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Macroeconomic shocks and capital structure dynamics: Evidence from Mongolia

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Abstract

This study investigates how macroeconomic factors shape corporate capital structure decisions in Mongolia across different economic phases, pre-COVID, COVID-19, and post-crisis recovery. Using a balanced panel of 907 firm-year observations from 91 non-financial companies listed on the Mongolian Stock Exchange between 2015 and 2024, the research applies the System Generalized Method of Moments (System GMM) to address endogeneity in dynamic leverage behavior. The analysis incorporates firm-specific, macroeconomic, and capital-market variables to capture both internal and external determinants of leverage. The findings indicate that leverage persistence intensified during the pandemic, while profitability, liquidity, and short-term liabilities became dominant determinants under heightened uncertainty. GDP growth positively affected leverage, inflation had a negative influence, and unemployment showed a strong positive association, reflecting firms' increased reliance on debt during downturns. Capital market development contributed to financing stability during the recovery phase. The pandemic reshaped Mongolian firms' capital structure, underscoring financial strength, flexibility, and macroeconomic stability as key elements of resilience. Strengthening capital-market infrastructure, diversifying financing beyond bank credit, and adopting counter-cyclical policies are crucial to sustain liquidity and mitigate systemic risks. Further, the results guide managers and investors in designing adaptive, evidence-based, and risk-aware financing strategies suited to volatile emerging economies.

Keywords: Capital structure, COVID-19 pandemic, Financial leverage, Macroeconomic factors, Mongolia, System GMM.

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1. Introduction

One of the fundamental issues in modern corporate financial management is the optimal management of financing sources, which necessitates assessing and evaluating the impact of both internal and external influencing factors. The COVID-19 pandemic brought about unprecedented challenges to global economic structures, corporate financial management, and particularly to capital structure decision-making. Due to the pandemic, companies faced supply chain disruptions, abrupt demand fluctuations, and market uncertainty, compelling them to review and adjust their financial strategies. This situation creates a need to reexamine capital structure theories and to deeply study the transformations in financial management during crises.

Managing financing sources by determining the optimal ratio of equity and debt used in financial operations and investment financing can enhance a company's financial stability, creditworthiness, and value, thus achieving business goals more efficiently. As a result of using financing sources, a company's capital structure, which is defined by the ratio of debt to equity, becomes a key component of strategic decision-making as it directly affects the cost of capital, risk tolerance, market value, and investor confidence [1].

This decision-making process, as acknowledged in international research, is influenced not only by internal factors but also by macroeconomic conditions and external environmental changes [2, 3]. In other words, both internal factors (such as profitability, firm size, and tax environment) and macroeconomic variables (such as inflation, interest rates, GDP, exchange rates, and unemployment) are crucial in determining capital structure strategies. Thus, capital structure theories (Trade-off theory, Pecking Order theory, Market Timing theory, Agency theory) emphasize that firms choose their financing structures based on information from both internal and external environments. These theories explain why firms choose specific structures, but their application is closely tied to a country's macroeconomic conditions. There are several theories that explain the advantages and decision-making of firms depending on their financing choices. Most modern studies rely on the scientific foundation provided by the core theories of capital structure, namely the Pecking Order Theory and the Trade-off Theory.

Internal factors (such as profitability, firm size, asset structure, growth opportunities, and tax benefits) reflect the business condition of the firm, while external factors reflect the overall market conditions and include variables such as inflation, policy interest rates, economic growth, exchange rates, and unemployment [2, 4]. This study, by applying a modern advanced methodology to scientifically explain the factors influencing capital structure decisions and the impact of economic cycles, contributes to the deeper academic investigation of this critical issue. Until today, there has been a notable lack of comprehensive empirical studies in this field, particularly concerning Mongolian firms.

For Mongolia, which is highly dependent on the export of a few mineral commodities and sensitive to external market shocks, such circumstances provide a unique environment to study the dynamic changes in capital structure. Since transitioning from a centrally planned economy in the 1990s to a market economy, Mongolia's financial system structure, capital flows, and corporate financing strategies have undergone fundamental changes. Although the shift to a market economy has introduced new financing sources such as capital markets, commercial bank loans, and foreign direct investment, companies remain heavily dependent on bank loans characterized by high interest rates and short maturities. This situation is associated with institutional factors such as underdeveloped securities markets, an almost nonexistent secondary market, and limited information transparency [5].

In the early years of this transition, several phased measures were implemented, including the privatization of state-owned enterprises, the transition to a free pricing system based on supply and demand, banking system reforms, and support for private enterprises. Nevertheless, the capital market infrastructure, loan accessibility, and financial management capacity remain weak. Although the Mongolian Stock Exchange began active trading in 1995 (including the establishment of a secondary market), the pace of development has been slow. The underdevelopment of the secondary market for stocks and bonds has led to a company financing structure heavily reliant on bank loans. To this day, Mongolian companies exhibit capital structures with high debt dependency, limited equity financing, and heightened sensitivity to market fluctuations. Despite rapid economic growth since the mid-2000s, driven by foreign investment and mining, this growth has been unstable. Specifically, the 2009 global financial crisis, the 2020 COVID-19 pandemic, long-term currency depreciation, inflation volatility, and persistently high interest rates have continuously exerted pressure on corporate capital structures and financing strategies.

