms experience losses as reflected by the negative minimum value. Tangibility has an average value of 42.08%, implying that a substantial proportion of firms' assets consist of fixed assets that may serve as collateral against debt financing.

The average industry median leverage ratio is 22.50%, indicating that firms within the same industry tend to maintain similar leverage structures. Cash flow volatility is relatively low on average, although the maximum value indicates that some firms experience highly unstable earnings. The average firm age is approximately 29 years, suggesting that most listed manufacturing firms in Bangladesh are relatively mature and established companies.

The ownership structure of Bangladeshi firms appears to be highly concentrated. Insider ownership averages 41.29%, with some firms having insider ownership as high as 75%, reflecting the dominance of controlling shareholders and family ownership in Bangladeshi listed firms. Institutional ownership averages 17.05%, indicating relatively limited participation by institutional investors in the ownership structure of firms. The average board consists of approximately seven directors, while the average number of independent directors is only two. This relatively low number of independent directors suggests that boards in Bangladeshi firms may not be strongly independent, which is

consistent with prior evidence regarding weak corporate governance practices in emerging economies such as Bangladesh.

Table 2: Descriptive Statistics

Variable	Mean	SD	Min	Max
Book Leverage	0.2395	0.1718	0.00	0.62
Short term debt	0.0820	0.1179	0.00	1.00
Long term debt	0.4685	3.1507	0.00	35.45
Log (sales)	21.6671	1.7485	16.9695	24.96
Market-to-book	2.1403	2.0178	0.0454	9.12
Profitability	0.1088	0.0787	-0.0458	0.45
Tangibility	0.4208	0.1922	0.0492	0.83
Industry median leverage	0.2250	0.0672	0.09	0.29
Cash Flow Volatility	0.034	0.1253	0.00	1.60
Age	29.1735	12.5492	7.00	67.00
Insider ownership	41.2877	17.2038	7.85	75.25
Institutional ownership	17.052	10.3519	4.26	40.75
Board size	6.6900	2.3200	4.00	15.00
Independent directors	1.9086	0.5673	1.00	3.00
Observations	229			

Source: Own research.

4.2 Correlation Analysis

Table 3 presents the correlation matrix among the variables used in the regression analysis. The correlation coefficients generally show relationships consistent with existing capital structure theories and prior empirical studies. Firm size, industry median leverage, firm age, insider ownership, institutional ownership, and board size are positively associated with leverage, while profitability, tangibility, market-to-book ratio, cash flow volatility, and independent directors exhibit negative relationships with leverage.

The positive relationship between firm size and leverage is consistent with the trade-off theory, which suggests that larger firms have lower bankruptcy risk and easier access to external financing. Profitability is negatively related to leverage, supporting the pecking order theory that profitable firms prefer internal financing over debt financing. The negative relationship between market-to-book ratio and leverage suggests that firms with high growth opportunities prefer to maintain financial flexibility and therefore rely less on debt financing.

Interestingly, tangibility is negatively associated with leverage, which is inconsistent with the traditional trade-off theory. This finding may indicate that firms with higher fixed assets rely more on retained earnings and less on external debt financing. Corporate governance variables such as insider ownership, institutional

ownership, and board size exhibit positive relationships with leverage, implying that stronger monitoring mechanisms may encourage debt financing. However, independent directors are negatively associated with leverage, suggesting that firms with more independent boards tend to adopt more conservative financing policies.

The correlation matrix also indicates that the correlations among explanatory variables are generally moderate, suggesting that multicollinearity is unlikely to pose a serious problem in the regression analysis.

