

Article

Capital Structure Dynamics: Evidence from the Korean Listing Market

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Abstract: This study analyzes how the trade-off theory, capital financing priority theory, and market timing hypothesis impact corporate capital structure for sustainable growth. Using a panel regression and system generalized method of moment analyses with balanced panel data for 1636 listed firms in the Korean stock market and KOSDAQ from 2011 to 2021, we discovered that the level of and change in capital structure are determined through a complex mechanism in which the target debt ratio adjustment speed, previous year's debt ratio, target debt ratio divergence, funding shortage situation, and market timing hypothesis interact complementarily. This indicates that the capital structure decisions of Korean listed firms are characterized by a complex mechanism that is difficult to explain with a single theory. The findings of this study have practical implications for understanding the capital structure decisions of Korean firms and for designing efficient capital-raising strategies. Additionally, by revealing the complementary relationship between the two theories, this study provides directions for future research on corporate capital structure.

Keywords: adjustment speed; capital structure; leverage; net short-term debt; net long-term debt; net equity; sustainable growth; target debt ratio



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1. Introduction

The capital structure theory has predominantly focused on the trade-off and pecking order theories. The trade-off theory, based on initial research by Modigliani and Miller [1], assumes that there exists an optimal capital structure for a company by balancing the benefits of debt, such as tax effects, and the disadvantages of debt, including bankruptcy costs [2]. Essentially, the theory suggests that there is an ideal combination of debt and equity to maximize corporate value under certain conditions. In contrast, Myers and Majluf [3] questioned the existence of an optimal capital structure through the pecking order theory, arguing that companies prefer sources to raise capital in the order of internal funds, low-risk debt, high-risk debt, and finally, equity issuance. They claimed that this structure originates from attempts to minimize the negative effects of information asymmetry and related costs.

Several follow-up studies have since been conducted. Shyam-Sunder and Myers [4] analyzed both theories simultaneously, verifying the relationship between fund deficits and long-term debt financing, asserting that the pecking order theory accurately explains corporate capital-raising behavior. Meanwhile, Frank and Goyal [5] demonstrated a negative correlation between previous debt ratios and changes in debt ratios using a method similar to that of Shyam-Sunder and Myers [4], reporting that the pecking order theory showed superiority. Conversely, Fama and French [6,7] presented empirical evidence that both theories exert valid influences on the determination of debt ratios. They stated that a stable and effective combination of factors from both theories could support decision making in a company's capital structure. In the wake of such debates, Baker and Wurgler [8] proposed a hypothesis concerning the existence of market timing to raise a company's capital, emphasizing the relationship between market timing and capital structure and

arguing that market timing variables influence capital raising when traditional capital structure variables are controlled.

In the absence of a clear consensus as to which theory is superior, studies have demonstrated diverse findings, reflecting differences in empirical variables, analysis periods, and target companies [4,6,9–12]. Moreover, theoretical debates have evolved from static perspectives focusing on the existence of an optimal capital structure to dynamic research tracing changes in capital raising [12–15]. Recent studies have shown a significant interest in dynamic capital-raising behaviors driving changes in capital structure rather than analyzing the static relationship between company characteristics and capital structure [16–18].

However, the field of corporate finance has shown interest in the sustainable growth of a firm rather than external growth, and capital structure is a factor that determines the sustainable growth rate of a firm [19–26]. The sustainable growth rate, proposed by Higgins [20], refers to the growth rate that can be achieved without raising additional equity capital and assumes that no equity issuance is made; thus, the capital required for growth can only be financed through debt financing. Numerous empirical studies have focused on the determinants of the sustainable growth rate and the debt-to-equity ratio, and there is a lack of research on equity issuance as an efficient method to raise capital [20,21,23–26]. A rational company's choice to raise capital does not solely rely on either debt or equity, but rather it forms the optimal capital structure through an appropriate combination of both. In this process, since the level of capital structure changes through new issuance, the examination of which company characteristics operate in capital structure levels and the actual raising of new funds is gaining an increasing amount of interest.

This study examines the influence of company characteristics on capital structure levels and theoretically verifies the factors influencing the preference of debt issuance or equity issuance when a company acquires external funds. The primary concern in the capital structure is the debt ratio, which is a crucial factor in determining a firm's sustainable growth. If we separate these debt ratios into short- and long-term debts, we can rigorously examine the capital structure. In particular, selecting the debt ratio, a determinant of the sustainable growth rate, as the dependent and main explanatory variable will contribute to refining and improving the financial structure issues highlighted in the sustainable growth rate research. From the perspective of a listed company, the proportion of equity is a crucial capital-raising strategy and plays a sensitive role in capital structure. Therefore, empirical studies covering this topic can provide practical contributions.

For this reason, this study tests whether the capital structure of Korean listed firms is explained by the trade-off and pecking order theories. It also investigates whether the market timing hypothesis can be confirmed. Thus, we interpret the capital structure of Korean listed firms from a broad and multifaceted perspective by combining the mixed results of domestic and foreign studies. Additionally, this study aims to compensate for the limitations of existing studies by differentiating the securities market, which includes Korean chaebol (a group of conglomerates) companies from the KOSDAQ market, and to test both the static and dynamic relationship between firm characteristics and capital structure. The empirical analysis comprises three main factors. First, the target debt ratio is estimated through a dynamic partial adjustment model, applying the methods of Hovakimian et al. [15], Flannery and Rangan [14], and Frank and Goyal [5]. For the companies' characteristic variables, information asymmetry variables from the pecking order theory are applied to the representative variables of the trade-off theory, and macroeconomic variables are included, in line with the claims of Korajczyk and Levy [27], Jong et al. [12], and Kim et al. [28]. For the robustness of the target debt ratio, we estimate the ordinary least squares (OLS), fixed effects model, and system GMM (SYS GMM), through which the adjustment speed of the target debt ratio and the gap with the target debt ratio are measured. Second, the previous year's debt ratio, gap with the target debt ratio, fund deficit, and weighted average market-to-book ratio of external financing are set as explanatory variables, and their relationships are verified with the capital structure level of the listed companies. A comprehensive verification is performed using traditional variables as control variables as

discussed above. Third, the changes in capital structure are verified, that is, the issuance of additional external funds can be theoretically explained in relation to the explanatory variables. For accurate judgment, the target companies are categorized into those listed on the main board of the Korea Exchange (KOSPI) or the KOSDAQ market when the empirical analysis results are presented.

2. Literature Review

We focus on the empirical findings of the theoretical arguments. First, conflict theory is characterized by studies that identify the determinants of target debt ratio estimates, existence of an optimal capital structure, and speed and cost of adjustments through target debt ratio divergence [29]. Titman and Wessels [30], Rajan and Zingales [31], and Hovakimian et al. [15] state that the target debt ratio is determined by firm characteristics, which is consistent with the trade-off theory. Shyam and Myers [4] and Frank and Goyal [5] also report that the difference between the level of the target debt ratio and the historical debt level is positively correlated with the change in debt of the firm. However, the degree of target debt ratio misalignment varies by firm size, with large firms adjusting their target debt ratio faster and relying more on long-term debt than small firms. Nonetheless, equity adjustments tend to be faster in small firms, as they are performed through equity issuance when stock prices are high [32]. Hovakimian et al. [15] provide evidence that firms adjust the gap between actual and target debt-to-equity ratios through equity issuance. Fama and French [7] discovered that equity issuance is favored when the debt level of firms issuing equity is not excessive and a surplus of funds exists. However, Rauh and Sufi [33] considered the heterogeneity of debt and indicate that firms with high debt-to-equity ratios in the previous year adjust levels of short- and long-term debt based on their financial flexibility, bankruptcy risk, and financial distress costs—which determine the spread of debt maturities.

The pecking order theory suggests that when a company raises external funds due to fund deficits, it first uses internal funds considering adverse selection costs due to information asymmetry and then raises funds in the order of debt and equity issuance [3–5]. Considering their claims, for the pecking order theory to be valid, a significant positive relationship must be proven between the fund deficit variable and debt ratio. Myers and Majluf [3] suggested that companies do not maintain a static capital structure, that internal funds are more beneficial to existing shareholders than external funds driven by information asymmetry among stakeholders, and that debt is preferred over equity when raising external funds. Meanwhile, Shyam-Sunder and Myers [4] performed a regression analysis using the fund deficit variable funded by debt in a company's financial data and claimed that the pecking order theory is supported when the regression coefficient value is close to one. However, Chirinko and Singha [34] noted a limitation in which the regression coefficient is close to one but insignificant, or, conversely, it is close to zero but supported. In subsequent research, Frank and Goyal [5] presented different results, stating that equity issuance has a higher relevance to fund deficit than net debt issuance and that the effects of traditional variables (the previous year's debt ratio, tangibility, growth potential, company size, and profitability) based on the trade-off theory are not offset. Therefore, it is imperative to exercise caution when interpreting the regression coefficient of the fund deficit. According to Myers and Majluf [3], when information asymmetry is high, companies can initially use debt, but those at high risk of bankruptcy from excessive debt or those with debt funding constraints may opt for a paid-in capital increase. In such cases, the negative relationship between the fund deficit and debt ratio does not necessarily contradict the pecking order theory.