Over the past decade, Mongolia's inflation rate has fluctuated between 1.9% and 16.1%, the exchange rate has depreciated by more than 70% (from 2,000 to 3,500 MNT/USD), and the policy interest rate has ranged between 6% and 13% [6]. These figures demonstrate the structural vulnerabilities of the Mongolian economy. During the pandemic, Mongolia's economy showed extreme fluctuations: GDP shrank by 4.6% in 2020, followed by signs of recovery in the following years. Sharp changes in inflation, unemployment, and policy interest rates underscore the necessity to study how macroeconomic indicators affect corporate financial decisions. Thus, there is reasonable justification to assume that macroeconomic indicators influence corporate financial decisions, particularly financing structure choices. Hence, there is a strong need to conduct dynamic analyses of macroeconomic variables and to quantify their effects on corporate capital structure responses. In Mongolia, no comprehensive and large-scale research in this area has yet been conducted. For instance, most existing studies are limited to internal corporate factors and lack systematic, quantitative modeling of the macroeconomic environment. Many have simply estimated statistical correlations. The Generalized Method of Moments (GMM), widely used internationally to analyze dynamic financial behavior, has not been sufficiently applied in Mongolia's context to explain capital structure decisions. This confirms the lack of empirical, data-driven insights linking capital structure responses to economic conditions.

Moreover, international research has found that developed countries have more market-based tools to manage crises [7] while in developing economies (e.g., China, Indonesia), inflation and exchange rate volatility have dynamic effects on capital structure [8]. In countries like Kazakhstan and Georgia, which have banking-dominated and underdeveloped capital markets like Mongolia, macroeconomic volatility results in short-term debt structures, high borrowing costs, and limited financial flexibility [9]. Based on these findings, we conclude that Mongolia's volatile economic environment necessitates testing capital structure theories using real-world data and methodological rigor. Moreover, such analyses can be immediately useful for domestic firms.

This study presents the first comprehensive examination of factors affecting capital structure decisions during the COVID-19 era in Mongolia and contributes theoretical and empirical foundations for understanding how corporate financing behavior changes under crisis conditions. Using the System GMM method, we investigate how firm characteristics, macroeconomic conditions, and capital market development affected capital structure across three distinct periods (pre-COVID, COVID, and post-COVID recovery).

The main objective of this study is to identify the determinants of capital structure by applying the Dynamic Panel Data Model (System GMM) using panel data from Mongolian companies between 2015 and 2024. The significance of this research lies in its contribution to understanding the dynamic nature of corporate debt structures and the impact of external shocks within the context of Mongolia's business environment. The findings offer important insights for corporate managers making financial decisions, for investors evaluating risk, and for policymakers developing strategies for economic stability and capital market growth. Overall, this study may be of particular interest for several reasons: First, since Mongolia's economy is highly dependent on foreign investment and exports, it provides a real-world example of how external shocks (like COVID) impact local financial systems and response mechanisms. Second, by covering three different economic contexts—pre-crisis, during crisis, and post-crisis—it enables a comparative analysis of how the significance and sensitivity of influencing factors change across periods. Such dynamic studies are rare and can play a vital role in analyzing and mitigating the adverse effects of financial crises on capital structure decisions. Third, the COVID-19 crisis provides an opportunity to investigate how the interplay between internal factors, macroeconomic variables, and capital market development influences capital structure. The findings serve as a foundation for policy recommendations aimed at enhancing crisis-resilient financial strategies and guiding investors to stable and low-risk opportunities.

We structure our paper as follows: Section 1 introduces the study; Section 2 provides a literature review; Section 3 presents the data and econometric methodology; Section 4 discusses variable interactions and empirical results; and Section 5 summarizes the conclusions and offers evaluations.

2. Literature Review

Research on capital structure has developed intensively since the foundational theory introduced by Modigliani and Miller [10] which stated that in a perfect market—with no taxes, agency costs, or information asymmetry—capital structure does not affect firm value. Since then, studies have examined in greater detail the internal and external factors that influence debt-level decisions. The MM theory remains the cornerstone of modern capital structure research. Myers [1] argued that there is no single theory that fully explains corporate leverage, nor is there a need for one. Nonetheless, many researchers have attempted to connect various variables related to capital structure. Several theories of capital structure explain a firm's advantages and decision-making based on financing choices. These theories help define both internal and external determinants of a company's capital structure. Most contemporary research on capital structure rests upon two competing theories that attempt to explain the use of leverage. In line with this, comparative evidence from Jordan and Saudi Arabia shows that while profitability consistently supports higher leverage, liquidity effects diverge across institutional settings, underscoring the context-dependent nature of capital structure determinants.

The Trade-off Theory argues that the inclusion of corporate income taxes introduces a benefit to debt financing. The theory suggests that firms determine optimal capital structure by balancing the benefits of debt (such as tax shields) against the costs of financial distress, agency costs, and other inefficiencies [11]. This theory is based on the idea that the tax advantage of debt is offset by the expected costs of bankruptcy.

The Pecking Order Theory was developed by Myers and Majluf [12] is based on the concept of information asymmetry between investors and managers. It suggests that firms prefer internal financing over external sources. When external financing is necessary, debt is preferred over equity. This theory does not aim for an optimal capital structure but instead starts with the firm's preference for internal funds. Managers tend to choose internal financing first to avoid capital market scrutiny, escape the costs associated with issuing new securities, and pursue the path of least resistance [13]. As a result, the asymmetry of information has evolved into the Signaling Theory, where capital structure choices reflect subjective rather than objective factors due to unequal access to market information by different participants [14]. Managers are believed to prioritize increasing the value of existing shareholders' equity over future shareholders. Hence, if a firm has a promising outlook, its managers will prefer debt over issuing new equity. Conversely, if prospects are poor, issuing new shares, despite their dilution effect, may benefit current shareholders. Consequently, issuing new shares may be perceived by investors as a negative signal, often leading to a decline in stock prices.

While these theories help understand capital structure and identify influencing factors, they do not always account for firm-specific variables. In times of financial crisis, these assumptions may lead to contradictory or ambiguous conclusions. Numerous researchers attempt to clarify the relationship between capital structure and its determinants by identifying consistent patterns and explanatory mechanisms [2, 15-19].

The impact of macroeconomic consequences and underlying causes on capital structure under volatile financial markets and crises has received relatively little attention. However, several studies reached a consensus that economic downturns significantly influence corporate financial behavior [20-23].

