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The Effects of Growth Option on Capital Structure Theory and Capital Structure Adjustment Speed: The Case of Diversified Enterprises

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Abstract: *It has been found that capital structure variables of Conflicting Theory, Pecking Order Model, Initial Growth Theory, and Inertia Theory of Capital Structure have significant effects on diversified enterprises as well as the adjustment speed, in cases where enterprises are interested in interesting in expanding outward form and revenue generation through business diversification. In the case where the actual leverage ratio deviates from the target leverage ratio, the gap was found to be partially adjusted each year, and that it takes about 3~4 years for a diversified enterprise to fully adjust the gap between the target and the actual leverage ratio. Moreover, although the growth option for a diversified enterprise is a convex curve, measuring the speed at which the capital structure adjustment is measured indicates that the growth option measured in the ratio of MB adjusts the liability faster than the growth option measured in the inverse exponential MB ratio. The growth option of a diversified enterprise has a negative (-) effect on the capital structure in a convex curve rather than that of linear, and its effect is mitigated under financial constraints. These results imply that it is necessary to refine capital structure policies, endorsing that growth options have negative effects in a convex curve rather than that of linear, and are expected to contribute to the research literature on capital structure. Hence, enterprises that have diversified their business should consider factors that determine the capital structure even during the revenue generation and external expansion process, thereby increasing the enterprise value as a consequence of cost savings and revenue growth, and reducing risk by adjusting the liabilities accordingly.*

Keywords:*growth option, Capital Structure Theory, Capital Structure Adjustment Speed, MB ratio, inverse exponential MB ratio*

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I. Introductionand Literature Review

Corporate capital structure, as it is a steady interest among the researchers, is critical in financial theory and has high practicality. Currently, most studies that are conducted focus on the determinants of the capital structure, and various studies are underway based on how much debt ratio is adjusted for the capital structure. This study attempts to compare and analyze how much growth options affect the capital structure adjustment speed, focusing on the enterprises that have undertaken business diversification, based on the Conflicting Theory, Pecking Order Model, Initial Growth Theory, and Inertia Theory of Capital Structure. In the business diversification studies, enterprises reduce investment in the poor global economies, but they have long focused on expanding businesses that increase their size by expanding their appearance through diversification. A conflict exists in the area of choice and concentration of business diversification, as businesses expand from a conservative approach. Currently, not many studies focus on business diversification of Korean companies in-depth, and in particular, there is no in-depth study on the capital structure of companies that have conducted business diversification.

In order to view the effect of growth option on the capital structure adjustment speed, the adjustment speed of the most crucial capital structure in the Dynamic Conflicting Theory should be accurately measured. The results of capital structure adjustment speed in studies by Flannery and Rangan (2006) and Lemmon et al. (2008), the deviation between the actual capital structure and the target capital structure was found to be adjusted to about a 5-year half-life. Because such a slow pace was due to the failure of the capital structure decision model to explain the actual changes in the capital structure, and it did not give a specific reason but said that it was essential to leave it as a future research project and accurately measure the capital structure adjustment speed. Ogden and Wu (2013) pointed out that the missing capital structure variable is the MB ratio that is related to growth option, and provided evidence that the curved MB ratio is more suitable for Conflicting Theory than the linear MB ratio, and Lin (2015) asserted that the growth option has a convex curve in the capital

structure and negative effect. Additionally, the explanation power of the capital structure determinant model was reduced to between 20~25%, which was said to be evidence that important capital structure variables were missing or misestimated, and that the MB ratio was a crucial variable as a growth option variable, although the capacity is meager. Barclay et al. (2006) stated that there is a negative (-) relationship between the growth option of an enterprise and capital structure and that it is a non-linear relationship, not that of linear; however, did not provide evidence.