An important issue raised in capital structure research is whether market timing exists in a firm's capital-raising process. The market timing hypothesis states that firms improve their capital structure through equity issuance when their stock is overvalued. This means a firm's pattern of equity issuance and share repurchases reflects its expectations about its stock price [8,35]. Baker and Wurgler [8] demonstrated that market timing affects capital

structure when controlling for traditional capital structure variables. They quantified the market pattern using the weighted average market-to-book ratio of external financing, finding a significant negative relationship between market timing variables and capital structure, and this effect persists over time. This implies that the cumulative impact of stock price overvaluation shapes a firm's capital structure.

In summary, the capital financing ranking theory states that a firm's capital structure is the cumulative result of past cash flows and that no optimal capital structure exists [3–5]. Conversely, the market timing hypothesis assumes that firms may preferentially issue equity when market conditions are favorable [8,35]. Considering these theoretical differences, capital structure theories are highly complex, and the results have been interpreted in various ways, which may lead to misleading conclusions if the validation process is biased toward a particular theory. Therefore, this study complements the existing research by comprehensively embracing the variables presented in the existing research, and a complex multifaceted analysis is conducted.

3. Data and Analysis Method

3.1. Data and Research Sample

The study sample included companies listed on the main board of the KOSPI and KOSDAQ markets between 2011 and 2021. The data can be used to understand how companies have adjusted and changed their capital structure since the 2008 global financial crisis, especially since the introduction of K-IFRS, which has been mandatory since 2011, which can enhance the reliability and international comparability of the research. Their financial data and stock price information can be obtained from FnGuide and the Financial Supervisory Service's Data Analysis, Retrieval, and Transfer System. In line with previous research, financial sectors, companies with impaired capital, and companies not settling in December were excluded. Companies in the financial industry were excluded because they regulate and operate differently than companies in other industries. Additionally, companies that do not have a December financial year-end were excluded for comparability. Furthermore, we concluded that capital-encumbered firms do not fit the purpose of this study, which is to analyze the capital-raising behavior of firms, because they rely on financial institutions, courts, and other stakeholder groups rather than discretionary decisions. We also excluded merged firms and firms in receivership for continuity of data. For the robustness of the statistical model, we excluded key variables such as net short-term debt issuance, net long-term debt issuance, net equity issuance, underfunding, and target debt-to-equity ratios exceeding ($\pm$)1.000 as extreme values [12,29]. Overall, 1043 companies met these conditions; a total of 11,473 company-year observations, representing balanced panel data, were analyzed.

The overall sample was categorized into companies listed on the KOSPI and KOSDAQ markets according to Korea's securities listing standards. This classification is based on the assumption that KOSPI, which includes large companies, and KOSDAQ, comprising small and medium venture companies, could have substantial differences in their capital raising according to exchange listing requirements. The subset of KOSPI companies comprises 464 firms with 5104 company-year observations, while the 579 KOSDAQ companies had 6369 company-year observations.

3.2. Research Model

3.2.1. Estimation of Target Debt Ratio

According to trade-off theory, as companies have a target debt ratio, they consider the benefits and costs of using debt when selecting their capital structure to pursue optimal structure [5,6,14,31]. Under this theory, the difference between actual and target debt ratio plays a crucial role in a company's decision to issue debt or equity. Therefore, we estimate the target debt ratio using a partial adjustment model of debt ratio to confirm the existence of an optimal capital structure and to verify it theoretically [12,14,15,17,18,27].

In the partial adjustment model, the LEV used for estimating the target debt ratio is measured with a dynamic panel model as in Equation (1), assuming that it is determined by the characteristics of the company in the previous year. The explanatory variables reflecting the characteristics of the company include tangibility (Tang), growth opportunities (MTB), company size (LogAsset), profitability (EBIT), and non-debt tax shields (Dep), which are typically used in verifying trade-off theory [6,14,15,17,18]. In addition, to reflect macroeconomic factors known to influence the capital structure, this study included the KOSPI return (MarketReturn) and 5-year government bond yield (5yearBond) [12,27,28].

In this study, we estimate the target debt ratio (LEV*_t) by adding an SYS GMM with a stochastic term and adjustment costs to the dependent variable (LEV_{t-1}) in Equation (1). This is to ensure the robustness of the results while controlling for estimation methodological issues in dynamic capital structure which were raised in previous studies. In the existing literature on dynamic capital structure, dynamic panel models are useful for analyzing firm-specific changes over time [16,36,37]. However, OLS estimation has been criticized for its biased results owing to firm-specific fixed effects, autocorrelation between past and present error terms, and endogeneity of explanatory variables. To address these issues, Arellano and Bond [38] proposed the differential GMM estimation method to overcome the limitations of OLS estimation. Differential GMM effectively addresses the autocorrelation problem of individual fixed effects and error terms; however, it suffers from the endogeneity of explanatory variables. Arellano and Bover [39] and Blundell and Bond [40] later proposed the SYS GMM estimation method to address the problem of the endogeneity of explanatory variables. The SYS GMM provides more efficient and consistent estimates than the OLS estimation and differential GMM. Therefore, SYS GMM was applied in this study, and the Stata 14.0 program was used for analysis.

To address the endogeneity problem from individual firm fixed effects when present in dynamic panel models, we add SYS GMM [39,40], which uses lagged variables as instrumental variables instead of variables that are correlated with individual firm fixed effects. Therefore, we estimate the target debt ratio using pooled OLS, fixed effects model, and SYS GMM to improve the robustness of the estimates and provide efficient estimates that best fit the sample characteristics of this study.

$$\text{LEV}_{i,t} = \beta_0 + \beta_1 \text{LEV}_{i,t-1} + \beta_2 \text{Tang}_{i,t-1} + \beta_3 \text{MTB}_{i,t-1} + \beta_4 \text{LogAsset}_{i,t-1} + \beta_5 \text{EBIT}_{i,t-1} + \beta_6 \text{Dep}_{i,t-1} + \beta_7 \text{MarketReturn}_{i,t-1} + \beta_8 \text{5yearBond}_{i,t-1} + \mu_i + \varepsilon_{i,t} \quad (1)$$

According to the partial adjustment model, the regression coefficient (β_1) estimated in Equation (1) is regarded as an adjustment speed that reduces the difference between the target and actual debt ratios over a given period. Theoretically, an optimal capital structure aims at a state in which the target and actual debt ratios are identical. However, in reality, companies may not be able to immediately adjust their actual debt ratio to the target debt ratio. This can be attributed to excessive adjustment costs or because external borrowing may not satisfy the company's need for raising capital. Therefore, in the partial adjustment model, it is expected that the actual debt ratio will be partially adjusted to the target debt ratio, which is defined as shown in Equation (2):

$$\text{LEV}_{i,t} - \text{LEV}_{i,t-1} = \theta_{i,t} (\text{LEV}_{i,t}^* - \text{LEV}_{i,t-1}) \quad (2)$$

where θ_t signifies the adjustment speed ($1 - \beta$) of the target debt ratio, so the extent to which the debt ratio at $t - 1$ reaches the target debt ratio at t will be determined by θ_t [12,14,41]. An adjustment speed (θ_t) of 1 in Equation (2) signifies that the debt ratio is expeditiously and perfectly adjusted to the target debt ratio without adjustment costs.