Studies on capital structure management have analyzed in detail the determinants of financial decisions. Research consistently highlights the significance of both internal and external factors in determining the debt-to-equity ratio. For internal factors, variables such as profitability [4, 24, 25] firm size [18, 26, 27] liquidity [12, 28, 29] risk [30, 31] and asset tangibility [32, 33] are found to be statistically significant. More profitable firms tend to favor equity financing, while larger and more stable firms have greater access to external financing, a common result across studies.

Additionally, risk and liquidity, as internal factors, play crucial roles in financing decisions. These influence the appropriate debt-to-equity ratio and thereby the overall capital structure. The higher the business or financial risk, the more likely lenders are to demand higher interest rates, prompting firms to avoid debt and lean towards equity [30, 31]. Rajan and Zingales [18] and Bevan and Danbolt [26] observed a negative correlation between leverage and risk. In other words, riskier firms tend to reduce their debt proportion. Within the framework of signaling and pecking order theories. Myers noted that high-risk firms often avoid using debt to prevent sending negative signals to investors [11]. Higher liquidity improves repayment capacity, boosts lender confidence, and increases the likelihood of securing debt financing [28, 34]. Found that firms with more liquid assets tend to hold more short-term debt, suggesting that liquidity enhances flexibility in meeting debt obligations [4].

Regarding external factors, studies addressing macroeconomic variables such as inflation, GDP growth, and market development [35-38] reveal that during crises, firms tend to avoid debt, whereas during stability, debt levels increase. These findings align with theoretical perspectives from Trade-off Theory (statically optimal structure), Pecking Order Theory, and Market Timing Theory. Firms assess stock valuations, interest rates, and market conditions to select appropriate financing strategies. This article uses econometric modeling to examine how these factors influence capital structure during financial crises. Therefore, analyzing leverage in the context of the two traditional theories is justified.

Recent years have seen increased attention to capital structure decisions during crises. Fosberg found that firms reduced debt during the 2008 global crisis to maintain financial flexibility Fosberg [39]. Kahle and Stulz observed that firms with stronger balance sheets were better positioned to seize investment opportunities during crises Kahle and Stulz [40]. Byoun [41] showed that firms adjust their capital structure differently depending on contractionary or expansionary conditions, demonstrating dynamic decision-making tied to economic cycles Byoun [41]. Hanousek, et al. [42] found that firms in emerging European markets significantly reduced leverage during crises due to elevated risks in capital markets and banking systems Hanousek, et al. [42]. Kuhnhausen and Stieber [43] observed that the speed of leverage adjustment slowed during crises, with firms favoring stable strategies Kuhnhausen and Stieber [43]. Moradi and Paulet [44] showed that during the European debt crisis, high-debt and low-profit firms began to limit financing decisions, indicating policy-driven capital structure adjustments [44]. These results confirm that capital structure is not static but changes dynamically with economic cycles, especially during crises.

The COVID-19 pandemic has drawn renewed attention to capital structure research. International studies examined changes in debt levels, financing approaches, and risk management strategies. Gao and Tsusaka [45] found that leverage increased for listed firms in China during COVID-19 Gao and Tsusaka [45]. Fatemi and Fooladi [46] reported similar trends in U.S. firms, highlighting a preference for financial flexibility over optimal structure [46]. Their findings are significant for transition economies, offering empirical insights into the effects of uncertainty on capital structure. During the COVID-19 pandemic, heightened uncertainty was associated with more conservative capital structure policies and lower D/E ratios [47].

For developing countries, institutional environments and macro instability strongly influence capital structure decisions. Fan et al. noted that legal systems, tax policy, and market development significantly impact debt choices [48]. In Mongolia's resource-dependent economy, commodity price fluctuations add further uncertainty, complicating the application of traditional theories. Regarding stock market development, some scholars find a positive correlation between capital structure and financial market growth [38]. Indicators like market capitalization positively influence capital structure [49]. This article applies an econometric model to quantify the effects of financial crises on capital structure, justifying the use of traditional leverage theories to identify these relationships.

3. Data Selection and Research Methodology

3.1. Data Description

The dataset used in this study consists of 907 firm-year observations from 91 companies listed on the Mongolian Stock Exchange (MSE) for the period from 2015 to 2024. This sample accounts for approximately 85% of all actively listed firms during that time, making it a representative and comprehensive reflection of the structure of Mongolia's capital market.
We divided the observation period into three distinct stages based on the timeline of the COVID-19 pandemic:

- Period 1 (2015–2019): Pre-COVID baseline period (455 observations, 91 firms)
- Period 2 (2020–2021): COVID-19 active period (182 observations, 91 firms)
- Period 3 (2022–2024): Post-COVID recovery period (270 observations, 91 firms)

The fact that 91 firms are observed across all three periods ensures the panel data is highly balanced, enabling reliable inter-period comparisons. Macroeconomic data were obtained from publicly available sources of the World Bank.

3.2. Variable Definitions

The variables used in this study, and their definitions and measurement units, are outlined below. In capital structure studies, the leverage ratio is typically used as a dependent variable in multivariate regression models. In this study, financial leverage is defined as the ratio of total debt to total assets (TDTA).

3.2.1. Dependent Variable

- TDTA (Total Debt to Total Assets): The primary measure of financial leverage, calculated as:

$$TDTA = (\text{Short term Debt} + \text{Long term Debt})/\text{Total Assets}$$

Explanatory Variables: The most frequently used explanatory variables in related capital structure research were selected, divided into firm-specific, macroeconomic, and capital market development factors.

3.2.2. Firm-Specific Variables

- GTA (Growth in Total Assets): Annual percentage change in total assets; a proxy for growth opportunities.
- NFATA (Net Fixed Assets to Total Assets): A proxy for collateral value; ratio of tangible fixed assets to total assets.
- ROA (Return on Assets): A profitability measure; ratio of net income to total assets.
- CL (Current Liabilities): Ratio of current liabilities to total assets.
- FR (Financial Risk): A composite indicator of financial health.