Table 3 Correlation among variables

		1	2	3	4	5	6	7	8	9	10	11	12
1	Book Leverage	1											
2	Log(sales)	0.04	1										
3	Market-to-book	-0.19	0.11	1									
4	Profitability	-0.25	0.49	0.52	1								
5	Tangibility	-0.23	-0.13	-0.17	-0.18	1							
6	Industry med. Leverage	0.17	0.14	-0.12	-0.06	0.23	1						
7	Volatility	-0.21	0.04	0.34	0.16	0	-0.17	1					
8	Age	0.35	0.22	-0.13	-0.22	-0.92	0.12	-0.16	1				
9	Sponsor	0.22	0.14	0.08	0.14	-0.05	0.32	-0.12	0.1	1			
10	Institution	0.16	0.56	-0.09	0.14	0	0.35	0	0.25	-0.16	1		
11	Board size	0.04	0.32	-0.09	0	0.13	0.03	-0.06	0.36	0.41	0.23	1	
12	Inde. Director	-0.01	0.33	-0.19	-0.04	0.27	0.43	-0.09	0.23	0.29	0.51	0.72	1

Source: Own research.

4.3 Panel Regression Analysis

4.3.1 Model Selection: Fixed Effects Versus Random Effects

To determine the appropriate panel data estimation technique, the Hausman specification test was conducted to compare the fixed-effects (FE) and random-effects (RE) estimators (Appendix A). The null hypothesis of the Hausman test states that the random-effects estimator is consistent and efficient because the unobserved firm-specific effects are not systematically correlated with the explanatory variables.

The Hausman test produced a chi-square statistic of 6.20 with 8 degrees of freedom and a p-value of 0.6246. Since the p-value exceeds the conventional 5% significance level, the null hypothesis cannot be rejected. This indicates that the differences between the fixed-effects and random-effects estimates are not statistically significant, suggesting that the random-effects estimator is both consistent and more efficient. Accordingly, the study employs the random-effects model for estimating the relationship between capital structure and its determinants.

4.3.2 Multicollinearity Diagnostics

To examine the presence of multicollinearity among the explanatory variables, Variance Inflation Factors (VIFs) were calculated (Appendix B). As reported in Table X, the VIF values range from 1.28 to 4.24, with a mean VIF of 2.32. Since all VIF values are well below the

commonly accepted threshold of 10 (and below the more conservative threshold of 5), multicollinearity is not considered a serious concern. These results indicate that the explanatory variables are not highly correlated and that the estimated regression coefficients are unlikely to be distorted by multicollinearity.

4.3.3 Regression Results

Table 4 presents the panel regression results examining the impact of firm-specific and corporate governance variables on leverage. The models are estimated using panel OLS regression with year fixed effects and robust standard errors clustered at the firm level. The analysis is conducted separately for total leverage, short-term debt ratio, and long-term debt ratio.

Firm-Specific Determinants

The regression results show that firm size has a positive and statistically significant relationship with leverage. Larger firms tend to use more debt financing because they face lower information asymmetry and lower expected bankruptcy costs (Rajan and Zingales, 1995; Frank and Goyal, 2009). This finding is consistent with the trade-off theory and prior studies such as Rajan and Zingales (1995) and Frank and Goyal (2009). The result also reflects the easier access of large firms to bank financing in Bangladesh.

Profitability is negatively and significantly associated with leverage, supporting the pecking order theory. Profitable firms rely more on internally generated funds and therefore demand less external debt financing. This finding is consistent with Myers and Majluf (1984). and previous evidence from emerging markets. The result also suggests that less profitable firms are more dependent on external borrowing because of insufficient internal cash flows.

The market-to-book ratio exhibits a positive and statistically significant relationship with leverage, which is inconsistent with the traditional trade-off and pecking order theories. The positive relationship suggests that high-growth firms in Bangladesh may rely more on debt financing because of limited access to equity markets and underdeveloped capital markets. Since Bangladeshi firms primarily depend on bank financing rather than market-based financing, firms with strong growth opportunities may increase leverage when internal financing becomes insufficient.

Tangibility is negatively associated with leverage, contrary to the trade-off theory. Although tangible assets are generally expected to facilitate borrowing by serving as collateral, the negative relationship may indicate that firms with high fixed assets possess stronger internal financing capacity and therefore rely less on debt financing. Another possible explanation is that banks in Bangladesh often lend based on firm reputation and business relationships rather than collateral value alone.

Cash flow volatility has a negative but statistically insignificant relationship with leverage. This finding suggests that firms with unstable earnings tend to avoid debt financing because of higher bankruptcy risk, although volatility does not appear to be a major determinant of leverage for Bangladeshi firms.