Meanwhile, Ogden and Wu (2013) pointed out that the missing capital structure variable is the MB ratio that is related to growth option, and provided evidence that the curved MB ratio is more suitable for Conflicting Theory than the linear MB ratio. In other words, they argued that the explanation power of the model increases when using the inverse exponential MB ratio converted by the MB ratio into a curve. In a study of Chinese enterprises by Lin (2015), growth options were to have a negative (-) effect on leverage in a convex curve. Faulkender and Smith (2007) stated that the enterprises with greater access to the capital market have a faster adjustment speed due to the reduced coordination costs of the capital structure, and Cantillo and Wright (2000) stated that there is a close relationship between the creditworthiness of an entity and the financial constraints and that the entity with higher credit ratings is more likely to issue bonds in the capital market. However, research on the determinants of capital structure is mainly focused on domestic research, and individual studies on the relationship between growth options and capital structure are still lacking. This study approaches to focus on the effect of growth options of business diversification on the capital structure theory and capital structure adjustment speed. The analysis period is set for a total of 22 years from 1996 to 2017, and among enterprises listed on the Korea Exchange, 4,271 enterprise-year will be analyzed with sample data only for diversified companies. The data used in this study are cross-sectional data, where heteroscedasticity problem and time-series correlated issues can coincide. So, this study analyzes with a panel data that incorporates time series and cross-sectional data.

Ⅱ. Models and Variables

This study sets the capital structure decision model as Equation (1), according to the previous studies and methodologies such as that of Heshmati (2001) and Drobetz and Wanzenried (2006).

$$TL_t = \alpha_0 + \sum_{k=1}^{M} \alpha_k X_{k,t-1} \quad (1)$$

However, TL_t = t year target leverage
$X_{k,t-1}$ = t-1 year k^{th} corporate characteristic variable

Equation (1) can be estimated by various statistical methodology; however, this study applies the capital structure regression model of a diversified business.

$$L_t = \alpha_0 + \sum_{k=1}^{8} \alpha_k X_{k,t-1} + \varepsilon_t \quad (2)$$

However, L_t = t year actual leverage
$X_{k,t-1}$ = t-1 year k^{th} corporate characteristic variable
$X_{1,t-1} = M/B_{t-1}$ = t-1 year M/B ratio
$X_{2,t-1} = \exp^{-MB_{i,t-1}}$ = t-1 year inverse exponential MB ratio
$X_{2,t-1} = TANG_{t-1}$ = t-1 year tangibility ratio
$X_{3,t-1} = PROFIT_{t-1}$ = t-1 year profitability ratio
$X_{4,t-1} = SIZE_{t-1}$ = t-1 year enterprise size
$X_{5,t-1} = DEFA_{t-1}$ = t-1 year financial deficit ratio
$X_{6,t-1} = M/B_{IGB\,t-1}$ = t-1 year initial growth based M/B ratio
$X_{7,t-1} = SPE_{t-1}$ = t-1 year stock price effect
u_t = error term

Leverage ratio ($L_{i,t}$), the dependent variable in Equation (1) is calculated as follows: [(total of year t liabilities of a company i) / (total liabilities of a company i + market cap of the year). The growth option variable, which is the explanatory variable in Equation (1), is measured by MB ratio and inverse exponential MB ratio, respectively. MB ratio ($MB_{i,t-1}$) is calculated by using the method of Chung and Pruitt (1994): [(total of t-1 year liabilities of a company i + total market cap of t-1 year)] and is expected to have a negative (-) effect on the leverage ratio linearly. In addition, the inverse exponential MB ratio ($\exp^{-MB_{i,t-1}}$)is expected to have a positive (+) effect on the leverage ratio as a variable taking an inverse exponential function on the MB ratio, and this implies that growth option has a negative (-) effect on leverage ratio with a convex curve.