3.2.3. Macroeconomic Variables

- GDPG (GDP Growth): Annual real GDP growth rate.
- INFL (Inflation): Consumer price inflation rate.
- UNEMP (Unemployment): National unemployment rate.
- INTEREST: Central bank policy interest rate (Bank of Mongolia).

3.2.4. Capital Market Development Indicator

- SMC (Stock Market Capitalization): Market capitalization as a percentage of GDP.

3.3. Empirical Model

To address potential endogeneity and to capture the dynamic nature of capital structure decisions, we use the System GMM estimator developed by Arellano and Bover [50] and Blundell and Bond [51].

The base model is specified as follows:

$$TDTA_{it} = \alpha + \beta_1 TDTA_{it-1} + \beta_2 GTA_{it} + \beta_3 NFATA_{it} + \beta_4 ROA_{it} + \beta_5 CL_{it} + \beta_6 FR_{it} + \beta_7 MACRO_t + \beta_8 SMC_t + \varepsilon_{it}$$

Where:

$i = firm\ index$

$t = time\ index$

$MACRO_t = vector\ of\ macroeconomic\ variables$

$\varepsilon_{it} = error\ term$

We estimate four model specifications for each period:

Model 1: Firm-specific variables only

Model 2: Firm-specific + macroeconomic variables

Model 3: Firm-specific + capital market development

Model 4: All variables combined

Table 1.
Descriptive Statistics by Period.

Variable	Pre-COVID (2015-2019)	COVID (2020-2021)	Recovery (2022-2024)	Full Sample (2015-2024)	Change (%)
TDTA	0.439	0.466	0.507	0.465	+15.5
GTA	0.575	0.125	0.168	0.364	-70.8
NFATA	0.508	0.473	0.465	0.488	-8.5
ROA	0.013	0.008	0.033	0.018	+153.8
CL	2.154	2.372	3.429	2.577	+59.2
FR	0.725	0.650	0.636	0.684	-12.3
GDPG	0.046	-0.015	0.058	0.037	+26.1
INFL	0.046	0.083	0.100	0.070	+117.4
UNEMP	0.066	0.072	0.057	0.065	-13.6
INTEREST	0.124	0.063	0.117	0.109	-5.6
SMC	0.071	0.110	0.150	0.102	+111.3

4. Empirical Results

4.1. Descriptive Statistics

Table 1 presents descriptive statistics for the three sub-periods, showing noticeable changes in firms' financial conditions and macroeconomic indicators.

The estimation results reveal several key trends likely to influence capital structure decisions:

First, the total debt to total assets ratio (TDTA) steadily increased over the study period, rising from an average of 43.9% during the pre-COVID period to 50.7% in the post-COVID recovery period. The full-sample average was 46.5%, indicating a gradual increase in leverage over time.

Second, growth opportunities, as measured by asset growth (GTA), declined sharply—over 70%—during the COVID-19 period compared to the pre-COVID baseline, highlighting a significant reduction in firms' investment activity.

Third, profitability (ROA) remained relatively low throughout the sample period, dropping during COVID but rebounding sharply in the recovery period. This reflects both the operational challenges firms faced during the pandemic and their improved performance during the recovery.

Moreover, current liabilities (CL) increased by 59.2%, indicating a greater reliance on short-term financing. This suggests that many firms turned to short-term debt to cover working capital needs during the pandemic.

The decline in financial ratios (FR) suggests weakening overall financial stability, while the doubling of inflation and the sharp rise in stock market capitalization signal heightened market activity.

4.2. Macroeconomic Factors

- GDPG: Mongolia's GDP growth turned negative (-0.0150) during the active COVID-19 period due to lockdowns and restrictions on economic activity. It became positive again (0.0583) during the recovery phase, likely supported by government stimulus, vaccination efforts, and relaxed restrictions.
- INFL: Inflation increased steadily across all periods (0.0462 → 0.0825 → 0.1003), indicating post-pandemic price pressures. This may reflect global supply chain disruptions and increases in money supply.
- SMC: Market capitalization rose significantly in all periods (7.0716 → 10.9582 → 14.9779), suggesting the Mongolian Stock Market has not only recovered from the pandemic but also experienced robust growth. This may be attributed to rising company valuations and increased investor confidence.

4.3. Correlation Analysis

Correlation matrices across the different periods provide critical insight into how the relationships between variables shifted with changes in economic conditions. These matrices allow us to detect shifts in firm-specific indicators, macroeconomic variables, and market-level factors before, during, and after the COVID-19 pandemic.

Table 2 displays the key correlation patterns that serve as a foundational input for interpreting the regression model outputs. It also helps assess multicollinearity risks and visualize directional trends in variable relationships.

Table 2.
Key Correlation Patterns Across Periods.

Correlation Pair	Pre-COVID (2015–2019)	COVID Period (2020–2021)	Recovery (2022–2024)	Full Period (2015–2024)
TDTA & ROA	-0.120	-0.171	-0.103	-0.112
TDTA & FR	-0.160	-0.316	-0.374	-0.276
TDTA & NFATA	-0.086	-0.110	0.013	-0.063
TDTA & GTA	-0.056	0.044	-0.008	-0.038
CL & ROA	-0.213	-0.471	-0.083	-0.145
FR & NFATA	0.273	0.194	0.088	0.207
GDPG & INFL	0.992	1.000	-0.822	0.390
SMC & INFL	0.842	1.000	-0.964	0.730

From the correlation analysis, several key observations emerge:

Link to Financial Strength: The negative correlation between total debt to assets (TDTA) and financial ratios (FR) intensified significantly during the COVID-19 period, deepening from -0.160 to -0.374 during recovery. This suggests that financial stability has become an increasingly critical determinant of leverage.

Profitability and Debt Relationship: The strongest negative correlation between profitability (ROA) and TDTA occurred during the peak COVID period (-0.171), indicating that more profitable firms reduced their debt to avoid risk.