3.2.2. Capital-Raising Behavior Model

This study aims to analyze the factors determining a company's choice of level and changes in capital raising. Particularly, through empirical analysis, the study evaluates the impact of the relationship with previous year's debt ratio (LEV_{t-1}), gap with the target debt

ratio (LeverageGap), fund deficit (Def), and average market-to-book ratio of external capital raising (MBRefwa), which have been extensively discussed in capital structure research. Equation (3) is a panel regression model to verify the effect of explanatory variables, and Equation (4) is a panel regression model that includes variables reviewed in previous studies as control variables in Equation (3).

$$y_{i,t} = \beta_0 + \beta_1 \text{LEV}_{i,t-1} + \beta_2 \text{LeverageGap}_{i,t} + \beta_3 \text{Def}_{i,t} + \beta_4 \text{MBRefwa}_{i,t} + \mu_i + \varepsilon_{i,t} \quad (3)$$

$$y_{i,t} = \beta_0 + \beta_1 \text{LEV}_{i,t-1} + \beta_2 \text{LeverageGap}_{i,t} + \beta_3 \text{Def}_{i,t} + \beta_4 \text{MBRefwa}_{i,t} + \beta_5 \text{Tang}_{i,t} + \beta_6 \text{MTB}_{i,t} + \beta_7 \text{LogAsset}_{i,t} + \beta_8 \text{EBIT}_{i,t} + \beta_9 \text{Dep}_{i,t} + \mu_i + \varepsilon_{i,t} \quad (4)$$

The empirical analysis was conducted using pooled OLS, fixed effects, and random effects models to ensure the robustness of the results. The reason for the additional models of the OLS is to ensure that there is no correlation between the error term and the independent variables. For the process of model selection, the Lagrange multiplier test proposed by Breusch and Pagan [42] was used to check the existence of firm- and time-specific effects, and the Hausman test was conducted. The results confirmed that the fixed effects model is a more appropriate model for this study than the random effects model. Therefore, the empirical analysis results are explained based on the results of the fixed effects model. The adopted fixed effects model is known to have the advantage of eliminating the endogeneity problem between the explanatory variable (x) and the individual characteristic error term (ε) when the explanatory variable (x) and the individual characteristic error term (ε) are correlated [43].

3.3. Variable Settings

3.3.1. Dependent Variable

In Equations (3) and (4), the dependent variable $y_{i,t}$ represents the level of and changes in capital raising using book value, which has been commonly utilized in previous studies. Despite its advantage of reflecting the actual market value, it has the disadvantage of high volatility due to period changes and large impacts depending on time selection [21,44,45]. First, with the dependent variable representing the level of capital raising, the net short-term debt ratio (NSDR) is measured as [(short-term borrowings + short-term bonds + current portion of long-term debt)/total assets]. The net long-term debt ratio (NLDR) is measured as [(long-term borrowings + bonds)/total assets]. The net equity ratio (NER) is measured as [(capital + capital surplus)/total assets]. The dependent variables representing changes in capital raising are net short-term debt issuance (NSD), net long-term debt issuance (NLD), and net equity issuance (NE). Each is measured by subtracting the previous year ($t - 1$) from the current year (t). If capital structure is an endogenous variable that is determined by managerial discretion, it is expected that the determinants of capital structure will mainly affect controllable borrowings. Yoon [10] also emphasized that the determinants of capital structure will mainly affect controllable borrowings. In order to solve the endogeneity problem of managerial discretion in capital structure and increase the reliability of the research results, this study uses short-term and long-term borrowing accounts as the dependent variable. By using short-term and long-term borrowings instead of a simple debt-to-equity ratio, we can clearly distinguish the components of capital structure between short-term and long-term borrowings and analyze the impact on each component more precisely.

3.3.2. Explanatory Variable

The previous year's debt ratio (LEV_{t-1}) is a variable used to observe dynamic debt adjustment; it can identify the influence of debt ratio level in the previous year on capital-raising choices of the next period [5,9,11,14,19,21,46,47]. From the perspective of the trade-off theory, companies with a high debt ratio in the previous year may have limitations in maintaining their capital-raising level in the current year. Therefore, a negative relationship

is expected between the previous year's debt ratio and the level of capital raising [5,14,46,47]. However, divergent results have been reported in existing studies. Kim and Park [46] reported that companies with a high debt ratio in the previous year tend to reduce their debt ratio in the current year. However, Oh and Kim [9] and Ju and Hwang [11] demonstrated a significant positive relationship between book leverage and market leverage, which does not conform to the theory. Meanwhile, in a study on debt maturity and equity issuance, Shin [29] demonstrated a positive relationship with net debt issuance but a negative association with net equity issuance, which does not conform to theoretical predictions. Ju and Park [19] demonstrated a negative relationship with net short-term debt issuance but a positive relationship with the dependence on short-term borrowings in the relationship with borrowing dependence. Moreover, in their study on debt heterogeneity, Rauh and Sufi [33] argued that, in a situation with a high debt ratio in the previous year, to maintain financial flexibility, companies prefer short-term debt and choose long-term debt to reduce their bankruptcy risk, opting for a debt maturity spread.

The gap with target debt ratio (LeverageGap) is measured as $LEV_t^* - LEV_{t-1}$. Here, target debt ratio (LEV_t) is estimated by the partial adjustment model as per Equation (1), and $LEV_t - LEV_{t-1}$ signifies the difference between target debt ratio and actual debt ratio, as explained in Equation (2). Therefore, the gap with target debt ratio serves as a variable to validate the support for trade-off theory by determining whether a company's capital structure regresses to the optimal capital structure. According to the partial adjustment model, if there is a target debt ratio due to the dynamic nature of the capital structure, it is adjusted toward the optimal capital structure [14,47,48]. Essentially, if a company's previous year's debt ratio is lower than the target debt ratio, it increases debt issuance; conversely, if it exceeds target debt ratio, the capital structure is adjusted by repaying the debt. In similar studies, Ozkan [49] and Antoniou et al. [50] stated that when the maturity of previous year's debt falls short of target debt maturity, the actual debt maturity is partially adjusted toward target debt maturity. Shin and Kim [51] suggested an estimated coefficient (0.672) in a study on debt maturity structure and argued that companies prefer long-term debt. Meanwhile, Hovakimian et al. [15] argued that trade-off theory is supported by providing evidence that the gap between actual and target debt ratios is resolved through equity issuance.

The fund deficit (Def) variable is used to measure the need for external capital raising [4,5]. In pecking order theory, fund deficit is considered the key variable that best explains the fluctuation in debt ratio. This is because it is assumed that under fund deficit, the company's insufficient funds not met by internal funding will be procured through debt in the next stage. In particular, Frank and Goyal [5] stated that, for pecking order theory to be relevant, the fund deficit variable must be capable of covering the effects of all input control variables. Additionally, according to Myers' [45] simple pecking order theory, if capital is raised through debt to avoid the cost of raising capital from equity issuance, then a positive relationship with debt ratio is established. However, in the combined pecking order theory, if the company maintains a low level of debt to maintain the capacity to bear current low-risk debt considering the future cost of raising capital, then a negative relationship with debt ratio and a positive relationship with equity issuance is established. Meanwhile, in their study using logistic analysis, Kim and Kim [52] suggested that companies with greater fund deficits tend to choose paid-in capital increases rather than debt issuance. Oh and Kim [9] and Ju and Hwang [11] categorized fund deficits into market debt ratios and book debt ratios and confirmed a negative relationship, arguing that this does not match theoretical expectations. The fund deficit variable was measured by dividing (cash dividends + net investment + increase in net working capital + current portion of long-term debt-after-tax operating cash flow) by total assets, in line with Shyam and Myers [4], Frank and Goyal [5], Shin [21], Oh and Kim [9], and Ju and Hwang [11].

The weighted average market-to-book value ratio for external capital raising (MBRe-fwa) is a variable used to verify the market timing hypothesis proposed by Baker and Wurgler [8]. According to the market timing hypothesis, a company's equity issuance and

share repurchase patterns reflect expectations about whether its stock is overvalued or undervalued [8,35]. Baker and Wurgler [8] defined this pattern quantitatively, as shown in Equation (5):

$$MBRefwa = \sum_{s=1}^t \frac{e_s + d_s}{\sum_{r=0}^t (e_r + d_r)} \times \left(\frac{M}{B} \right)_s \quad (5)$$

where e represents net equity issuance, d is net debt issuance, and M/B denotes the market-to-book value ratio. The right side of Equation (5) is measured as a weighted average of the time-variable M/B ratio, with total external capital raised in a specific year (s) as the weight, up to a specific period (r). In Equation (5), as the M/B ratio increases, $MBRefwa$ also proportionally increases. If the rising stock price leads to an increase in $MBRefwa$, the company value is overestimated, and the effect of reducing capital costs during overvaluation increases the issuance of equity. According to the market timing hypothesis, companies issue shares when their stock price is overvalued [8,35,53]. Firms prefer equity issuance when the cost of new equity issuance is low and conversely prefer debt issuance when the cost of new equity issuance is high. Therefore, a positive correlation between $MBRefwa$ and equity issuance and a negative correlation with debt ratio are expected. Baker and Wurgler [8] demonstrated a negative relationship between the $MBRefwa$ variable and capital structure, arguing that the influence of $MBRefwa$ persists over a certain period. In research on Korean companies, Shin and Song [54] and Shin [55] reported that the market timing variable has a negative influence on the debt ratio level. However, Jeong [56] presented results showing a significant positive value contrary to the predictions of the hypothesis with debt ratio, which was also confirmed in a sample of chaebol companies. He pointed out that chaebol companies in South Korea, unlike American firms, consider maintaining the stake of major shareholders to be more important than capital costs. In this study, we analyze the market timing hypothesis in the Korean listed market and use traditional capital structure variables as controls to test whether market timing remains. Therefore, the focus is on the relevance of capital structure choices rather than the persistence of market timing.