Finally, firm age is positively and significantly associated with leverage, indicating that mature firms rely more on debt financing than younger firms. Older firms generally possess stronger

reputations, longer relationships with creditors, and greater access to external financing markets. The result also suggests that debt may serve as a disciplinary mechanism for mature firms where agency problems are more severe.

Corporate Governance and Leverage

The regression results reveal several important relationships between corporate governance variables and leverage decisions. Independent directors are negatively and significantly associated with leverage, indicating that firms with more independent boards tend to adopt more conservative capital structures. This finding differs .from evidence reported in many developed economies where board independence is associated with stronger monitoring and greater access to debt financing. One possible explanation is that independent directors in Bangladesh may be more risk-averse and therefore prefer lower leverage to reduce financial distress risk. Another explanation is that independent directors in Bangladeshi firms may not function fully independently because many are socially connected to controlling families.

Board size exhibits a positive relationship with leverage, particularly long-term debt financing. Larger boards may improve monitoring quality and facilitate access to external financing by enhancing firms' credibility with lenders. This finding supports the argument that larger boards possess broader expertise and stronger advisory capabilities.

Institutional ownership has a positive but statistically insignificant relationship with leverage. Although institutional investors are expected to improve monitoring and support debt financing, their relatively limited presence in Bangladeshi firms may weaken their influence on financing decisions.

Family ownership, proxied by sponsor ownership, significantly influences debt maturity structure. Sponsor ownership is positively associated with short-term debt but negatively associated with long-term debt. This finding suggests that family-controlled firms prefer short-term borrowing while avoiding long-term debt obligations. Family firms may avoid long-term debt to maintain flexibility, reduce external monitoring, and preserve control over corporate decisions.

Table 4 Regression results for firm specific and governance factors

Variables	Book Leverage TD/TA	STD/TA	LTD/TA
Log(sales)	0.013 (1.78) *	0.0110 (1.91) **	0.0020 (0.69)
Market-to-book	0.0044 (3.67) ***	-0.0009 (-0.99)	0.0053 (10.82) ***
Profitability	-0.8975 (-4.24) ***	-0.7971 (-4.64) ***	-0.1693 (-1.90) **
Tangibility	-0.2202 (-2.94) ***	-0.1286 (-2.08) ***	-.0618 (-1.92) **

Cash flow volatility	-0.0621 (-0.42)	0.0157 (0.13)	-0.0858 (-1.39)
Industry Median Leverage	0.9434 (3.38) ***	0.2361 (1.04)	0.6190 (5.27) ***
Age	0.0032 (2.52) ***	0.0027 (2.69) ***	0.0000 (0.09)
Sponsor	0.0004 (0.43)	0.0023 (2.76) ***	-.0013 (-3.07) ***
Institution	0.002 (1.22)	0.0027 (1.74) *	-0.0003 (-0.37)
Independent director	-0.1147 (-2.60) ***	-0.1170 (-2.98) ***	-0.0264 (-1.29)
Board Size	0.0185 (1.66) *	0.0026 (0.33)	0.0153 (3.44) ***
Year fixed effects	Yes	Yes	Yes
R^2	0.3472	0.2877	0.6433
Adj. R^2	0.2896	0.2312	0.6021
Observations	219	219	219

Source: Own research. Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

5. Discussion

The findings demonstrate that both traditional firm-specific characteristics and corporate governance mechanisms influence the capital structure decisions of Bangladeshi manufacturing firms. Overall, the results suggest that financing decisions are shaped by the country's institutional environment, characterized by concentrated ownership, relatively weak governance practices, and dependence on bank-based financing. This supports the view that governance-related factors provide additional explanatory power beyond conventional capital structure determinants in emerging economies.

Among the firm-specific variables, industry median leverage exerts the strongest influence on firms' financing decisions, indicating that firms tend to follow industry financing norms. This finding is consistent with the trade-off theory and with Frank and Goyal (2009), who argue that firms use industry leverage as a benchmark when determining their capital structures. In Bangladesh, where relationship-based bank lending dominates, industry practices may play an even greater role because lenders often evaluate firms relative to their industry peers.