Asset Structure Evolution: The correlation between TDTA and tangible assets (NFATA), which was negative in the earlier phases, became slightly positive in the recovery phase. This reflects a shift in the role of collateral assets and shows that firms started leveraging physical assets more efficiently.

Macroeconomic Environment Shifts: The correlation between GDP growth (GDPG) and inflation (INFL) changed from a strong positive during COVID to a strong negative during recovery, signaling structural transformations in the macroeconomic landscape.

Capital Market Development: The stock market capitalization (SMC) showed different correlations with inflation and other macro variables across periods, indicating evolving market conditions and shifting investor expectations.

4.4. Dynamic Panel Results

4.4.1. Pre-COVID Period (2015–2019)

During the pre-COVID period (2015–2019), capital structure decisions exhibited relatively stable characteristics and aligned with traditional theories. The coefficient for lagged debt ratio (L1.TDTA – prior period total debt to total assets) ranged from 0.772 to 0.803 across all models, reflecting a high level of persistence and stability in capital structure. This outcome confirms that under stable economic conditions, firms are more likely to maintain their long-term capital structure decisions.

Table 3.
Pre-COVID Period Results (2015–2019).

Variables	Model 1	Model 2	Model 3	Model 4
L1.TDTA	0.792***	0.803***	0.772***	0.803***
GTA	0.314	0.152	0.381	0.152
NFATA	0.003	-0.028	0.013	-0.028
ROA	-0.434	-0.341	-0.498	-0.341
CL	0.003	0.003	0.004	0.003
FR	0.087	0.077	0.090	0.077
GDPG		0.559		0.038
INFL		-0.627		-0.122
UNEMP		0.518		0.587
INTEREST		-0.198		-0.238
SMC			-0.803	-0.175

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

During the pre-COVID period, none of the firm-specific internal variables were statistically significant predictors of the debt ratio. This indicates that in stable economic conditions, firms likely had more flexibility in financing decisions regardless of operational or resource characteristics. In other words, this supports the trade-off theory that under relatively low adjustment costs, firms tend to maintain a stable target debt ratio.

4.4.2. COVID Period (2020–2024)

The regression results combining both the active pandemic and recovery phases reveal a sharp shift in the determinants of capital structure. While the coefficient of the lagged debt ratio remained stable (0.858–0.870), suggesting continued persistence in capital structure decisions, firm-level internal variables became more influential.

This indicates that during times of economic crisis and recovery, company-specific factors—such as asset structure, operational characteristics, and profitability—play a more prominent role in shaping debt decisions. It also suggests that firms respond more strategically to financial pressures under crisis conditions.

Table 4.
COVID Period Results (2020–2024).

Variables	Model 1	Model 2	Model 3	Model 4
L1.TDTA	0.858***	0.870***	0.866***	0.870***
GTA	0.029	0.023	0.054	0.023
NFATA	0.067	0.045	0.092	0.045
ROA	-0.023	-0.034	-0.046	-0.034
CL	0.001**	0.001**	0.001**	0.001**
FR	-0.171*	-0.180*	-0.175**	-0.180*
GDPG		2.170		1.803
INFL		0.044		0.029
UNEMP		2.456		2.717
INTEREST		-0.923		-0.620
SMC			2.210	0.362

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

The COVID-19 regression analysis highlights two major determinants of capital structure decisions:

First, current liabilities (CL) showed a statistically significant positive association with capital structure across all regression models. This indicates that firms relied more heavily on short-term financing during the pandemic, likely due to heightened financial uncertainty and reduced access to long-term debt.

Second, financial ratios (FR) were strongly negatively associated with debt levels, implying that financially healthier firms adopted precautionary behavior and deliberately kept leverage lower. This aligns with the precautionary motive theory, emphasizing the importance of financial flexibility during crises.

4.5. Full Period Analysis with COVID Dummy

To fully capture the effects of COVID-19 on capital structure determinants, we estimate models using the entire sample period (2015–2024) and include a dummy variable for the COVID years (2020–2024).

Table 5.
Full Period Analysis with COVID Dummy (2015-2024).

Variables	Model 1	Model 2	Model 3	Model 4
L1.TDTA	0.541**	0.640***	0.630***	0.645***
GTA	0.343	0.186*	0.256	0.212*
NFATA	0.194	0.128	0.192	0.154
ROA	-0.227	-0.254	-0.327	-0.260
CL	-0.005	-0.002	-0.003	-0.003
FR	-0.245	-0.155	-0.158	-0.171
COVID*	0.188	0.281*	-0.039	0.066
GDPG		2.891*		0.875
INFL		-1.460*		-1.517*
UNEMP		5.736*		5.327*
INTEREST		-1.024		-0.389
SMC			3.070*	3.408*

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

The full-period analysis reveals that macroeconomic variables played a significantly more prominent role. GDP growth exhibited a positive correlation with capital structure, while inflation showed a negative one—indicating that firms tend to deleverage during inflationary periods, likely due to rising borrowing costs.

Unemployment showed a strong positive association with leverage, implying that as economic activity weakened and revenues fell, firms may have increased borrowing to cope with financial distress.

Interest rates had no statistically significant effect in any model, suggesting that borrowing decisions of Mongolian firms may not be highly sensitive to interest rate fluctuations.

Stock market capitalization (SMC) displayed a significant positive association with leverage, reflecting that firms may have had easier access to debt in more developed capital markets. Growth opportunities (GTA) were also significant with Model 2, indicating their growing importance during the full period.

