

A Study on the Effect of Diversified Companies' Labor Union's Bargaining Power on the Capital Structure under Financial Constraints

Chanil Boo¹, Sooeun Kim²

¹(School of Global Finance and Management, Sangmyung University, Korea)

²(School of Global Finance and Management, Sangmyung University, Korea)

Corresponding author: Sooeun Kim

Abstract: This study empirically analyzed the effects of the labor union's bargaining power of diversified companies on the capital structure under financial constraints with the diversified companies listed on the Korea Stock Exchange from January 1, 2000 to December 31, 2019. The significant findings are as follows. Companies with the labor union strategically increase leverage to increase bargaining power with trade unions, and firms with large operating profit volatility tend to increase leverage more. This means that the greater the volatility of operating profit, the greater the bargaining power with trade unions through increased leverage, representing both corporate and trade union interests. In addition, companies with labor unions increase their leverage to increase bargaining power with the labor union even under financial constraints and make a strategic choice to diversify profits and minimize future disputes by increasing leverage under the dynamic capital structure and the static capital structure as well. In conclusion, it can be said that companies listed on the Korea Exchange's stock market strategically increase their leverage to increase bargaining power with the labor union. These findings suggest the need to establish financial policies by acknowledging that the labor union is a new variable affecting the capital structure, expecting to contribute to the researches on the relationship between bargaining power with the labor union and the capital structure.

Key words: Labor union, Company with a labor union, Capital structure, Financial constraints

Date of Submission: 29-12-2020

Date of Acceptance: 10-01-2021

I. INTRODUCTION AND LITERATURE REVIEW

The capital structure of a corporation is important in financial theory and highly practical as a field attracting researchers' continuous interests. Currently, most of the studies are on the determinants of capital structure, and various studies are being conducted on the adjustment of the debt ratio to some extent for the capital structure. The economic environment at home and abroad is changing rapidly, and companies are strategically choosing various activities. In particular, to generate higher growth and greater market dominance than their competitors, companies carry out many business diversification strategies, which are considered important enough to be said as an essential factor that can enhance corporate value. This indicates how important the diversification activities are in the various strategic choices available to the entity, as the business diversification strategy can create greater market dominance and higher corporate performance for the entity in a competitive market environment. This study aims to analyze the effects of companies' labor unions that have diversified under financial constraints on the capital structure of companies that have diversified their business. A study on corporate diversification argued that companies are currently reducing investment in a situation where the global economy is bogged down, but since the past, companies have focused on increasing the business by expanding the appearance of the company through diversification. As businesses expand from a conservative point of view, corporate diversification also has conflicts regarding selection and concentration. Studies on corporate diversification of Korean companies are currently not being studied in-depth, particularly in-depth studies, especially on the capital structure of companies that have diversified their businesses.

A corporation makes diverse efforts to reduce wage expenditures from corporate profits in negotiation with the labor union. Klasa et al.(2009) argued that companies could increase their bargaining power with labor unions by strategically reducing their cash reserves, and DeAngelo and DeAngelo (1991) suggested that companies strategically reduce the corporate profit through profit management before the negotiation with the trade union. Lang and Stulz (1994) suggested that a company with a high level of diversification has a lower value than a company running a single business, and a diversified company running multiple businesses outperforms a company specialized in one field. Berger and Obek (1995) argued with the empirical evidence