3.3.3. Control Variables

To examine theoretical support for verifying the two theories and market timing hypothesis, it is imperative to ensure a significant level of statistical power for the explanatory variable effects of the theory while controlling for the main variables suggested in existing research. Therefore, in Equation (4), we applied the following variables used in existing research [5,6,14,18,28,31] to control various company characteristics: tangibility ($Tang$), growth opportunities (MTB), company size ($LogAsset$), profitability ($EBIT$), and non-debt tax shield (Dep). First, $Tang$ is measured as [tangible assets/total assets]. As a proxy for collateral value and asset substitution effects, opposite results are expected according to the two theories. From the perspective of trade-off theory, tangible assets help to mitigate the underinvestment problem [45], and from the perspective of creditors, they provide collateral value for borrowing and facilitate the evaluation of tangible asset investments [29]. Therefore, larger tangible assets can increase the use of debt and are positively related to the debt-to-equity ratio [6,15,29,30,45]. However, pecking order theory suggests that debt-to-equity ratio increases over time as more tangible assets reduce information asymmetry, which favors equity issuance [32]. Therefore, we expect a negative relationship between tangible asset ratio and debt-to-equity ratio [3,4,27,32]. MTB is measured as [(total market value of common stock + total debt)/total assets] as in Frank and Goyal [5] and Flannery and Rangan [14], and a negative relationship with debt ratio is expected. The proxy for size, company size ($LogAsset$), uses the logarithm of the book value of assets, and profitability ($EBIT$) is measured as [operating profit/total assets]. As profitability increases, trade-off theory predicts a positive impact on debt ratio because of reduced bankruptcy costs and tax effects, whereas pecking order theory anticipates a negative influence on debt ratio because increased profitability leads to a decrease in debt due to a preference for internal funds.

Finally, the non-debt tax effect (Dep) is measured as [depreciation expense/total assets] to account for variables that result in non-debt tax effects. In terms of trade-off theory, depreciation can be expected to have a similar tax reduction effect as interest expenses. Therefore, an increase in the depreciation rate is expected to decrease the use of debt or be negatively related to the debt-to-equity ratio as the incentive to take advantage of tax savings is lower. However, firms with a large proportion of non-debt tax benefits have sufficient collateral value, so their debt capacity increases, and a positive relationship with the debt ratio is expected [6,57].

4. Empirical Analysis

4.1. Descriptive Statistics and Correlation Analysis

Table 1 summarizes the descriptive statistics of the main variables for the sample companies and the results of the difference testing for the sub-samples. The average net short-term debt ratio of 0.148 is higher than the average net long-term debt ratio of 0.072. The average net equity ratio is 0.285, suggesting a higher dependence on equity than debt. The average of the net short-term debt issuance, which indicates changes in capital structure, is 0.002, and the average of the net long-term debt ratio is 0.003, indicating a greater issuance of net long-term debt. The average of the net equity issuance is 0.015, indicating that net equity issuance is a major means of long-term capital raising compared to debt issuance. The average fund deficit is relatively weak at 0.008 but has a positive value, confirming a fund deficit in the overall sample. When the overall sample was categorized into the companies listed on the KOSPI and KOSDAQ and a difference test was performed, the net short-term and long-term debt ratios were significantly larger in the KOSPI companies than in the KOSDAQ companies at the 1% level. However, the net equity ratio and net equity issuance were significantly larger in the KOSDAQ companies at the 1% level, implying differences in capital structure behavior between the classified groups. Additionally, the KOSDAQ companies showed larger external capital-raising weighted average market-to-book value ratios (a market timing validation variable), and the KOSPI companies demonstrated larger debt ratios in the previous year.

Table 1. Basic statistics of the sample and sub-sample difference tests.

Var.	Entire Sample		KOSPI		KOSDAQ		t-Test
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	
NSDR	0.148	0.133	0.152	0.132	0.146	0.134	2.404 ***
NLDR	0.072	0.094	0.076	0.092	0.070	0.096	3.499 ***
NER	0.286	0.334	0.222	0.318	0.337	0.338	−18.510 ***
NSD	0.002	0.082	0.001	0.078	0.002	0.085	−0.550
NLD	0.003	0.073	0.002	0.070	0.003	0.075	−0.549
NE	0.015	0.076	0.010	0.069	0.020	0.082	−6.632 ***
LEV _{t−1}	0.435	0.203	0.467	0.205	0.410	0.198	15.030 ***
Def	0.008	0.116	0.009	0.102	0.008	0.126	0.245
MBRefwa	0.240	0.503	0.200	0.398	0.273	0.572	−7.696 ***
Tang	0.315	0.188	0.338	0.184	0.296	0.188	12.067 ***
MTB	1.220	0.847	1.099	0.759	1.317	0.899	−13.810 ***
LogAsset	19.426	1.455	20.252	1.580	18.764	0.909	63.233 ***
EBIT	0.037	0.069	0.036	0.061	0.037	0.075	−0.358
Dep	0.027	0.022	0.027	0.020	0.027	0.024	1.920 **
MarketReturn	0.042	0.129	0.042	0.129	0.042	0.129	
5yearBond	0.022	0.007	0.022	0.007	0.022	0.007	
N	11,473		5104		6369		

Notes: (1) *** and ** indicate significance levels of 1%, 5%, respectively; (2) The *t*-value is the result of the *t*-test.

Table 2 presents the correlations among the main variables used in the analysis, represented by the Pearson correlation coefficient. The six variables used as dependent variables in the behavior model of capital structure levels and changes exhibit significant

positive or negative correlations with each other, ranging from -0.110 to 0.373 . Notably, there are significant positive correlations at the 1% level between the net short-term debt ratio and net short-term debt issuance and between the net equity ratio and net equity issuance. The explanatory variable, fund deficit, has a significant positive correlation at the 1% level with the net short-term debt ratio, net equity ratio, net short-term debt issuance, and net equity issuance. Meanwhile, the weighted average market-to-book ratio of external capital raising shows a significant negative correlation with the net short-term debt ratio and a significant positive correlation with the net equity ratio, net short-term debt issuance, net long-term debt issuance, net equity issuance, and the fund deficit. In terms of multicollinearity, the correlation between the fund deficit of the explanatory variables and the weighted average market-to-book ratio of external capitalization is not very high, so it is used as an explanatory variable. The other variables are also not highly correlated, so we are not concerned about multicollinearity in the regression. The average VIF of the variables is 1.23, which is within the statistically acceptable range, indicating that there is no multicollinearity problem.

Table 2. Correlations among main variables of the entire sample.