*4.5.1. COVID-19 Dummy Variable: COVID**

The effect of the dummy variable COVID* varied across models, reflecting the complex and multifaceted nature of the pandemic's impact:

- COVID MODEL 1: The coefficient on COVID* was positive but statistically insignificant, suggesting that without macroeconomic controls, the pandemic did not have a significant direct impact on firm leverage.
- COVID MODEL 2: Once macroeconomic variables were controlled for, COVID* became positive and statistically significant (0.281, $p<0.05$), indicating that COVID-19 indirectly contributed to higher firm leverage through shifts in the macroeconomic environment.
- COVID MODEL 3: When market variables were added, the coefficient turned negative and remained statistically insignificant, suggesting that capital market factors may have absorbed the COVID impact.
- COVID MODEL 4: When all firm-level, macroeconomic, and market variables were included, COVID* was positive but statistically insignificant, implying that the pandemic's direct effect on leverage diminishes after accounting for all other explanatory variables.

4.6. Model Diagnostics

All estimated models satisfied the standard diagnostic tests for dynamic panel models. The Hansen test for overidentifying restrictions failed to reject the null hypothesis in all cases, validating the instrument set. Arellano-Bond tests confirmed the presence of first-order but not second-order serial correlation, supporting the consistency of the GMM estimation.

4.6.1. Robustness Checks

To ensure robustness, we performed several additional checks:

1. We re-estimated models using alternative definitions of debt, including market-based leverage and long-term debt ratios. The core findings remained stable across specifications.
2. We compared results from balanced and unbalanced panels to check for sample selection bias. Similar outcomes suggest the findings are not driven by firm survival during crisis periods.
3. We tested the sensitivity of results to alternative COVID period definitions (e.g., treating 2020 as a standalone phase). The qualitative conclusions demonstrate that our findings are robust to timing assumptions.

5. Limitations

While this study provides novel insights, it is subject to certain constraints. First, the analysis focuses only on non-financial firms listed on the Mongolian Stock Exchange, which may limit generalizability to other sectors or countries. Second, the dataset covers 2015–2024, so structural changes beyond this period are not captured. Finally, although System GMM addresses endogeneity, potential measurement errors and omitted variables remain possible. Future research could expand to include other economies, alternative methodologies, or longer time horizons to validate and extend these findings.

6. Discussion

6.1. Dynamic Effects

Our findings reveal several important conclusions about how the COVID-19 pandemic altered the determinants of capital structure for Mongolian firms. The increased importance of firm-level variables during the pandemic suggests that operational characteristics played a more critical role in financing decisions under external uncertainty. This shift indicates that during crises, firms must balance financial flexibility with financing needs. Unlike traditional pecking order theory predictions, growth opportunities (GTA) were not consistently significant across models during the pandemic. This suggests that, regardless of investment prospects, some firms had limited access to debt markets. The results indicate that the pandemic may have created segmentation in credit markets, allowing only certain firms to access external finance. The negative association between financial robustness (FR) and leverage highlights the importance of internal financial strength during crises. Firms with greater financial capacity appeared to deliberately reduce leverage to mitigate future shocks or ensure liquidity.

6.2. Macroeconomic Effects

The significant correlations between macroeconomic indicators and leverage over the full sample underscore the influence of economic conditions on financing decisions. The positive relationship between GDP growth (GDPG) and leverage suggests that firms tend to increase borrowing during economic expansion, aligning with prior research. The negative relationship between inflation (INFL) and leverage can be interpreted in several ways. High inflation increases future cash flow uncertainty, leading firms to deleverage as a precaution. Furthermore, inflation erodes the real value of fixed-interest debt, making borrowing riskier for lenders, who may restrict credit availability. The strong positive link between unemployment (UNEMP) and leverage implies increased financial distress during economic downturns, emphasizing the role of employment policies in improving business environments. Firms may borrow to offset income losses or cover operational costs during periods of weak demand. Stock market development (SMC) showed a significant positive correlation with leverage, indicating that a more mature and liquid capital market provides greater financing opportunities. Even during times of stress, well-functioning capital markets can offer alternative funding sources. The significant direct impact of COVID-19 on leverage emerged only when macroeconomic variables were controlled, suggesting that the pandemic increased financial pressures on firms. However, the diminishing effect when additional controls were added implies that COVID's impact may have been transmitted indirectly through macro, sectoral, and market variables. This underscores the importance of not only direct support but also macroeconomic stabilization during external shocks.

6.3. Policy Implications

The results of this study yield several important policy implications for both Mongolia and other developing economies. At the national level, the evidence highlights the urgent need to strengthen Mongolia's capital market infrastructure, diversify financing channels beyond bank loans, and raise disclosure standards to enhance transparency and investor confidence. Reducing excessive reliance on short-term bank financing through the development of bond markets and equity instruments would mitigate firms' vulnerability to macroeconomic shocks. In addition, monetary and fiscal authorities should integrate firm-level financing dynamics into their policy design and adopt counter-cyclical measures—such as temporary interest rate adjustments, targeted credit facilities, and fiscal guarantees—to preserve corporate liquidity and sustain access to external finance during crises.

More broadly, the findings offer insights applicable to other resource-dependent and banking-dominated developing economies. First, the heightened sensitivity of capital structure decisions to macroeconomic conditions during the COVID-19 pandemic underscores the importance of capital market deepening for enhancing financial resilience. Policymakers should prioritize reforms that promote liquidity, investor protection, and the development of active secondary markets. Second, the dynamic role of macroeconomic indicators, including inflation, unemployment, and GDP growth, suggests that financial stability frameworks should incorporate corporate financing indicators as part of early-warning systems. Third, international development agencies and regional financial institutions can contribute by providing technical assistance, capacity building, and credit enhancement mechanisms to support capital market development in emerging economies. Finally, fostering cross-country collaboration and the exchange of best practices can help developing economies design crisis-resilient financing frameworks, thereby reducing systemic risks and improving firms' long-term sustainability.

7. Conclusion

This study presents the first comprehensive analysis of the determinants of capital structure for non-financial firms listed on the Mongolian Stock Exchange during the COVID-19 pandemic. Using advanced dynamic panel methods, we identified notable shifts in leverage determinants across different crisis phases.