that excessive investment by companies with a high level of diversification and mutual support between business sectors are the main factors that cause a decline in corporate value and that the higher the level of diversification, the greater the inefficiency of resource allocation across the corporation due to the transfer of scarce resources from a profitable business unit to a less profitable business unit (Scharfstein and Stein, 2000). Lewellen (1971) argued that diversification policies would reduce the volatility of companies running various business units, reducing capital raising costs, which induces an increase in debt-bearing capacity and a tax reduction effect, thereby increasing corporate value. Stulz (1990) suggested that corporate diversification creates a larger internal capital market and that the problem of underinvestment raised by Myers (1977) is solved, increasing the company value by investing more in investments with a net present value greater than zero compared to individual companies. Companies reduce their cash reserves less than the optimum level to gain a strategic advantage in negotiating with the labor union. As the labor union focuses on increasing union members' wages and increasing benefits such as health insurance and retirement pensions, the level of union members' wages increases but the corporate profitability decreases. Hirsch (1991) argued that the profitability of the corporation with the labor union declines while Besley and Burgess (2004) argue that the proportion of labor costs increases because of rigid layoffs and inventories of employees and Simintzi et al. (2009) suggested that the stronger the guarantee of employment for employees, the higher the cost of labor and the lower the profitability. Card (1996) argued that a corporation with a labor union has a 17% higher wage level than the one without a labor union, while Clark (1984) suggested that a corporation with a labor union has a 19% lower net income rate of equity capital than the one without a labor union. In addition, Hilary (2006) stated that information asymmetry in the corporation with a labor union increases, increasing the spread of quotes in the capital market, decreasing transaction volume and analyst coverage, and increasing the probability of insider trading. Myers and Majluf (1984), Brennan and Subrahmanyam (1996), Easley and O'hara (2004). et al. argue that as information asymmetry increases, equity costs increase, and Chen et al. (2011) suggested that the unionization rate increases by 1 standard deviation, the cost of equity capital increases by 1.23%. The more union members demand their share of corporate profits, the lower the net return on assets of the corporation with a labor union decreases with a higher risk of bankruptcy. Klasa et al.(2009) argued that as the level of cash reserves of a company increases, the demand for a wage increase by the union increases, and companies strategically reduce the level of cash reserves to increase bargaining power with the union. With this research motivation, this study empirically analyzes the effects of diversified companies' bargaining power on the capital structure under financial constraints on diversified companies listed on First, the effect of trade union bargaining power on the capital structure for all subjects was analyzed, and then the effect of labor union bargaining power on the capital structure under financial constraints. In addition, in terms of the robustness test, the effect of the labor union's bargaining power on the capital structure under dynamic and static capital structure is analyzed.

II. MODELS AND VARIABLES

To empirically analyze the effect of labor union's bargaining power on the capital structure of the diversified corporation, a capital structure decision model is established such as Expression (1) by applying prior studies of Bronars and Deere (1991), Matsa (2010), and Simintzi et al. (2009).

$$L_{i,t} = \alpha_0 + \alpha_1 Union_{i,t-1} + \alpha_2 Vol_{i,t-1} + \alpha_3 Union_{i,t-1} \times Vol_{i,t-1}^d + \alpha_4 Q_{i,t-1} + \alpha_5 Tang_{i,t-1} + \alpha_6 ROA_{i,t-1} + \alpha_7 Size_{i,t-1} + \alpha_8 Depr_{i,t-1} + \alpha_9 DEF_{i,t-1} + \alpha_{10} Chaebul_{i,t-1} + \varepsilon_t \quad (1)$$

In equation (1), the dependent variable, the leverage ratio ($Union_{i,t-1}$), is measured as [(company i's total liabilities in year t)/(company i's total liabilities in year t + market capitalization of company i's equity capital in year t)] according to Fama and French (2002) and Flannery and Rangan, et al.(2006). In Equation (1), the explanatory variables are the unionization rate ($Union_{i,t-1}$), the operating profit's volatility, and its interaction variables. First of all, the unionization rate is measured by [(company i's union members in t-1 year)/(company i's salary workers in t-1 year)] based on the "National Labor Union Organization Status Report by Year" published by the Ministry of Employment and Labor and annual corporate union membership data extracted through extensive manual work and time. Matsa (2010) suggested that a corporation can increase its bargaining power with the labor union by strategically increasing leverage through debt raising. And Myers and Saretto (2010) argued that if a company decreases its leverage before a strike, the probability of a strike increases, so it strategically increases its leverage by purchasing treasury shares or issuing debt in preparation for the next strike. Operating profit volatility ($Vol_{i,t-1}^d$) is measured by rolling over each year during the sample period (the standard deviation of an entity's operating profit ratio to sales over the past five years from t-5 to t-1). However, the operating profit volatility dummy ($Vol_{i,t-1}^d$) is measured as a dummy variable having [1 if the volatility of the t-1 year operating profit of the entity i is greater than or equal to the median during the analysis period, or 0]. Matsa (2010) argued that the greater the operating profit variability, the more strategic the

leverage could be increased, and the greater the bargaining power with the trade union. And a one-year time lag is applied to the explanatory variable, which effectively mitigates endogeneity problems between variables.