In Equation (1), the control variable applies 1 parallax to control the problem of endogeneity between variables. First, tangibility ratio ($TANG_{t-1}$) is measured as [(t-1 year inventory + t-1 year tangible asset)/(t-1 year total assets)], and the profitability ratio ($PROFIT_{t-1}$) is measured by [(t-1 year EBITDA)/(t-1 year total asset), and enterprise size ($SIZE_{t-1}$) is measured by In(t-1 year total asset).

The ratio of fiscal deficits is calculated by the method of Frank and Goyal (2003) [(t-1 year cash dividend + t-1 year net investment + t year net working capital change -t-1 year interest and after-tax operating cash flow) / t-1 year total assets]. The t-1 year cash dividend ($D\,IV_{t-1}$) is measured as a cash dividend (payment of t-1 year cash dividend), t-1 year net investment (I_{t-1}) is measured by (cash flow from t-1 year investment activities - cash inflow from t-1 year investment activities) from the cash flow statement. The t-1 year net working capital (ΔWC_{t-1}) is measured as (t-1 year networking capital - t-2 year net working capital), t-1 year working capital is measured in the balance sheet by (t-1 year current asset - t-1 year current liabilities). And the t-1 year interest and after-tax operating cash flow are measured in the income statement by (t-1 year operating profit + t-1 year depreciation cost - t-1 year interest expense - t-1 year corporate tax expense).

The initial growth-based M / B ratio ($M/B_{IGB\,t-1}$) is defined by Equation (2) as Korajczyk et al. (2007) analyzes the effect of initial growth on capital structure.

$$M/B_{IGB\,t-1} = \sum_{s=0}^{t-1} \frac{\Delta N\,E_s + \Delta D_s}{\sum_{r=0}^{t-1} \Delta N\,E_r + \Delta D_r} M/B_I \qquad (3)$$

However, $M/B_{IGB\,t-1}$ = initial growth-based M/B ratio
M/B_I = initial M/B ratio
ΔD_s = t year net debt issuance
ΔNE_s = t year net stock issue

In Equation (3), net debt issuance (ΔD_s) is measured as (s year total debt - s-1 year debt) and net debt issuance amount (ΔNE_s) is measured as (s year capital total - s-1 year capital total). The initial M/B ratio (M/B_I) is measured as the average of the initial 3 years (IPO+0, IPO+1, IPO+2) according to the methodology of Lemmon et al. (2006), and the effects of early market disturbances on initial growth can be controlled. Therefore, the $M/B_{IGB\,t-1}$ the ratio of Korajczyk et al. (2007) reflects the initial growth potential of the firm and is expected to have a negative impact on leverage.

In order to test the capital structure inertia theory (SPE_{t-1})that Welch (2004) raises the market value leverage in a year after Welch's (2004) decrease in market value leverage, the Equation (4) is defined.

$$SPE_{t-1} = \left(\frac{D_{t-2}}{D_{t-2} + N_{t-2} \times P_{t-2}(1 + R_{t-1})}\right) - L_{t-2} \qquad (4)$$

However, SPE_{t-1} = t-1 year stock price effect
D_{t-2} = t-2 year account total debt
N_{t-2} = t-2 year number of shares issued
P_{t-2} = t-2 year stock price
R_{t-1} = t-1 year stock return

In Equation (4), when the stock price rises, the denominator of the right-side () increases, thereby reducing the market-price leverage of (). Thus, the stock price effect is expected to have a positive impact on market leverage after one year due to the effect of reducing market price leverage.

In this study, the capital restructuring model, like Equation (5) is set up to analyze the effect of growth options of the business diversification firm on the rate of capital restructuring. Miguel and Pindado (2001) and Flannery and Rangan (2006) stated that if the actual capital structure temporarily deviates from the target capital structure, the capital structure is dynamically adjusted again to the target capital structure.

$$L_{i,t} = \beta_0 + \beta_1 L_{i,t-1} + \sum_{k=2}^{9} \beta_k X_{k,t-1} + \varepsilon_t \qquad (5)$$

In the partial adjustment model in equation (2), it is assumed that the firm partially adjusts its capital structure over time, and the one-time leverage ratio is used as a control variable to reflect this in the model. The leverage adjustment rate (θ) is measured by subtracting the regression coefficient (β_1) from the 1 to 1-time lag ratio as $\theta = 1 - \beta_2$, according to the method of Flannery and Rangan (2006) and Korajczyk et al. (2007). The adjustment speed (θ) is measured within the $0 < \theta < 1$ range, which means that the actual leverage is partially adjusted toward the target leverage by reflecting the adjustment cost over time.