Var.	NSDR	NLDR	NER	NSD	NLD	NE	Def	MBRefwa	Tang	MTB	Log Asset	EBIT	Dep
NSDR	1.000												
NLDR	0.013	1.000											
NER	0.003	-0.016^*	1.000										
NSD	0.229 ***	-0.014	-0.110 ***	1.000									
NLD	0.004	0.373 ***	-0.007	0.000	1.000								
NE	0.027 ***	-0.007	0.340 ***	-0.053 ***	0.006	1.000							
Def	0.230 ***	0.007	0.150 ***	0.228 ***	0.004	0.242 ***	1.000						
MBRefwa	-0.164 ***	-0.014	0.030 ***	0.025 ***	0.016 *	0.172 ***	0.058 ***	1.000					
Tang	0.275 ***	0.011	-0.175 ***	0.013	-0.005	-0.059 ***	0.098 ***	-0.094 ***	1.000				
MTB	-0.072 ***	-0.031 ***	0.306 ***	0.004	-0.002	0.125 ***	0.024 **	0.399 ***	-0.112 ***	1.000			
LogAsset	0.011	0.022 **	-0.387 ***	0.049 ***	0.008	-0.089 ***	0.031 ***	-0.017^*	0.126 ***	-0.145 ***	1.000		
EBIT	-0.264 ***	-0.009	-0.349 ***	0.013	-0.008	-0.123 ***	-0.310 ***	0.122 ***	-0.058 ***	0.094 ***	0.132 ***	1.000	
Dep	0.143 ***	-0.002	-0.082 ***	-0.030 ***	0.005	-0.054 ***	-0.017^*	-0.072 ***	0.504 ***	-0.047 ***	0.140 ***	-0.036 ***	1.000

Notes: ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

4.2. Estimation of Target Debt Ratio

Table 3 presents the results of estimating the target debt ratio using the partial adjustment model of Equation (1). Model 1 is a partial adjustment model comprising existing variables testing the trade-off theory and macroeconomic factors, while Model 2 is an extended model incorporating the fund deficit, a validation variable for the pecking order theory, and market timing variables. This represents a partial adjustment model accepting both major theories and market timing hypothesis. To enhance robustness, we used OLS, fixed effects model, and SYS GMM for all estimations in the analysis. From the estimates, the regression coefficient values of the one-period lagged dependent variable's debt ratio were between zero and one, demonstrating considerable differences in the speed of the adjustment in the partial adjustment model. In Model 2, the adjustment speed in OLS is 0.094, while it is 0.431 in the fixed effects model and 0.223 in SYS GMM. These results prove that including fixed effects and instrumental variables satisfying the orthogonality condition in the estimation of panel data coefficients considerably influences the speed of adjustment toward the target debt ratio. Given the downward bias issue of OLS in the adjustment speed and the rejection of the null hypothesis in the Sargan test conducted in SYS GMM, this study adopts the fixed effects model results as the efficient estimates.

The adjustment speed estimated in Model 2 of the fixed effects model is 0.431, signifying that 43.1% of the gap with the target debt ratio is adjusted annually when considering transaction costs and other factors. This adjustment speed is similar to the 2.3 years required to fully adjust to the optimal capital structure as proposed by Ozkan [47], with an adjustment speed of 0.45. This adjustment speed is slower than the 49% proposed by Son and Lee [16] and 75% proposed by Kim et al. [28], both for Korean companies. However, it is faster than the 24% reported by Shin and Moon [58] and the 34% reported by

Jeong [56]. It can be interpreted as adjusting the capital structure at a faster rate than the 33% reported by Flannery and Rangan [14] for American companies and the 39% reported by Lemmon et al. [59].

Table 3. Estimation of the target debt ratio.

Variables	OLS		Fixed Model		SYS GMM	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
lagged_LEV _t	0.911 *** (0.004)	0.906 *** (0.004)	0.572 *** (0.009)	0.569 *** (0.009)	0.769 *** (0.020)	0.777 *** (0.020)
lagged_Tang	0.008 * (0.005)	0.008 * (0.005)	0.046 *** (0.011)	0.044 *** (0.011)	−0.012 (0.018)	−0.009 (0.018)
lagged_MTB	−0.001 (0.001)	0.001 (0.001)	−0.001 (0.001)	−0.001 (0.001)	−0.010 *** (0.002)	−0.010 *** (0.002)
lagged_LogAsset	0.004 *** (0.001)	0.004 *** (0.001)	0.014 *** (0.003)	0.014 *** (0.003)	−0.066 *** (0.005)	−0.066 *** (0.005)
lagged_EBIT	−0.119 *** (0.011)	−0.111 *** (0.012)	−0.202 *** (0.014)	−0.193 *** (0.015)	0.009 (0.022)	−0.003 (0.022)
lagged_Dep	0.001 (0.038)	−0.000 (0.038)	−0.162 ** (0.080)	−0.129 (0.081)	−0.368 *** (0.128)	−0.428 *** (0.130)
lagged_MarketReturn	−0.012 ** (0.006)	−0.012 ** (0.006)	−0.011 ** (0.005)	−0.011 ** (0.005)	−0.002 (0.006)	−0.002 (0.006)
lagged_5yearBond	−0.009 (0.114)	−0.044 (0.114)	0.694 *** (0.120)	0.684 *** (0.121)	−0.921 *** (0.168)	−0.926 *** (0.169)
lagged_Def		0.012 * (0.007)		0.020 *** (0.007)		−0.027 *** (0.009)
lagged_MBRefwa		−0.010 *** (0.002)		−0.002 (0.002)		0.002 (0.002)
Constant	−0.039 *** (0.011)	−0.040 *** (0.011)	−0.110 ** (0.054)	−0.106 * (0.055)	1.433 *** (0.100)	1.426 *** (0.101)
N	10,430	10,430	10,430	10,430	10,430	10,430
F	8488.641 ***	6809.764 ***	747.128 ***	598.957 ***		
r2_a	0.867	0.867	0.885	0.885		

Notes: (1) ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively. (2) Models 1 and 2 of SYS GMM showed Sargan test results of 456.195 *** and 458.376 ***, respectively, thus rejecting the null hypothesis and raising doubts about the appropriateness of over-identification.

4.3. Panel Regression Analysis on Capital-Raising Level

Table 4 presents an empirical analysis results of the entire sample when testing what factors determine the level of capital raising when the Korean listed companies choose their level of capital raising. First, in Model 3, which comprises the explanatory variables, and in Model 4, which includes the control variables, the previous year's debt-to-equity ratio, target debt-to-equity ratio deviation, and underfunding are statistically significant with the level of capital raising. The coefficient of determination (r2_a) explaining the variability of the dependent variable is high in Models 3 (0.488) and 4 (0.540) for the net short-term debt ratio and relatively high in Model 4 (0.380) for the net equity ratio.

Table 4. Panel regression analysis on capital raising level: entire sample.

Variables	Net Short-Term Debt Ratio		Net Long-Term Debt Ratio		Net Equity Ratio	
	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
LEV _t	0.078 *** (0.012)	0.088 *** (0.012)	0.025 ** (0.012)	0.026 ** (0.012)	0.502 *** (0.041)	0.724 *** (0.034)
LeverageGap	−0.363 *** (0.012)	−0.369 *** (0.012)	0.017 (0.012)	0.021 * (0.012)	0.718 *** (0.042)	0.839 *** (0.034)
Def	0.111 *** (0.008)	0.075 *** (0.008)	0.007 (0.008)	0.005 (0.008)	0.586 *** (0.027)	0.321 *** (0.023)
MBRefwa	−0.008 *** (0.002)	0.001 (0.002)	−0.002 (0.002)	−0.001 (0.002)	−0.006 (0.006)	−0.057 *** (0.006)
Tang		0.086 *** (0.005)		0.006 (0.006)		−0.256 *** (0.016)
MTB		−0.005 *** (0.001)		−0.003 ** (0.001)		0.124 *** (0.003)
LogAsset		−0.018 *** (0.001)		0.001 * (0.001)		−0.060 *** (0.002)
EBIT		−0.122 *** (0.014)		−0.010 (0.014)		−1.711 *** (0.040)
Dep		−0.078 * (0.044)		−0.072 (0.046)		0.490 *** (0.129)
Constant	0.164 *** (0.007)	0.490 *** (0.014)	0.060 *** (0.007)	0.040 *** (0.015)	−0.033 (0.024)	1.018 *** (0.042)
N	11,473	11,473	11,473	11,473	11,473	11,473
F	2732.831 ***	1496.542 ***	2.528 **	2.491 ***	168.508 ***	784.347 ***
r ² _a	0.488	0.540	0.055	0.075	0.054	0.380

Notes: ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

A detailed examination of the analysis shows that the previous year's debt ratio had a significant positive effect on the current year's capital-raising level, suggesting that a high debt ratio in the preceding year leads to an increase in both long-term and short-term debts and shares in the current year. In particular, the strong positive relationships between the net equity ratio and previous year's debt ratio in Model 3 (0.502) and Model 4 (0.724) suggest that firms with higher debt ratios in the previous year are more inclined to raise capital to balance their capital structure. This can be interpreted from the perspective of the pecking order theory, in which a high debt ratio from the previous year increases the dependence on borrowed funds in the current year and results in an increase in paid-in capital when it becomes difficult to raise sufficient capital through debt [3,45]. However, this does not align with our expectations according to the trade-off theory, suggesting that a high debt ratio from the previous year negatively impacts the subsequent year's debt acquisition [14,46,47].