In Expression (1), control variables consist of six capital structure variables and a Chaebol dummy suggested in the existing capital structure theory, and one year-time lag is applied to all of the variables to control the endogeneity problem. First, Tobin-q($Q_{i,t-1}$) is theoretically defined as [(company i's market value in t-1 year)/(company i's asset replacement cost in t-1 year)], but since it is challenging to collect data on the replacement cost of an asset, [(company i's total liabilities in year t-1 + company i's market capitalization in year t-1)/(company i's asset in year t-1 Total)] according to the method of Hung and Pruitt (1994). The tangibility ratio ($Tang_{i,t-1}$) is measured as [(company i's t-1 year inventory + company i's t-1 year tangible assets)/(i company's t-1 year total assets)]. The profitability ratio ($Roa_{i,t-1}$) is measured as [(company i's t-1 year EBIT)/(company i's total assets in year t-1)]. company size ($Size_{i,t-1}$) is measured with \ln (total assets in t-1 year of company i). The depreciation expense ratio ($Depr_{i,t-1}$) is measured as [(company i's t-1 year depreciation expense)/(i company's t-1 year total assets)]. The financial deficit ratio($DEF_{i,t-1}$) is measured as [(company i's t-1 year financial deficit)/(company i's total assets in t-1 year)] according to the method of Frank and Goyal (2003).The technical definition of Chaebol (Chaebol) can be made in many ways, but based on the definition given by the Fair Trade Commission, which carries out its policy on Chaebol, it is measured as 1 if it belongs to a chaebol, and 0 if not. This study additionally analyzes the effect of the labor union bargaining power on the capital structure by using not only the static capital structure model such as Equation (1) but also the dynamic capital structure model such as Equation (2). Miguel and Pindado(2001), Flannery and Rangan (2006) et al. argued that Since capital structures have historically averaged regression properties if the actual capital structure temporarily deviates from the target capital structure, it dynamically adjusts the capital structure again toward the target capital structure.

$$L_{i,t} = \beta_0 + \beta_1 L_{i,t-1} + \beta_2 Union_{i,t-1} + \beta_3 Vol_{i,t-1} + \beta_4 Union_{i,t-1} \times Vol_{i,t-1}^d + \beta_5 Q_{i,t-1} + \beta_6 Tang_{i,t-1} + \beta_7 ROA_{i,t-1} + \beta_8 Size_{i,t-1} + \beta_9 Depr_{i,t-1} + \beta_{10} DEF_{i,t-1} + \beta_{11} Chaebol_{i,t-1} + \varepsilon_t \quad (2)$$

In equation (2), the dependent variable is the leverage ratio ($L_{i,t}$), and the explanatory variable is the unionization rate ($Union_{i,t-1}$) as in equation (1), As for the control variable, a one-year time lag leverage ratio ($L_{i,t-1}$) was added in addition to the six capital structure variables and Chaebol dummy used in equation (1). Therefore, Equation (2) belongs to a partial adjustment model because a one-year time lag dependent variable ($L_{i,t-1}$) is used as an independent variable. Flannery and Rangan (2006) and Korajczyk et al. (2007) measured the leverage adjustment speed (θ) as $1 - \beta_1$ by subtracting β_1 the regression coefficient (β_1) of a one-year time lag leverage ratio from 1. A more advanced econometric model is required to estimate Equation (2). Above all, the OLS (ordinary least squares) regression model is inappropriate because a one-year time lag dependent variable ($L_{i,t-1}$) is used as a control variable. And if the fixed-effect model is used, the unobservable corporate characteristic effect and the time characteristic effect can be effectively controlled, but the endogeneity and simultaneity problem due to the correlation between the past value of a one-year time lag dependent variable ($L_{i,t-1}$) cannot be controlled. To effectively control the endogeneity and simultaneity problem, therefore, GMM (generalized method of moments) model using instrumental variables suggested by Arellano and Bover (1995), Blundell and Bond (1998), is employed among various panel regression models. This method uses the differential variable as an instrument variable for the level variable, the level variable as the instrument variable for the differential variable, and the level variable of the dependent variable and the past value of the differential variable as an additional instrument variable. Therefore, since the model is estimated by simultaneously applying level variables, differential variables, and past values, inconsistency and bias due to endogenous and simultaneity problem can be effectively removed (Aggarwal and Kyaw, 2010; Antoniou et al., 2006).In addition, the Arellano-Bond test for the first and second order autocorrelation of the error term is performed, and the system GMM model is applied through the Hansen test for overidentifying restrictions test through the correlation between the instrument variable and the error term (Hansen, 1982).

Data and Descriptive Statistics

In this study, subjects are selected according to the following criteria among companies listed on the Korea Stock Exchange. First, companies whose financial and stock price data are not available from January 1, 2000 to December 31, 2019 in KIS Value Library, FnGuide, and TS2000 were excluded. Financial industries such as banks, securities, and insurance are excluded from the subject because they differ from common manufacturing industries in terms of capital structure, business methods, and government regulatory supervision. In addition, de-listed companies during the analysis period are excluded, and merged companies or companies under legal management are excluded from the subject due to issue of the continuity of financial data. In addition, companies with total assets of less than KRW 1 billion or without sales may generate outliers

for the variables, so they are excluded from the subject, and 1% above and below each variable is winsorized to control the effect of outliers on analysis results. The number of companies-years of diversified companies that meet the above conditions is 3,958. A diversified company is defined as a company with at least two business units belonging to different standard industry classification codes under the Korean Standard Industry Classification (KSIC) (Tong, 2011). Diversified companies are classified as financially constrained and non-constrained companies according to financial constraints. Sub-sample classification is classified as accessing companies if the amount of new debt issuance, issuance of new shares, debt repayment or capital reduction is 5% or more of the total assets according to Faulkender and Smith (2007). If it is less than 5%, it is classified as non-accessible. The sub-sample classification according to the credit rating level is classified into high and low credit rating companies based on the median of the credit rating of Korea Credit Rating Information Co., according to Aivazian et al. (2006).