Firm size is positively associated with leverage, consistent with the trade-off theory and previous studies by Rajan and Zingales (1995), Friend and Lang (1988), Delcoure (2007), and De Haas and Peeters (2006). Larger firms generally experience lower information asymmetry, lower expected bankruptcy costs, and stronger relationships with creditors, enabling easier access to external debt. Similarly,

firm age is positively related to leverage, supporting Hovakimian and Li (2009), De Haas and Peeters (2006), Sundaresan et al. (2015), and Jõeveer (2006), although contradicting DeAngelo and Roll (2015). Mature firms possess stronger reputations and longer relationships with creditors, which reduce borrowing costs and improve access to debt financing.

Profitability is negatively related to leverage, providing strong support for the pecking order theory proposed by Myers and Majluf (1984). This finding is also consistent with Rajan and Zingales (1995), De Haas and Peeters (2006), and Haque et al. (2011), suggesting that profitable firms rely primarily on internally generated funds rather than external borrowing. In contrast, the positive association between market-to-book ratio and leverage contradicts the traditional trade-off and market timing theories but is consistent with Chen and Zhao (2006) and Berger et al. (1997). This result suggests that firms with greater growth opportunities rely more heavily on bank borrowing because equity financing remains limited in Bangladesh. Tangibility also exhibits a negative relationship with leverage, contrary to the trade-off theory but similar to the findings of De Haas and Peeters (2006) and Jõeveer (2006). This may reflect the fact that lending decisions in Bangladesh depend more on business reputation and banking relationships than on collateral value. Cash flow volatility is negatively associated with leverage, although the relationship is statistically insignificant, implying that earnings instability is not a major determinant of financing decisions in the Bangladeshi context.

The governance variables provide additional insights into firms' financing behaviour. Independent directors are negatively associated with leverage, indicating that firms with more independent boards adopt more conservative financing policies. This finding contrasts with evidence from developed economies, such as Alves et al. (2015), where board independence is generally associated with greater use of debt, but is consistent with Rashid (2018). The result may reflect the limited effectiveness of independent directors in Bangladesh, where boards are often dominated by controlling families and independent directors may lack genuine independence. Moreover, the relatively small number of independent directors compared with governance standards in developed countries (Brennan, 2006; Dalton and Daily, 1999) may further limit their monitoring effectiveness.

Board size is positively related to leverage, particularly long-term debt, supporting the agency theory perspective and the findings of Kiel and Nicholson (2003) that larger boards provide broader expertise and greater credibility with creditors. Institutional ownership is positively related to leverage but remains statistically insignificant, suggesting that institutional investors have only a limited monitoring role in Bangladesh. Similarly, ownership concentration exhibits a positive but insignificant relationship with leverage, implying that although concentrated owners may prefer debt to avoid ownership dilution, they may also avoid excessive leverage to preserve private benefits and reduce creditor monitoring. Family-controlled firms, however, rely

more heavily on short-term debt while avoiding long-term borrowing, indicating a preference for maintaining financial flexibility and control. This pattern is consistent with the characteristics of Bangladesh's bank-dominated financial system, where short-term bank financing remains the dominant external funding source.

Overall, the findings indicate that conventional capital structure theories explain several financing decisions of Bangladeshi firms, particularly those relating to firm size, profitability, and age. However, the governance results suggest that institutional characteristics significantly shape financing behaviour. The negative effect of board independence and the preference of family-controlled firms for short-term debt highlight how concentrated ownership, weak shareholder protection, and dependence on bank financing influence capital structure decisions in Bangladesh. These findings reinforce the importance of incorporating country-specific governance and institutional factors when applying conventional capital structure theories to emerging economies.

6. Conclusions

This study examines the determinants of capital structure of manufacturing firms listed on the Dhaka Stock Exchange during the period 2012–2021 by integrating traditional firm-specific variables with corporate governance variables. The findings suggest that both conventional determinants and governance-related factors significantly influence firms' financing decisions in Bangladesh. Among the firm-specific variables, industry median leverage, firm size, and firm age exhibit positive relationships with leverage, while profitability and tangibility are negatively associated with leverage. The positive relationship between growth opportunities and leverage indicates that high-growth firms in Bangladesh rely heavily on debt financing because of limited access to equity markets and underdeveloped capital markets.