The results from Equation (1) and the average gap between the actual and target debt ratio measured through Equation (2) was 0.135, indicating that the target debt ratio for the entire sample was on average higher than the actual debt ratio by 0.135. The trade-off theory anticipates a positive relationship if the target debt ratio is higher than the actual debt ratio and a negative relationship with the equity ratio, as companies tend to prefer debt. However, the empirical analysis shows that the gap with the target debt ratio has a

negative relationship with the net short-term debt ratio and a positive relationship with the net equity ratio, which does not align with our expectations according to the trade-off theory. These results imply that while companies with a higher target debt ratio than actual debt ratio are reducing their debt ratios, firms with a lower target debt ratio are actually increasing their debt issuance, meaning no regression to the target capital structure occurs.

The Korean listed companies facing a fund deficit were shown to be raising funds through net short-term debt and an increase in paid-in capital. The coefficient of fund deficits in Model 4 for the net short-term debt ratio is significant at the 1% level with a value of 0.075; however, as it does not approach the theoretical expectation of 1, the simple pecking order theory is not supported [4,34,60]. Nevertheless, this variable is considered an additional factor for explaining the debt ratio, in line with studies by Kim and Park [46] and Shin [29]. Meanwhile, the coefficient for the net equity ratio was 0.321, demonstrating that the companies chose to increase their paid-in capital to a higher level than their net short-term debt. Such results can be interpreted as these companies choosing to raise capital through net equity, maintaining their capacity to handle low-risk debt, as Myers [45] suggested, rather than maintaining their net short-term debt ratio at a lower range. Therefore, the impact of fund deficits on the net equity ratio is more in line with the combined pecking order theory rather than the simple theory.

The weighted average market-to-book ratio of external capital raising is a variable used to test the market timing hypothesis. Companies prefer equity issuance when the cost of new equity issuance is low and conversely favor debt issuance when the cost of new equity issuance is high [8,9,35,53]. Therefore, a negative relationship between this variable and the debt ratio and a positive relationship with the net equity ratio are expected. The analysis results showed a significant negative impact on the net short-term debt ratio in Model 3, consistent with the theory, but this significance disappeared in Model 4 when the control variables were introduced. Conversely, no significant effect was observed between this variable and the net equity ratio in Model 3, but after introducing the control variables in Model 4, it showed a significant negative value, contradicting the theoretical prediction. This means that favorable market conditions decrease the net equity ratio by 0.057, suggesting that the Korean listed companies are less likely to issue equity when market conditions are favorable and prefer other financing options. However, since a consistent level of significance with the dependent variable was not confirmed in both models, it is difficult to determine that it provides a consistent impact.

Table 5 presents the analysis results, classifying the companies into KOSPI and KOSDAQ to clearly examine the impact of the characteristics of the Korean listed companies on their capital structure levels. Panel A represents the empirical analysis results for the companies listed on the KOSPI, and Panel B for those on the KOSDAQ. The coefficient of determination showed a high explanatory power for the net short-term debt ratio and net equity ratio at levels similar to the entire sample. The sign relationship between the explanatory variables and dependent variables in the sub-samples was identical to that of Model 3 except for the association between the market timing variable and net equity ratio. In particular, the KOSDAQ companies showed significance in all relationships between the explanatory variables and net equity ratio, confirming that they are different from the KOSPI companies.

According to the empirical analysis results, there were significant positive relationships between the previous year's debt ratio and debt maturity structure selection in the companies listed on the KOSPI with net long-term debt, while the KOSDAQ companies showed significant positive relationships with net short-term debt, demonstrating selective differences in debt maturity. Existing studies have suggested that companies with low levels of information asymmetry and bankruptcy risk and a high debt capacity prefer long-term debt over short-term debt [61,62]. The analysis results showed that the KOSPI companies, which are large and stable based on the stock exchange listing criteria, preferred the net long-term debt ratio, while the KOSDAQ companies, which include many small- and medium-sized venture businesses, chose the net short-term debt ratio. Additionally,

the positive relationship between the previous year's debt ratio and net equity ratio that appeared in the sub-samples can be interpreted as supporting the pecking order theory, which states that companies procure capital through equity when they cannot meet the conditions for debt maturity [3,45].

Table 5. Panel regression analysis on capital raising level: KOSPI and KOSDAQ companies.

Panel A: KOSPI Companies						
Variables	Net Short-Term Debt Ratio		Net Long-Term Debt Ratio		Net Equity Ratio	
	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
LEV _t	0.031 (0.021)	0.041 ** (0.020)	0.039 ** (0.020)	0.039 ** (0.020)	0.743 *** (0.065)	0.842 *** (0.054)
LeverageGap	−0.370 *** (0.021)	−0.388 *** (0.020)	0.040 ** (0.020)	0.042 ** (0.020)	0.964 *** (0.066)	1.035 *** (0.055)
Def	0.104 *** (0.014)	0.076 *** (0.014)	0.013 (0.013)	0.012 (0.014)	0.734 *** (0.044)	0.491 *** (0.038)
MBRefwa	−0.014 *** (0.004)	0.002 (0.004)	−0.005 (0.003)	−0.003 (0.004)	0.002 (0.011)	−0.092 *** (0.010)
Tang		0.074 *** (0.008)		0.014 * (0.008)		−0.135 *** (0.022)
MTB		−0.009 *** (0.002)		−0.002 (0.002)		0.151 *** (0.005)
LogAsset		−0.021 *** (0.001)		−0.001 (0.001)		−0.050 *** (0.002)
EBIT		−0.107 *** (0.024)		−0.005 (0.024)		−1.679 *** (0.066)
Dep		−0.082 (0.077)		0.088 (0.076)		0.235 (0.210)
Constant	0.177 *** (0.012)	0.594 *** (0.022)	0.054 *** (0.011)	0.062 *** (0.022)	−0.231 *** (0.037)	0.677 *** (0.060)
N	5104	5104	5104	5104	5104	5104
F	967.986 ***	588.064 ***	1.826 *	1.844 **	107.572 ***	331.302 ***
r2_a	0.431	0.508	0.054	0.055	0.075	0.367
Panel B: KOSDAQ Companies						
Variables	Net Short-Term Debt Ratio		Net Long-Term Debt Ratio		Net Equity Ratio	
	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
LEV _t	0.113 *** (0.014)	0.120 *** (0.014)	0.017 (0.015)	0.021 (0.015)	0.388 *** (0.052)	0.653 *** (0.042)
LeverageGap	−0.376 *** (0.014)	−0.356 *** (0.014)	0.006 (0.015)	0.009 (0.016)	0.533 *** (0.053)	0.676 *** (0.044)
Def	0.110 *** (0.009)	0.074 *** (0.009)	0.005 (0.010)	0.003 (0.010)	0.490 *** (0.034)	0.236 *** (0.029)
MBRefwa	−0.005 *** (0.002)	−0.000 (0.002)	−0.001 (0.002)	0.001 (0.002)	−0.015 * (0.008)	−0.035 *** (0.007)

Table 5. Cont.

Tang	0.098 ***		−0.003		−0.367 ***	
	(0.007)		(0.008)		(0.021)	
MTB	−0.001		−0.003 *		0.103 ***	
	(0.001)		(0.001)		(0.004)	
LogAsset	−0.008 ***		0.002		−0.104 ***	
	(0.001)		(0.002)		(0.004)	
EBIT	−0.142 ***		−0.010		−1.651 ***	
	(0.017)		(0.018)		(0.051)	
Dep	−0.126 **		−0.132 **		0.828 ***	
	(0.054)		(0.060)		(0.165)	
Constant	0.161 ***	0.293 ***	0.062 ***	0.034	0.092 ***	1.936 ***
	(0.008)	(0.028)	(0.009)	(0.030)	(0.030)	(0.084)
N	6369	6369	6369	6369	6369	6369
F	1935.652 ***	952.141 ***	1.141 *	1.944 ***	63.207 ***	439.667 ***
r2_a	0.548	0.573	0.001	0.001	0.036	0.382

Notes: ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

The gap with the target debt ratio and net short-term debt ratio showed significant negative signs in all sub-samples. However, while net long-term debt ratio showed a positive sign in KOSDAQ companies, this result was not significant. In contrast, it showed a significant positive relationship in the KOSPI companies, a finding consistent with the trade-off theory prediction. Therefore, the KOSPI companies were found to reduce their net short-term debt and expand their net long-term debt when the target debt ratio exceeded the previous year's debt ratio.