The pandemic significantly altered the capital structure landscape. Firm-specific factors that were insignificant in normal periods became critical during the crisis. Growth opportunities, liquidity needs, and financial robustness emerged as key elements influencing leverage decisions. The rising importance of macroeconomic variables highlights firms' growing sensitivity to external conditions in times of uncertainty. These findings stress the importance of maintaining macroeconomic stability and developing robust financial markets to support corporate resilience in future crises. Our results suggest that managing capital structure and financial regulation during crises requires a more flexible, adaptive policy framework. The dynamic nature of these relationships calls for context-sensitive approaches that reflect shifting economic realities.

Future research could build on these findings by extending the analysis to multi-country contexts, incorporating unlisted firms such as SMEs, and exploring longer-term structural consequences of external shocks. Such extensions would help validate and generalize the results, offering a broader understanding of how macroeconomic conditions shape financing behavior in emerging markets.

References

[1] S. C. Myers, "Capital structure," *Journal of Economic Perspectives*, vol. 15, no. 2, pp. 81–102, 2001. https://doi.org/10.1257/jep.15.2.81

[2] L. Booth, V. Aivazian, A. Demirguc-Kunt, and V. Maksimovic, "Capital structures in developing countries," *The journal of finance*, vol. 56, no. 1, pp. 87-130, 2001. https://doi.org/10.1111/0022-1082.00320

[3] M. J. Flannery and K. P. Rangan, "Partial adjustment toward target capital structures," *Journal of financial economics*, vol. 79, no. 3, pp. 469-506, 2006. https://doi.org/10.1016/j.jfineco.2005.03.004

[4] M. Z. Frank and V. K. Goyal, "Capital structure decisions: which factors are reliably important?," *Financial management*, vol. 38, no. 1, pp. 1-37, 2009. https://doi.org/10.1111/j.1755-053X.2009.01026.x

[5] International Monetary Fund, "Financial and climate policies for a high interest rate era," Global Financial Stability Report, vol. (October 2023), 2023.

[6] Bank of Mongolia, "Monetary policy statement," Monetary Policy Statement – 2024 03, Vols. 2024/03, 2024.

[7] M. Baker and J. Wurgler, "Market timing and capital structure," *The journal of finance*, vol. 57, no. 1, pp. 1-32, 2002. https://doi.org/10.1111/1540-6261.00414

[8] J. Chen and R. Strange, "The determinants of capital structure: Evidence from Chinese listed companies," *Economic change and Restructuring*, vol. 38, no. 1, pp. 11-35, 2005.

[9] World Bank, "Georgia country diagnostic: Private sector development and financial sector concentration," *Joint EBRD–EIB Diagnostic*, 2021.

[10] F. Modigliani and M. H. Miller, "The cost of capital, corporation finance and the theory of investment," *The American economic review*, vol. 48, no. 3, pp. 261-297, 1958.

[11] S. C. Myers, "The capital structure puzzle," *The Journal of Finance*, vol. 39, no. 3, pp. 574-592, 1984. https://doi.org/10.1111/j.1540-6261.1984.tb03646.x

[12] S. C. Myers and N. S. Majluf, "Corporate financing and investment decisions when firms have information that investors do not have," *Journal of financial economics*, vol. 13, no. 2, pp. 187-221, 1984.

[13] R. A. Brealey and S. C. Myers, *Principles of corporate finance*, 7th ed. New York: McGraw-Hill/Irwin, 2003.

[14] E. F. Brigham and M. C. Ehrhardt, *Financial management: Theory and practice*, 12th ed. Mason, OH: Thomson South-Western, 2008.

[15] A. Antoniou, Y. Guney, and K. Paudyal, "The determinants of capital structure: capital market-oriented versus bank-oriented institutions," *Journal of financial and quantitative analysis*, vol. 43, no. 1, pp. 59-92, 2008. https://doi.org/10.1017/S0022109000002751

[16] M. Belkhir, A. Maghyereh, and B. Awartani, "Institutions and corporate capital structure in the MENA region," *Emerging Markets Review*, vol. 26, pp. 99-129, 2016.

[17] R. Deesomsak, K. Paudyal, and G. Pescetto, "The determinants of capital structure: evidence from the Asia Pacific region," *Journal of multinational financial management*, vol. 14, no. 4-5, pp. 387-405, 2004. https://doi.org/10.1016/j.mulfin.2004.03.001

[18] R. G. Rajan and L. Zingales, "What do we know about capital structure? Some evidence from international data," *The journal of Finance*, vol. 50, no. 5, pp. 1421-1460, 1995. https://doi.org/10.1111/j.1540-6261.1995.tb05184.x

[19] W. Sbeiti, "The determinants of capital structure: evidence from the GCC countries," *International Research Journal of Finance and Economics*, vol. 47, no. 2, pp. 56-82, 2010.

[20] S. Akbar, R. Rehman, and P. Ormrod, "Capital structure, global contractions and financial performance: Evidence from private firms," *Global Review of Accounting and Finance*, vol. 4, no. 1-2, pp. 42–60, 2013.

[21] R. Duchin, O. Ozbas, and B. A. Sensoy, "Costly external finance, corporate investment, and the subprime mortgage credit crisis," *Journal of financial economics*, vol. 97, no. 3, pp. 418-435, 2010. https://doi.org/10.1016/j.jfineco.2009.12.008

[22] B. Harrison and T. W. Widjaja, "The determinants of capital structure: Comparison between before and after financial crisis," *Economic Issues*, vol. 19, no. 2, pp. 55-82, 2014.

[23] A. Iqbal and O. Kume, "Impact of financial crisis on firms' capital structure in UK, France, and Germany," *Multinational Finance Journal*, vol. 18, no. 3/4, pp. 249-280, 2014.

[24] E. F. Fama and K. R. French, "Testing trade-off and pecking order predictions about dividends and debt," *Review of financial studies*, vol. 15, no. 1, pp. 1-33, 2002.