In this study, a dynamic capital restructuring model like Equation (6) is set up to analyze the effect of

growth options of a business diversification firm on the rate of capital restructuring under financial constraints.

$$L_{i,t} = \gamma_0 + \gamma_1 L_{i,t-1} + \gamma_2 \exp^{-MB_{i,t-1}} + \gamma_3 Credit_{i,t-1}{}^{fcd} + \gamma_4 HP_{i,t-1}{}^{fcd} + \gamma_5 Credit_{i,t-1}{}^{fcd} \times \exp^{-MB_{i,t-1}} + \gamma_6 HP_{i,t-1}{}^{fcd} \times \exp^{-MB_{i,t-1}} + \gamma_7 TANG_{i,t-1} + \gamma_8 PROFIT_{i,t-1} + \gamma_9 SIZE_{i,t-1} + \gamma_{10} DEFA_{i,t-1} + \gamma_{11} M/B_{IGB,i,t-1} + \gamma_{12} SPE_{i,t-1} + \varepsilon_{i,t} \quad (6)$$

The financial constraint dummy ($Credit_{i,t-1}{}^{fcd}$), measured at the credit rating level in Equation (6), is measured as (1 or 0 if the firm's t-1 credit rating is lower than that of the entire sample firm). The financial constraint dummy ($HP_{i,t-1}{}^{fcd}$) measured by HP index of Hadlock and Pierce (2010) is measured as (1 if the company i's t-1 year HP index is higher than the HP index of the whole sample company, and 0 if not). In addition, the two interaction variables are the interaction variable ($Credit_{i,t-1}{}^{fcd} \times \exp^{-MB_{i,t-1}}$) between the financial constraint dummy and the inverse exponential MB ratio measured by the credit rating level, and the interaction variable ($HP_{i,t-1}{}^{fcd} \times \exp^{-MB_{i,t-1}}$) between the financial constraint dummy and the inverse exponential MB ratio, in which it is expected to have a negative (-) effect on the leverage ratio.

Ⅲ. Data and Descriptive Statistics

In this study, sample companies are selected from the companies listed on the Korea Exchange's securities market from Jan. 1, 1996 to Dec. 31, 2017, based on the following criteria: First, financial industries such as banks, securities, and insurance are excluded from sample enterprises in terms of capital structure, operating methods and government regulatory oversight, except for those whose financial and stock data are not available from KIS Value Library, FnGuide and TS2000, and those whose financial and stock price data are not available from banks, securities, and insurance businesses during the analysis period are excluded from the sample or merger period. Moreover, an enterprise that has less than 1 billion won in total assets or does not have sales may generate an anomaly for the variables, excluding them from the sample entity, and cutting the upper and lower 1 percent of each variable to control the effect of the anomalies on the analysis results. The entire sample entity is classified as a diversified and non-variable entity. A diversified entity is defined as an entity that has at least two units belonging to different Standard Industrial Classification codes (SIC codes), and an entity that does not is classified as a non-variable entity (Tong, 2011). The number of company-year in a diversified company satisfying the above conditions is 4,271.