<Table 1> identifies the probability distribution characteristics and outliers of variables through analysis of basic statistics on the subject's characteristic variables. Through correlation analysis between variables, the direction and magnitude of the correlation and the possibility of multicollinearity are also checked. <Table 1> shows the analysis of basic statistics on the characteristic variables of diversified companies. As a result of the analysis of basic statistics for diversified companies, the average of the leverage ratio, which is a capital structure variable, is 50.78%, which is greater than the median 49.42%, and the average (median) of the unionization rate is 48.93% (48.17%), which is 13.35% for US companies. % (9.00%) (Chen and Chen, 2013), the average of operating profit volatility is 4.88%, less than the median 2.90%. Among the control variables, Tobin-q's mean (median) was 0.9605 (0.8538), which was lower than 1.7919 (1.3673) for US firms and lower than 1.872 (1.451) for UK firms (Hovakimian and Hovakimian, 2009; Pawlina and Renneboog, 2005; Chen and Chen, 2013). The average of the tangibility ratio is 46.53%, which is less than the median 47.17%, the average of the profitability ratio is 7.18%, which is greater than the median 7.05%, and the average of the company size is 25.5019, which is greater than the median 25.2830. The average of the depreciation ratio is 0.24%, which is less than the median 0.28%, and the average of the financial deficit ratio is 5.90%, which is asymmetrically larger than the median 5.83%. The result of the analysis shows that most of the corporate characteristic variables were not significantly affected by the extreme value, and the distribution of the variables was a little more stable because the outliers were winsorized, which exceeded the upper and lower 1% for each variable.

<Table 1> Analysis of basic statistics on characteristic variables of the subject

Variable	Diversified company				
	Average	Standard deviation	Minimum value	Median	Maximum value
$L_{i,t}$	0.5078	0.2613	0.0013	0.4942	0.9991
$Union_{i,t-1}$	0.4893	0.2346	0.0004	0.4817	0.9977
$Vol_{i,t-1}^d$	0.0488	0.0509	0.0016	0.0290	0.3303
$Q_{i,t-1}$	0.9605	0.5014	0.1905	0.8538	2.8309
$Tang_{i,t-1}$	0.4653	0.1940	0.0008	0.4717	0.9011
$Roa_{i,t-1}$	0.0718	0.0876	-0.2743	0.0705	0.4288
$Size_{i,t-1}$	25.5019	1.6907	18.8054	25.2830	32.0982
$Depr_{i,t-1}$	0.0024	0.0101	0.0001	0.0028	0.0469
$DEF_{i,t-1}$	0.0590	0.2517	-0.4749	0.0583	0.7638

<Table 2> shows the correlation and multicollinearity analysis. As a result of the correlation analysis for diversified companies, the sign of the correlation coefficient between the dependent variables and the independent variables is generally consistent with the prediction. The unionization rate has a significant positive correlation with the leverage ratio, which is a capital structure variable, at the 1% level, suggesting that the leverage increases as the unionization rate increases. Of the control variables, the tangibility ratio, company size, depreciation expense ratio, and financial deficit ratio have a significant positive correlation with the leverage ratio at a level of 1 to 5%, respectively, and the operating profit volatility, Tobin-q, and profitability ratio have negative (-) correlation with at the 1% level. There is also no concern about multicollinearity as the absolute value of the correlation coefficient is not large between the independent variables. (Kennedy, 1992). In addition, the result of individually measuring variance inflation factors (VIFs) for the regression coefficient, the VIF value of the profitability ratio was the largest at 1.19, but distributed within the statistically acceptable range. In this study, therefore, no concern exist on the multicollinearity problem that often occurs in regression analysis using financial variables.