[25] S. Titman and R. Wessels, "The determinants of capital structure choice," *The Journal of finance*, vol. 43, no. 1, pp. 1-19, 1988. https://doi.org/10.1111/j.1540-6261.1988.tb02585.x

[26] A. A. Bevan and J. Danbolt, "Capital structure and its determinants in the UK-a decompositional analysis," *Applied financial economics*, vol. 12, no. 3, pp. 159-170, 2002.

[27] G. Hall, P. Hutchinson, and N. Michaelas, "Industry effects on the determinants of unquoted SMEs' capital structure," *International journal of the economics of business*, vol. 7, no. 3, pp. 297-312, 2000.

[28] J. P. O. Esperança and E. A. Mohamed, "Determinants of capital structure: Evidence from the Portuguese stock market," *Journal of Business Finance & Accounting*, vol. 30, no. 5-6, pp. 1193–1221, 2003.
[29] G. Köksal, C. Orman, and P. Tuchen, "Capital structure decisions under varying inflation rates: Evidence from Turkish firms," *Financial Studies*, vol. 17, no. 2, pp. 123–147, 2013.
[30] M. C. Jensen and W. H. Meckling, "Theory of the firm: Managerial behavior, agency costs and ownership structure," *Journal of Financial Economics*, vol. 3, no. 4, pp. 305-360, 1976. https://doi.org/10.1016/0304-405X(76)90026-X
[31] M. Harris and A. Raviv, "The theory of capital structure," *the Journal of Finance*, vol. 46, no. 1, pp. 297-355, 1991. https://doi.org/10.1111/j.1540-6261.1991.tb03753.x
[32] J. S. Ang, J. H. Chua, and J. J. McConnell, "The administrative costs of corporate bankruptcy: A note," *The Journal of finance*, vol. 37, no. 1, pp. 219-226, 1982.
[33] G. Cassar and S. Holmes, "Capital structure and financing of SMEs: Australian evidence," *Accounting & Finance*, vol. 43, no. 2, pp. 123-147, 2003. https://doi.org/10.1111/1467-629X.t01-1-00085
[34] A. Ozkan, "Determinants of capital structure and adjustment to long run target: evidence from UK company panel data," *Journal of business finance & accounting*, vol. 28, no. 1-2, pp. 175-198, 2001.
[35] F. Bancel and U. R. Mittoo, "Cross-country determinants of capital structure choice: a survey of European firms," *Financial management*, vol. 10, no. 1, pp. 103-132, 2004.
[36] G. Alufar Bokpin, "Macroeconomic development and capital structure decisions of firms: Evidence from emerging market economies," *Studies in economics and finance*, vol. 26, no. 2, pp. 129-142, 2009. https://doi.org/10.1108/10867370910963055
[37] I. Brierley and P. Bunn, "Firm financing and macroeconomic shocks: Evidence from panel UK manufacturing firms," *Economic Modelling*, vol. 22, no. 1, pp. 1–28, 2005.
[38] S. E. Dincergok and C. Y. Yalciner, "Macroeconomic volatility and corporate leverage: Evidence from Turkish firms," *Emerging Markets Review*, vol. 12, no. 4, pp. 437–450, 2011.
[39] R. H. Fosberg, "Leverage and market timing during the financial crisis," *Journal of Corporate Finance*, vol. 18, no. 4, pp. 850–872, 2012.
[40] K. M. Kahle and R. M. Stulz, "Access to capital, investment, and the financial crisis," *Journal of Financial economics*, vol. 110, no. 2, pp. 280-299, 2013. https://doi.org/10.1016/j.jfineco.2013.02.014
[41] S. Byoun, "How and when do firms adjust their capital structures toward targets?," *The Journal of Finance*, vol. 63, no. 6, pp. 3069-3096, 2008. https://doi.org/10.1111/j.1540-6261.2008.01421.x
[42] J. Hanousek, E. Kočenda, and M. Maurel, "Leverage dynamics in Central European firms during crisis," *Journal of Banking & Finance*, vol. 35, no. 1, pp. 129–142, 2011.
[43] D. Kuhnhausen and T. Stieber, "Macroeconomic determinants and capital structure revisited: Evidence for Germany," *Applied Economics Letters*, vol. 21, no. 11, pp. 764–769, 2014.
[44] M. Moradi and E. Paulet, "Leverage adjustment during the European sovereign debt crisis," *Journal of International Financial Markets, Institutions & Money*, vol. 63, pp. 33–46, 2019.
[45] C. Gao and T. W. Tsusaka, "COVID-19, new uncertainty, and leverage: Evidence from Chinese listed firms," *China Journal of Accounting Research*, vol. 16, no. 1, pp. 45–62, 2023.
[46] A. Fatemi and I. Fooladi, "COVID-19, corporate leverage, and liquidity: Evidence from the US," *Journal of Corporate Finance*, vol. 66, p. 101789, 2021.
[47] B. Abuzayed, M. Al-Saidi, and W. Chbib, "Leverage adjustments for uncertainty: Evidence from COVID-19," *Finance Research Letters*, vol. 38, p. 101632, 2021.
[48] J. P. Fan, S. Titman, and G. Twite, "An international comparison of capital structure and debt maturity choices," *Journal of Financial and quantitative Analysis*, vol. 47, no. 1, pp. 23-56, 2012. https://doi.org/10.1017/S0022109011000597
[49] D. P. Gajurel, "Macroeconomic influences on corporate capital structure," *Prayas: A Journal of Management*, vol. 2, pp. 30–34, 2006.
[50] M. Arellano and O. Bover, "Another look at the instrumental variable estimation of error-components models," *Journal of econometrics*, vol. 68, no. 1, pp. 29-51, 1995. https://doi.org/10.1016/0304-4076(94)01642-D
[51] R. Blundell and S. Bond, "Initial conditions and moment restrictions in dynamic panel data models," *Journal of econometrics*, vol. 87, no. 1, pp. 115-143, 1998. https://doi.org/10.1016/S0304-4076(98)00009-8