In this section, the probability distribution characteristics, anomalies, the direction and size of the correlation, and the possibility of multi-affiliate variables through the analysis of underlying statistics, correlations, and multi-affiliate variables are checked. In the analysis of basic statistics of diversified firms, the average (median) of the leverage ratio as capital structure variable is 52.86% (50.49%) and the average (median) of MB ratio is 0.8907 (0.8442) (median) is 0.3915 (0.4085). Overall, Korean companies have higher leverage ratios than US and Chinese firms, while they have lower results for growth options. Among the control variables, the average of the type ratio among the variables of the conflicting theory is 46.88%, smaller than the median of 47.63%, the average of the profitability ratio is 6.91%, smaller than the median of 7.05%, and the average of the enterprise size is 25.5053 and higher than the median of 25.2950. The average of the financial deficit ratio among the variables of capital procurement sequence, initial growth theory and capital structure inertia theory is -14.76%, higher than the median of -13.03%, the mean of the initial growth-based M/B ratio is 1.1053, smaller than the median of 1.0809 cases, and the average of the effects of stock price is -4.86%, which is greater than the median of -2.68%. As a result of the analysis, the enterprise characteristic variables are not significantly affected by extreme measures, and the distribution of variables indicates a stable state. In the correlation analysis in <Table 1>, the MB ratio has a significant negative correlation at the 1% level with the capital structure variable, the leverage ratio, and the inverse exponential MB ratio has a significant positive correlation at the 1% level. These results suggest that as growth options increase, the leverage ratio decreases each. Among the control variables, tangible ratios, corporate size, financial deficits and stock price effects were all found to have a significant positive (+) correlation at the 1% level with the leverage ratio, while the profitability ratio and the initial growth-based M/B ratio were found to have a significant negative (-) correlation at the 1% level.

There is a mixture of significant correlations and no correlations between the independent variables. However, since the two growth option variables are highly correlated with each other, they can be inputted into the regression model simultaneously, resulting in multiple collinearities. Other independent variables do not have a large absolute value of correlation coefficient and therefore are not concerned about multi-collinearity (Kennedy, 1992). In addition, the variance inflation factor values (VIFs) are separately measured for the regression coefficients of the control variables and are distributed within a statistically acceptable range. Therefore, this study does not concern the multi-collinear problem that often occurs in regression analysis using financial variables.

<Table 1> Analysis of Basic Statistics, Correlation, and Multi-Collinearity of Diversified Enterprises

	$L_{i,t}$	$MB_{i,t-1}$	$\exp^{-MB_{i,t-1}}$	$TANG_{t-1}$	$PROFIT_{t-1}$	$SIZE_{t-1}$	$DEFA_{t-1}$	$M/B_{IGB_{t-1}}$	SPE_{t-1}
Average	0.5286	0.8907	0.3915	0.4688	0.0691	25.5053	-0.1476	1.1053	-0.0486
SD	0.2624	0.3325	0.1384	0.2006	0.0883	1.6918	0.2297	0.2607	0.1064
Median	0.5049	0.8442	0.4085	0.4763	0.0705	25.2950	-0.1303	1.0809	-0.0268

Variable		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	VIFs
(1)	$L_{i,t}$	1									
(2)	$MB_{i,t-1}$	-0.251**	1								3.08
(3)	$\exp^{-MB_{i,t-1}}$	0.268**	-0.846**	1							3.16
(4)	$TANG_{t-1}$	0.269**	-0.152**	0.115**	1						1.08
(5)	$PROFIT_{t-1}$	-0.146**	0.056**	-0.019*	-0.027**	1					1.09
(6)	$SIZE_{t-1}$	0.080**	0.107**	-0.176**	0.024*	0.062**	1				1.07
(7)	$DEFA_{t-1}$	0.283**	-0.046**	0.352**	0.195*	0.180*	0.062	1			1.42
(8)	$M/B_{IGB_{t-1}}$	-0.118**	-0.356*	0.196**	-0.073**	-0.180**	0.097**	0.155**	1		1.55
(9)	SPE_{t-1}	0.328**	-0.299**	0.061**	-0.166**	0.069**	0.065*	0.204**	0.103*	1	1.49

Note) **, * each indicate significance at 1% and 5% (both).