<Table 2>Correlation and multicollinearity analysis

변수	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	VIFs
(1) $L_{i,t}$	1									
(2) $Union_{i,t-1}$	0.185**	1								1.13
(3) $Vol_{i,t-1}^d$	-0.198**	-0.004*	1							1.19
(4) $Q_{i,t-1}$	-0.310**	-0.120**	0.114**	1						1.05
(5) $Tang_{i,t-1}$	0.227**	0.229**	-0.092**	-0.113**	1					1.08
(6) $Roa_{i,t-1}$	-0.254**	-0.078**	-0.187**	0.125**	-0.034*	1				1.06
(7) $Size_{i,t-1}$	0.040**	0.037**	-0.142**	0.115**	0.123**	0.144**	1			1.10
(8) $Depr_{i,t-1}$	0.077*	-0.002*	-0.053	0.108**	0.091**	0.090**	0.115**	1		1.06
(9) $DEF_{i,t-1}$	0.029*	0.070*	0.082*	-0.035	0.140**	-0.208**	0.106**	0.067	1	1.08

** , * Indicates significance at the 1% and 5% levels (both sides), respectively.

V. EMPIRICAL RESULTS

This chapter empirically analyzes the effect of the labor union's bargaining power on the capital structure of diversified companies. First, the effect of labor union bargaining power on the capital structure for all sample companies are analyzed, and the effect of labor union bargaining power on the capital structure under financial constraints are additionally analyzed.

<Table 3> shows the results of analyzing the effect of labor union's bargaining power on the capital structure for all diversified companies. As a result of the analysis of [Model 1], the unionization rate (=0.176) has a significant positive (+) effect on the leverage ratio at the 1% level, which means that as the unionization rate increases, the leverage ratio also increases. These findings are consistent with previous studies showing that companies strategically increase leverage to increase bargaining power with labor unions. (Bronars and Deere, 1991; Matsa, 2010; Myers and Saretto, 2010). Of the controlling variables, Tobin-q has a significant negative (-) effect on the leverage ratio at the 1% level, which is in line with previous studies that debt capacity decreases when a high-growth company increases its investment in intangible and special assets. The tangibility ratio has a significant positive (+) effect on the leverage ratio at the level of 1%, which suggests that companies use more liabilities as the collateral value increases as they hold more collateral assets such as tangible assets and inventory. The profitability ratio has a significant negative (-) effect on the leverage ratio at the 1% level, which is consistent with the capital raising order theory that the high-margin company reduces the issuance of debt as the internal finance increases. Company size has a significant positive (+) effect on the leverage ratio at the level of 10%, which is consistent with the claim that debt issuance increases as the size of the company increase, it is easier to diversify management and the volatility of cash flow and the likelihood of bankruptcy decrease, so the debt capacity increases, as the size of the company increases, the monitoring cost for managers decreases and moral risk and adverse selection problems can be reduced. The depreciation ratio, a variable that shows the non-debt tax reduction effect, has a significant positive (+) effect on the leverage ratio at the 5% level. The financial deficit ratio has a significantly positive (+) effect on the leverage ratio at the level of 10%, which means that The chaebol dummy was observed to have a significant effect on the leverage ratio at the 5% level. As a result of the analysis of [Model 2], the unionization rate (=0.139) had not only a significantly positive (+) effect on the leverage ratio at the 1% level but also the interaction variable between the unionization rate and the dummy of operating profit volatility (=0.048) also have a significantly positive (+) effect at the 1% level. Therefore, the coefficient of the unionization rate (=0.187) of a company with high volatility in operating profit increases by the coefficient of the interaction variable (=0.048) between the unionization rate and the dummy of volatility in operating profits (=0.048) than the company with low volatility in operating profits (=0.139). These findings are evidence that the greater the volatility of operating profit, the greater the impact of the unionization rate on the leverage ratio. Matsa (2010) argued that the greater the volatility of operating profit, the more strategically increasing leverage can increase the bargaining power with the labor union.

<Table 3> The effect of labor union bargaining power on the capital structure

Variable	Coefficient	Company diversification	
		Model 1	Model 2
Constant	α_0	0.336 (1.08)	0.656** (2.11)

$Union_{i,t-1}$	α_1	0.176*** (4.09)	0.139*** (2.99)
$Vol_{i,t-1}$	α_2		-0.726*** (-5.86)
$Union_{i,t-1} \times Vol_{i,t-1}^d$	α_3		0.048*** (2.58)
$Q_{i,t-1}$	α_4	-0.117*** (-8.39)	-0.094*** (-8.66)
$Tang_{i,t-1}$	α_5	0.325*** (6.39)	0.279*** (6.10)
$Roa_{i,t-1}$	α_6	-0.418*** (-5.06)	-0.424*** (-5.88)
$Size_{i,t-1}$	α_7	0.031* (1.75)	0.030* (1.79)
$Depr_{i,t-1}$	α_8	1.004** (1.99)	0.785* (1.76)
$DEF_{i,t-1}$	α_9	0.030* (1.86)	0.035* (1.91)
$Chaebul$	α_{10}	0.486** (2.46)	0.491** (2.53)
Number of observations		3,958	3,958
Adjusted – R ²		0.2186	0.2573
F – value		89.06***	98.55***

() Indicates the t-value to which the corrected standard error of White (1980) was applied, and ***, **, * indicate significance at the 1%, 5%, and 10% levels (both sides), respectively.