The impact of fund deficits on the net short-term debt ratio was significant at a similar level in both the KOSPI and KOSDAQ companies. However, the coefficient value did not correspond to the expected value of the pecking order theory, so it was not possible to confirm theoretical support. Nevertheless, the fund deficit showed a significant positive relationship with the net equity ratio at the 1% significance level in all sub-samples, supporting the combined pecking order theory. This is in contrast to Frank and Goyal [5], who found that for Korean listed firms, the underfunding variable is an additional factor that significantly affects the variation in the net short-term debt ratio, showing that it contributes to explaining the debt ratio along with traditional variables. These results suggest that the pecking order theory does not have a simple hierarchical structure. Rather, various factors interact to influence capital structure decisions depending on firm characteristics.

Regarding the weighted average market-to-book ratio of external capital raising, which is used to verify market timing, the relationship with the net equity ratio was not significant in the KOSPI companies in Model 3, and it was significantly negative after controlling for traditional variables, making it difficult to observe a consistent impact. Conversely, in the KOSDAQ companies, there was a significant negative relationship in Models 3 and 4. This indicates the hypothesis that conditions in the external capital raising market impact a company's means of capital raising cannot be applied to the KOSDAQ companies, as claimed by Baker and Wurgler [8] and Huang and Ritter [53].

4.4. Panel Regression Analysis on Changes in Capital Raising

In a shift from the influence of company characteristics on static capital structure levels, this study seeks to verify the extent to which the variables that influence the preference phenomenon between debt issuance and equity issuance when a company raises additional external funds explain the changes in capital structure. Accordingly, a panel regression

analysis was conducted with net short-term debt issuance, net long-term debt issuance, and net equity issuance as dependent variables. The analysis results for the entire sample are presented in Table 6. First, the model in Table 6 shows a lower coefficient of determination (r^2_a) than that of the model in Table 4, and the related difference between Model 3 and Model 4 is present but insignificant. These results suggest that predicting changes in capital raising is more difficult than predicting its level. This may be because changes in capital raising for Korean firms are more dynamic in nature, which may be due to a higher level of volatility or the impact of unobserved factors.

Table 6. Panel regression analysis on changes in capital raising: entire sample.

Variables	Net Short-Term Debt Issuance		Net Long-Term Debt Issuance		Net Equity Issuance	
	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
LEV _t	−0.453 *** (0.009)	−0.473 *** (0.009)	0.005 (0.009)	0.006 (0.009)	0.321 *** (0.009)	0.340 *** (0.009)
LeverageGap	−0.442 *** (0.009)	−0.468 *** (0.009)	0.002 (0.009)	0.004 (0.010)	0.324 *** (0.009)	0.337 *** (0.009)
Def	0.099 *** (0.006)	0.127 *** (0.006)	0.002 * (0.006)	0.001 (0.006)	0.201 *** (0.006)	0.180 *** (0.006)
MBRefwa	0.000 (0.001)	−0.003 ** (0.001)	0.002 (0.001)	0.003 * (0.002)	0.024 *** (0.001)	0.023 *** (0.001)
Tang		0.006 (0.004)		−0.003 (0.004)		−0.025 *** (0.004)
MTB		−0.000 (0.001)		−0.000 (0.001)		0.005 *** (0.001)
LogAsset		0.001 (0.001)		0.000 (0.001)		−0.003 *** (0.000)
EBIT		0.183 *** (0.011)		−0.009 (0.011)		−0.136 *** (0.010)
Dep		−0.076 ** (0.035)		0.021 (0.036)		−0.034 (0.033)
Constant	0.258 *** (0.005)	0.251 *** (0.011)	0.000 * (0.005)	−0.006 (0.012)	−0.176 *** (0.005)	−0.120 *** (0.011)
N	11,473	11,473	11,473	11,473	11,473	11,473
F	819.289 ***	410.386 ***	0.731 ***	0.545 ***	638.791 ***	334.819 ***
r^2_a	0.221	0.243	0.001	0.001	0.181	0.207

Notes: ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

The previous year's debt ratio shows a significant negative relationship with net short-term debt issuance and a significant positive relationship with net equity issuance. Therefore, when the previous year's debt increases, instead of reducing short-term debt issuance, companies raise additional funds through equity issuance. While net short-term debt issuance maintains a marginal increase as the previous year's debt ratio increases, as confirmed in Table 4, companies reduce the actual issuance volume within a range that does not lower the net short-term debt ratio level. This aligns with the trade-off theory, which anticipates a negative relationship with the debt ratio when a high debt ratio in the previous year limits the current year's debt issuance [5,14,47]. Meanwhile, the positive relationship shown in net equity issuance can be interpreted as companies choosing to

issue equity when capital raising through debt is difficult, which appears to conform with the pecking order theory [3,45].

We find that the gap with the target debt ratio is negatively related to net short-term debt issuance and positively related to net equity issuance at the 1% significance level, which is inconsistent with the trade-off theory. Firms adjust their capital structure by decreasing their net short-term debt issuance by 0.442 to 0.468 and increasing their net equity issuance by 0.324 to 0.337 when the gap with the target debt ratio increases by 1 percentage point. On the other hand, the fund deficit variable is correlated with an adjusted capital structure as companies utilize net short-term debt issuance and net equity issuance. This suggests that the Korean listed companies use short-term debt and equity issuance to meet their liquidity needs. We show that for a 1% increase in fund deficit, the firms issue 0.099 to 0.127 more net short-term debt and 0.180 to 0.201 more net equity. The gap between the target debt ratio and fund deficit was confirmed to have signs and significance levels similar to those found at the capital raising level, suggesting that the influence of these two variables also consistently applies when additional external funds are raised.

In verifying the market timing hypothesis, the weighted average market-to-book value ratio of external capital raising did not significantly influence net short-term and long-term debt issuance. However, after controlling for traditional variables, it was significantly negative with net short-term debt issuance and significantly positive with net long-term debt issuance, which makes it difficult to observe a consistent influence. However, we confirmed that it has a significant positive impact at the 1% level on net equity issuance. This provides evidence that when the stock price is relatively overvalued, companies raise their equity capital by issuing new shares rather than debt [8,53]. The results also do not support Jeong's [56] argument that the institutional characteristics of the Korean stock market regarding rights issues may not apply to the capital structure of Korean firms, unlike in the United States (U.S.).

Table 7 presents our analysis results on how company characteristics influence changes in capital structure in the KOSPI and KOSDAQ markets. Previous year's debt ratio showed a significant negative influence on net short-term debt issuance in both the KOSPI and KOSDAQ companies, in a shift from the capital structure level results in Table 4. Although the KOSPI companies showed a positive relationship with the net long-term debt ratio in Table 4, they displayed a significant negative relationship with net short-term debt issuance. This can be interpreted as companies adjusting their level of debt through long-term debt while reducing the issuance of short-term debt. Particularly, the KOSDAQ companies showed a positive relationship with the net short-term debt ratio but a negative relationship with net short-term debt issuance, suggesting possible constraints in their debt issuance. These results can be interpreted as companies reducing their net short-term debt issuance owing to constraints such as debt financing when their previous year's debt ratio is high. This aligns with the pecking order theory, which suggests a negative relationship between the previous year's debt ratio and debt issuance [5,14,46]. Meanwhile, the previous year's debt ratio showed a significant positive influence on net equity issuance in both groups. This is interpreted as showing that the listed companies, regardless of the size of their market, chose to issue equity as an additional capital-raising method when it is difficult to issue debt, supporting the pecking order theory [3,45].

The gap between the target debt ratio and fund deficit exhibited similar results with the variables representing the capital-raising level in net equity issuance and net short-term debt issuance, and no effect of additional external fund acquisition was found in the sub-samples. In particular, unlike Frank and Goyal [5], we find that underfunding has a significant positive effect on net short-term debt issuance and net equity issuance for Korean listed firms, regardless of the market. Frank and Goyal [5] argued that equity issuance is more related to underfunding than is net debt issuance. However, there is no difference in the Korean market, and there are no results on the preference for equity issuance by small firms. These results suggest that Korean firms chose a more flexible

approach between short-term debt and equity issuance when facing financial constraints, in contrast to the preference for equity issuance in the U.S.

Table 7. Panel regression analysis on changes in capital raising: KOSPI and KOSDAQ companies.