The study also provides important evidence regarding the role of corporate governance in explaining leverage decisions. Independent directors are negatively associated with leverage, suggesting that firms with more independent boards adopt more conservative financing policies. This finding differs from evidence reported in developed economies and highlights the institutional differences between developed and emerging markets. Ownership concentration and institutional ownership show positive but statistically insignificant relationships with leverage, while family-controlled firms rely more on short-term debt and avoid long-term borrowing. These findings indicate that governance mechanisms in Bangladesh operate within a unique institutional environment characterized by concentrated ownership, weak shareholder protection, and bank-based financing.

The study has several important implications. First, the findings suggest that capital structure theories developed in advanced economies cannot be directly generalized to emerging markets without considering institutional characteristics. Second, policymakers and regulators

should strengthen the effectiveness of corporate governance mechanisms, particularly the independence and monitoring role of boards, to improve financing efficiency and protect minority shareholders. Third, the results indicate the need for developing long-term financing alternatives, including bond markets and equity markets, to reduce excessive dependence on short-term bank borrowing. The findings may also assist managers, investors, and financial institutions in understanding how governance structures influence financing behavior in Bangladesh.

Despite its contributions, the study has several limitations. First, the analysis is limited to manufacturing firms listed on the Dhaka Stock Exchange, and the final sample consists of 26 firms. Although the sample includes firms from all major manufacturing sub-sectors and provides broad sectoral representation, the relatively small sample size reflects the limited availability of complete corporate governance disclosures and the exclusion of firms with incomplete financial information or irregular reporting. Consequently, the findings should be interpreted with caution and may not be fully generalizable to other sectors or unlisted firms in Bangladesh. Second, although the study employs one-year lagged explanatory variables to mitigate potential endogeneity arising from reverse causality and simultaneity, this approach cannot completely eliminate all sources of endogeneity, such as omitted variable bias or unobserved firm-specific factors. Future studies may therefore employ larger datasets and more advanced econometric techniques, such as dynamic panel estimators (e.g., system GMM), to further address endogeneity concerns and examine the dynamic adjustment of capital structure. Finally, the study relies primarily on publicly available corporate governance disclosures, which may not fully capture informal governance practices, political connections, or other institutional factors that influence financing decisions in emerging economies. Future research may extend the analysis by incorporating non-listed firms, conducting cross-country comparisons among emerging economies, and examining the roles of political connections, family succession, board networks, and macroeconomic conditions in shaping firms' capital structure decisions.

Appendix A. Model Selection: Hausman Specification Test

Test	Chi-square (χ^2)	df	p-value	Decision
Hausman Specification Test	6.20	8	0.6246	Fail to reject H_0; Random-effects model preferred

Note: The null hypothesis states that the random-effects estimator is consistent and efficient because the individual-specific effects are not correlated with the explanatory variables. Since the p-value (0.6246) exceeds the 5% significance level, the null hypothesis cannot be rejected. Therefore, the random-effects model is adopted for the empirical analysis.

Appendix B. Variance Inflation Factor (VIF) Test for Multicollinearity

Variable	VIF	Tolerance (1/VIF)
Independent Directors	4.24	0.236
Board Size	3.57	0.280
Market-to-Book Ratio	2.70	0.370
Cash Flow Volatility	2.66	0.376
Institutional Ownership	2.33	0.429
Industry Median Leverage	2.06	0.486
Sponsor Ownership	1.97	0.507
Profitability	1.65	0.605
Firm Size (Log Sales)	1.59	0.628
Firm Age	1.42	0.706
Tangibility	1.28	0.780
Mean VIF	**2.32**	

Note: Variance Inflation Factors (VIFs) were computed to assess multicollinearity among the explanatory variables. All VIF values are below the commonly accepted threshold of 10 and the more conservative threshold of 5, with a mean VIF of 2.32. These results indicate that multicollinearity is not a serious concern in the estimated regression models.

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