<Table 4> shows estimates of the effect of labor union bargaining power on the capital structure under financial constraints. Financial constraints use capital market accessibility in addition to the credit rating level that falls under the financial constraints criterion. First, the result of the analysis using the credit score level as a financial constraint criterion shows that the positive (+) coefficient (=0.098) of the unionization rate of the low-credit firm (=0.098) is significantly smaller than that of the high credit rating firm (=0.159) and the coefficient of the interaction variable between the unionization rate and the volatility dummy in operating profit of the low-credit firm (=0.029) is significantly smaller than that of the high-credit firm (=0.065). In addition, the result of the analysis using capital market accessibility as a financial constraint criterion shows that the coefficient of positive (+) of the unionization rate of the inaccessible firm (=0.115) is significantly smaller than that of the accessible firm (=0.176), and the coefficient of the interaction variable between the unionization rate and operating profit volatility dummy of the inaccessible firm (=0.033) is significantly smaller than that of the accessible firm (=0.051). In summary, it can be said that although the financially constrained firm has a weaker positive effect on the leverage ratio of the labor union than the non-constrained firm, a company with a labor union increases leverage in the name of increasing bargaining power with the labor union even under financial constraints.

<Table 4> The effect of the labor union bargaining power on the capital structure under financial constraints

Variable	Coefficient	Company diversification			
		Credit rating level		Capital market accessibility	
		Low	High	Inaccessible	Accessible
Constant	α_0	-0.306 (-0.80)	2.035*** (4.83)	0.376 (1.03)	0.939** (2.19)
$Union_{i,t-1}$	α_1	0.098* (1.91)	0.159** (2.10)	0.115** (2.18)	0.176** (2.35)
$Vol_{i,t-1}$	α_2	-0.411** (-2.23)	-0.869*** (-5.88)	-0.642*** (-3.75)	-0.740*** (-4.52)
$Union_{i,t-1} \times Vol_{i,t-1}^d$	α_3	0.029 (1.20)	0.065** (2.50)	0.033 (1.26)	0.051** (2.18)
$Q_{i,t-1}$	α_4	-0.133*** (-7.68)	-0.064*** (-6.22)	-0.082*** (-6.28)	-0.121*** (-6.76)

Tang _{i,t-1}	α_5	0.193*** (3.31)	0.353*** (5.39)	0.181*** (3.22)	0.357*** (5.25)
Roa _{i,t-1}	α_6	-0.465*** (-5.09)	-0.446*** (-3.68)	-0.241** (-2.39)	-0.637*** (-5.76)
Size _{i,t-1}	α_7	0.040*** (2.99)	0.060*** (3.17)	0.003 (0.48)	0.016 (1.05)
Depr _{i,t-1}	α_8	0.783* (1.90)	0.218 (0.86)	0.899* (1.67)	1.050* (1.94)
DEF _{i,t-1}	α_9	0.030** (2.16)	0.011 (1.15)	0.003 (0.18)	0.021* (1.70)
Chaebul	α_{10}	0.196** (1.99)	0.208** (2.18)	0.229** (2.26)	0.358*** (2.60)
Number of observations		1,979	1,979	2,975	983
Adjusted - R ²		0.2396	0.1908	0.2257	0.2986
F - value		25.76***	27.46***	28.55***	46.03***

() Indicates the t-value to which the corrected standard error of White (1980) was applied, and ***, **, * indicate significance at the 1%, 5%, and 10% levels (both sides), respectively.