Panel A: KOSPI Companies						
Variables	Net Short-Term Debt Issuance		Net Long-Term Debt Issuance		Net Equity Issuance	
	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
LEV _t	−0.489 *** (0.015)	−0.501 *** (0.015)	0.006 (0.015)	0.006 (0.015)	0.347 *** (0.013)	0.363 *** (0.013)
LeverageGap	−0.471 *** (0.015)	−0.490 *** (0.015)	0.003 (0.015)	0.006 (0.015)	0.356 *** (0.013)	0.375 *** (0.013)
Def	0.104 *** (0.010)	0.129 *** (0.010)	0.012 * (0.010)	0.011 (0.011)	0.194 *** (0.009)	0.161 *** (0.009)
MBRefwa	−0.001 (0.002)	−0.003 (0.003)	−0.002 (0.003)	−0.002 * (0.003)	0.027 *** (0.002)	0.024 *** (0.002)
Tang		−0.002 (0.006)		−0.001 (0.006)		−0.015 *** (0.005)
MTB		−0.000 (0.001)		0.000 (0.001)		0.007 *** (0.001)
LogAsset		0.000 (0.001)		0.001 (0.001)		−0.002 *** (0.001)
EBIT		0.157 *** (0.018)		−0.011 (0.018)		−0.217 *** (0.016)
Dep		−0.028 (0.056)		−0.010 (0.058)		−0.081 (0.050)
Constant	0.277 *** (0.008)	0.275 *** (0.016)	−0.000 * (0.009)	−0.017 (0.016)	−0.196 *** (0.008)	−0.157 *** (0.014)
N	5104	5104	5104	5104	5104	5104
F	356.790 ***	171.026 ***	0.701 *	0.501 *	294.006 ***	170.170 ***
r ² _a	0.217	0.230	0.002	0.003	0.185	0.229
Panel B: KOSDAQ Companies						
Variables	Net Short-Term Debt Issuance		Net Long-Term Debt Issuance		Net Equity Issuance	
	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
LEV _t	−0.433 *** (0.012)	−0.456 *** (0.012)	0.004 (0.012)	0.005 (0.012)	0.309 *** (0.012)	0.327 *** (0.012)
LeverageGap	−0.427 *** (0.012)	−0.453 *** (0.012)	0.001 (0.012)	0.003 (0.012)	0.302 *** (0.012)	0.313 *** (0.012)
Def	0.096 *** (0.008)	0.124 *** (0.008)	−0.004 (0.008)	−0.005 (0.008)	0.203 *** (0.008)	0.189 *** (0.008)
MBRefwa	0.001 (0.002)	−0.004 ** (0.002)	0.004 ** (0.002)	0.004 ** (0.002)	0.022 *** (0.002)	0.022 *** (0.002)
Tang		0.016 *** (0.006)		−0.005 (0.006)		−0.030 *** (0.006)

Table 7. Cont.

MTB		0.000		−0.001		0.004 ***
		(0.001)		(0.001)		(0.001)
LogAsset		0.005 ***		0.000		−0.003 **
		(0.001)		(0.001)		(0.001)
EBIT		0.186 ***		−0.012		−0.096 ***
		(0.014)		(0.014)		(0.014)
Dep		−0.140 ***		0.035		−0.026
		(0.045)		(0.046)		(0.046)
Constant	0.247 ***	0.163 ***	0.000	−0.002	−0.164 ***	−0.114 ***
	(0.007)	(0.023)	(0.007)	(0.023)	(0.007)	(0.023)
N	6369	6369	6369	6369	6369	6369
F	463.850 ***	242.332 ***	1.301 *	0.799 *	348.358 ***	171.335 ***
r2_a	0.224	0.253	0.001	0.002	0.178	0.193

Notes: ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

The market timing variable showed a significant positive influence on net equity issuance in both the KOSPI and KOSDAQ companies, verifying the market timing hypothesis proposed by Baker and Wurgler [8] for Korean listed companies. These results differ from those showing no significance or a significant negative relationship regarding the capital structure level and are interpreted as evidence that net equity issuance, which represents a change in capital structure, aligns with the market timing hypothesis. Institutional differences exist between Korea and the U.S. In the U.S., equity issuances are typically conducted through a general public offering, whereas in Korea and Europe, equity issuances are primarily conducted through shareholder preferential allocation. Notwithstanding the disadvantages of the shareholder preferential allocation method, Korean listed companies have been raising capital through equity issuance by seizing the moment when the stock price is overvalued.

5. Discussion and Conclusions

This study conducted a panel analysis of listed firms in the Korean stock and KOSDAQ markets from 2011 to 2021. It examined the relationship between firm characteristics and the static level of capital structure, determining whether firms have a preference between dynamic debt and equity issuance for raising external funds and identifying the firm characteristics that affect this preference.

First, we analyzed the speed of the target debt-to-equity ratio adjustment among the Korean listed firms and discovered that the firms adjust their deviations from the target debt-to-equity ratio by 43.1% annually, taking 2.3 years to fully adjust. Compared to previous studies, the speed of debt-level adjustment has changed to a moderate level, suggesting that companies need a long-term capital-raising strategy considering transaction costs, financial constraints, and company characteristics.

Second, we discovered that the previous year's debt-to-equity ratio positively impacts the current year's short- and long-term debt and equity. However, when issuing debt or equity to raise additional capital, firms adjust their capital structure by reducing net short-term debt issuance and increasing equity issuance. The results suggest that the Korean listed firms should consider that both short- and long-term debt and equity are likely to increase when the previous year's debt-to-equity ratio is high and that it may be effective to adjust the capital structure by reducing net short-term debt issuance and increasing equity issuance when raising capital.

Third, the target debt-to-equity ratio is negatively correlated with the net short-term debt ratio but positively correlated with the net equity ratio, and a similar effect was found for external financing. This suggests that firms with higher target debt-to-equity ratios than actual debt-to-equity ratios reduce the level and issuance of net short-term debt; thus, no regression of target capital structure exists. Theoretically, firms should reduce their net short-term debt and adjust their capital structure through equity issuance when the target debt-to-equity ratio is high. However, the Korean listed companies' target debt-to-equity ratio is inconsistent with our expectations according to the trade-off theory regarding capital structure level and issuance; thus, a capital structure plan that takes this into consideration is required.

Fourth, the Korean listed firms that are underfunded use net short-term debt issuance and net equity issuance to finance their firms. The analysis indicates that underfunding positively impacts capital structure level and issuance when the target debt-to-equity ratio is higher than the actual debt-to-equity ratio. In particular, the effect of net equity issuance is greater than that of net short-term debt issuance. This suggests that firms prefer net equity to net short-term debt, which is consistent with the composite ranking theory rather than the simple capital financing ranking theory.

Fifth, regarding market timing, the weighted average market-to-book ratio of external financing is negatively related to the net equity ratio in the KOSDAQ market but positively correlated to net equity issuance in all samples. When the market stock price is relatively overvalued, the KOSDAQ firms should reduce their net equity ratio and raise external capital by issuing new shares. Therefore, the market timing hypothesis, which posits that the state of the external capital financing market affects a firm's means of raising capital, is a valid hypothesis for the net equity issuance of Korean listed firms.

In conclusion, the capital structure of the Korean listed firms is determined through a complex mechanism in which the trade-off theory, pecking order theory, and the market timing hypothesis act complementarily. From the perspective of both theories, this study confirms that the previous year's debt-to-equity ratio and shortage situation significantly influence the choice of capital structure and that the market timing hypothesis is valid in the KOSDAQ market. This indicates that certain theories proposed in the literature may explain variables in other theories or may apply only to certain markets. Therefore, a comparative analysis of various countries and markets and a comprehensive approach that considers firm, industry, and economic conditions are required to accurately understand the capital structure of firms. However, an analysis of the debt ratio, which is a decomposition of the sustainable growth rate, categorized into short- and long-term periods, shows that the target debt ratio misalignment and the underfunding situation of firms are significantly related to the level and issuance of net short-term debt. This can be validly explained by both theories under theoretical assumptions. This can serve as a basis for subdividing the static level of debt ratios observed in existing sustainable growth studies into short- and long-term debt issuance from a dynamic perspective. Additionally, from a practical perspective, companies should utilize a pragmatic approach to complement the theoretical approach to meet their short-term financing needs and build a stable financing foundation for sustainable growth in a changing environment.

The findings of this study provide practical implications for the design of efficient capital-raising strategies by providing a clearer understanding of the capital structure decision process of firms. However, this study has several limitations that should be considered when interpreting the results. Bias may have been caused by the inherent measurement error of the empirical variables, and the limited scope of the study may not capture all relevant factors. Future research can compensate for these limitations by rigorously lowering the measurement error and exploring the various factors that influence firms' capital structure decisions.

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