<Table 5> shows the results of analyzing the effects of labor union bargaining power on the capital structure dynamically using the system GMM model. [Model 1] is a model that analyzes the effect of the unionization rate on the leverage ratio dynamically, and [Model 2] is a model that analyzes the effect of the interaction variable between the unionization rate and the dummy of operating profit volatility, as well as the union organization ratio, on the leverage ratio dynamically. As a result of the Arellano-Bond test for the existence of the first-order autocorrelation [AR(1)] and the second-order autocorrelation [AR(2)] for the error term, the first-order autocorrelation has a significant time-series correlation at the 1% level, but the second-order autocorrelation does not have a time series correlation. In addition, the Hansen test showed that the over-identification constraint was valid, while the Wald test showed that all models were significantly appropriate at the 1% level. As a result of the analysis of [model 1], the unionization rate ($\beta_2=0.086$) significantly positive (+) effect on the leverage rate at the 1% level, which means that as the unionization rate increases, the leverage ratio increases. And as a result of the analysis of [Model 2], not only does the unionization rate ($\beta_2=0.061$) have a significantly positive (+) effect on the leverage ratio at the 5% level, but also the interaction variable between the unionization rate and dummy of operating profit volatility. ($\beta_4=0.040$) also have a significantly positive (+) effect at the 1% level. Therefore, the coefficient of the unionization rate ($\beta_2 + \beta_4 = 0.101$) of a firm with large operating profit volatility increases by the coefficient of the interaction variable between the unionization rate and the dummy of operating profit volatility ($\beta_4=0.040$) than a firm with small operating profit volatility ($\beta_2=0.061$). These findings are evidence that the greater the volatility of operating profit, the greater the impact of the unionization rate on the leverage ratio. And as a result of measuring the leverage adjustment speed of all subjects, in [Model 1] and [Model 2], the coefficients (β_1) of the company t-1 year leverage ratio ($L_{i,t-1}$) are 0.852 and 0.834, respectively, so the leverage adjustment speed ($\theta = 1 - \beta_1$) is measured 0.148 and 0.166 respectively. The leverage adjustment speed (θ) of 0.148 means that when the actual leverage ratio deviates from the target leverage ratio, the gap is partially adjusted by 14.8% every year. In such a case, it is observed that it takes about 7 to 8 years for a firm to fully adjust the gap between the target leverage ratio and the actual leverage ratio.

<Table 5> The dynamic effect of the labor union bargaining power on the capital structure

Variable	Coefficient	Company diversification	
		Model 1	Model 2
상수	β_0	-0.153 (-0.96)	-0.116 (-0.72)
$L_{i,t-1}$	β_1	0.852*** (23.86)	0.834*** (23.75)
$Union_{i,t-1}$	β_2	0.086*** (2.65)	0.061** (2.33)
$Vol_{i,t-1}$	β_3		-0.312*** (-2.65)
$Union_{i,t-1} \times Vol_{i,t-1}^d$	β_4		0.040*** (2.90)

$Q_{i,t-1}$	β_5	-0.163*** (-4.80)	-0.159*** (-4.58)
Tang $_{i,t-1}$	β_6	0.004 (0.09)	0.001 (0.11)
Roa $_{i,t-1}$	β_7	0.202*** (3.16)	0.208*** (3.24)
Size $_{i,t-1}$	β_8	0.001 (0.09)	0.001 (0.04)
Depr $_{i,t-1}$	β_9	0.428 (0.42)	0.419 (0.47)
DEF $_{i,t-1}$	β_{10}	0.041*** (3.62)	0.042*** (3.72)
Chaebul	β_{11}	0.453** (2.33)	0.476** (2.48)
Adjustment speed (θ)	$1 - \beta_1$	0.148	0.166
Number of observations		3,958	3,958
AR(1)		-3.865***	-3.786***
AR(2)		0.506	0.597
Hasen test(χ^2)		91.83	87.49
Wald test(χ^2)		1,608.63***	1,725.77***

() shows the z-value to which the corrected standard error of Windmeijer (2005) is applied, AR(1) and AR(2) show the Arellano-Bond test results for the first- and second-order time-series correlation of the error term. The Hansen test shows the results of the over-identification constraint test, the Wald test represents the test result for the fit of the model. ***, **, * indicates significance at the 1%, 5%, and 10% levels (both sides), respectively.

<Table 6> shows the results of analyzing the dynamic effect of the labor union bargaining power on the capital structure under financial constraints using the system GMM model. First, as a result of analyzing using the credit rating level as a financial constraint criterion, the positive coefficient ($\beta_2 = 0.030$) of the unionization rate of low-credit firms is significantly smaller than that of high-credit firms ($\beta_2 = 0.080$). The coefficient of the interaction variable between the unionization rate and the dummy of operating profit volatility of the low-credit firms ($\beta_4 = 0.025$) is significantly smaller than that of the high-credit firms ($\beta_4 = 0.081$). And as a result of analyzing using capital market accessibility as a financial constraint criterion, the positive coefficient ($\beta_2 = 0.062$) of the inaccessible company's unionization rate is significantly smaller than that of the accessible company ($\beta_2 = 0.118$). The interaction variable ($\beta_4 = 0.037$) between the unionization rate and the dummy of operating profit volatility high-HP index firms is significantly smaller than that of the accessible firm ($\beta_4 = 0.071$). In summary, these findings show that the positive effect (+) of the labor union on the leverage ratio dynamically is weaker for financially constrained companies than for non-constrained companies. so, it can be said that the firm increases leverage in the name of bargaining power increase.

<Table 6> The dynamic effect of labor union bargaining power on the capital structure under financial constraints

Variable	Coefficient	Company diversification			
		Credit rating level		Capital market accessibility	
		Low	High	Inaccessible	Accessible
상수	β_0	0.563* (1.73)	-0.305 (-1.56)	0.440 (1.39)	-0.418 (-1.62)
$L_{i,t-1}$	β_1	0.917*** (15.92)	0.844*** (23.17)	0.912*** (20.64)	0.783*** (17.62)
$Union_{i,t-1}$	β_2	0.030 (0.79)	0.080* (1.78)	0.062 (1.09)	0.118** (2.18)
$Vol_{i,t-1}$	β_3	-0.181 (-1.56)	-0.380** (-2.05)	-0.368 (-1.60)	-0.398** (-2.50)
$Union_{i,t-1} \times Vol_{i,t-1}^d$	β_4	0.025* (1.73)	0.081*** (3.17)	0.037** (2.29)	0.071*** (2.76)

$Q_{i,t-1}$	β_5	-0.120*** (-2.95)	-0.197*** (-5.69)	-0.251*** (-11.33)	-0.107*** (-3.58)
Tang $_{i,t-1}$	β_6	0.001 (0.17)	0.009 (0.15)	0.187 (1.11)	0.186 (1.27)
Roa $_{i,t-1}$	β_7	-0.120* (-1.76)	-0.175** (-2.26)	-1.059* (-1.90)	-0.497*** (-4.55)
Size $_{i,t-1}$	β_8	0.022* (1.93)	0.006 (0.69)	0.035** (2.17)	0.019 (1.60)
Depr $_{i,t-1}$	β_9	0.316 (0.29)	0.611 (0.96)	0.768* (1.94)	0.659* (2.33)
DEF $_{i,t-1}$	β_{10}	0.030*** (2.69)	0.041** (2.46)	0.423** (2.53)	0.565*** (4.48)
Chaebul	β_{11}	0.202* (1.89)	0.197** (2.03)	0.235** (2.34)	0.366*** (2.69)
Adjustment speed (θ)	$1 - \beta_1$	0.083	0.156	0.088	0.217
Number of observation		1,979	1,979	2,975	983
AR(1)		-3.563***	-3.697***	-3.986***	-7.185***
AR(2)		0.907	1.113	0.809	2.117
Hasen test(χ^2)		87.450	109.531	76.857	168.597
Wald test(χ^2)		1318.86***	667.53***	877.96***	1028.98***

(θ) shows the z-value to which the corrected standard error of Windmeijer (2005) is applied, AR(1) and AR(2) show the Arellano-Bond test results for the first- and second-order time-series correlation of the error term. The Hansen test shows the results of the over-identification constraint test, the Wald test represents the test result for the fit of the model. ***, **, * indicates significance at the 1%, 5%, and 10% levels (both sides), respectively.

IV. CONCLUSIONS AND DISCUSSION

This study empirically investigates the effects of diversified companies' labor union bargaining power on the capital structure under financial constraints with diversified companies listed on the Korea Stock Exchange from January 1, 2000, to December 31, 2019. And the significant findings are as follows. Companies with a labor union strategically increase leverage to increase bargaining power against the labor union, and firms with large operating profit volatility tend to increase leverage more. This means that the greater the volatility of operating profit, the greater the bargaining power against the labor union through increased leverage, representing both corporate interests and labor union interests. In addition, a company with a labor union increases its leverage to increase bargaining power against the labor union even under financial constraints and increases leverage not only under a static capital structure but also under a dynamic capital structure, thereby making a strategic choice to diversify profits and minimize disputes in the future. In conclusion, it can be said that companies listed on the Korea Exchange's stock market strategically increase their leverage to increase bargaining power with the labor union. These findings imply that it is necessary to establish financial policy by acknowledging that the labor union is a new capital structure variable affecting the capital structure, and also contributes to the research literature on the relationship between the labor union's bargaining power and the capital structure. However, since this study only analyzed companies listed on the securities market of the Korea Exchange due to limitations in collecting data on the unionization rate, it is limited in generalizing the interpretation of these findings. Therefore, in future research, if unionization rate data is accumulated among listed companies of KOSDAQ, it is necessary to include them in the research subject and further diversify control variables and analysis methods.

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Chanil Boo. "A Study on the Effect of Diversified Companies' Labor Union's Bargaining Power on the Capital Structure under Financial Constraints." *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, 26(01), 2021, pp. 34-44.