V. Empirical Results

This section aims to empirically analyze the effects of growth options of business diversification firms on capital structure theory and capital structure restructuring, and examine changes in capital structure even under financial constraints. Table 2 shows the results of an analysis of the effect of growth options on the capital structure of a diversified enterprise. First, in [Model 1] and [Model 2], the MB ratio (α_1=-0.181, -0.146) affects a significant negative (-) at the 1% level both, which means that the leverage ratio decreases as the growth option measured in the MB ratio increases. In addition, in [Model 3] and [Model 4], the inverse exponential MB ratio (α_2=0.419, 0.382) affects a significant amount (+) at the 1% level both, which means that the leverage ratio decreases as the growth option measured at the reverse index MB ratio increases. However, when the analysis results are compared, the inverse exponent MB ratio is larger than the MB ratio, the t-value of the regression coefficient is larger, the economic significance is larger, and the explanatory power of the regression model using the inverse exponential MB ratio is larger than the regression model using the MB ratio. These results are consistent with the study by Ogden and Wu (2013) and Lin (2015) that the growth option has a negative (-) effect on the leverage ratio rather than a linear, convex curve. Among the control variables, the tangible ratio, the enterprise size, the financial deficit ratio, and the effect of the share price were found to affect a significant amount (+) at the leverage ratio of 1% to 10%, while the profitability ratio and the initial growth-based M/B ratio affected a significant negative (-) at both the 1% level of the leverage ratio. The variables in Conflicting Theory, Pecking Order Model, Initial Growth Theory, and Inertia Theory of Capital Structure of Models 1~4 all appear to have a significant impact on leverage, so companies that have diversified their operations will be able to increase the value of their businesses by taking into account factors that determine the capital structure even during the revenue generation and external expansion process.

<Table 2> Impact of Growth Options of Diversified Enterprises on Capital Structure

Variable	Coefficient	Diversified Enterprise			
		Model 1	Model 2	Model 3	Model 4
Constant	α_0	0.606*** (72.32)	0.329*** (45.13)	0.447*** (23.20)	0.296*** (15.62)
$MB_{i,t-1}$	α_1	-0.181*** (-30.60)	-0.146*** (-27.53)		
$\exp^{-MB_{i,t-1}}$	α_2			0.419*** (32.01)	0.382*** (34.55)
$TANG_{t-1}$	α_3	0.008** (2.02)	0.004* (1.90)	0.006** (2.49)	0.010** (2.53)
$PROFIT_{t-1}$	α_4	-0.321*** (-7.98)	-0.306*** (-6.20)	-0.321*** (-7.91)	-0.315*** (-7.47)

$SIZE_{t-1}$	α_5	0.009*** (18.31)	0.007*** (15.83)	0.008*** (14.37)	0.005*** (13.83)
$DEFA_{t-1}$	α_6		0.038* (1.72)		0.033* (1.75)
$M/B_{IGB\,t-1}$	α_7		-0.166*** (-5.52)		-0.159*** (-5.34)
SPE_{t-1}	α_8		0.217*** (7.49)		0.208*** (7.31)
Economic Sig.	MB ratio	-0.005	-0.003		
	Inverse exponential MB ratio			0.017	0.013
No. of observations		4,271	4,271	4,271	4,271
$Adjusted - R^2$		0.2908	0.3605	0.3046	0.3689
$F - value$		438.82***	671.07***	468.48***	695.48***

( ) indicates the t-value using the corrected standard errors of White (1980), and the economic significance of MB ratio or inverse exponential MB ratio is measured by multiplying each regression coefficient by the standard deviation, and ***, **, * each indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 3 presents the results of an analysis of the effects of growth options on the diversified enterprise adjustment speed. First, the MB ratio (β_2 = -0.091, 0.092) in [Model 1] and [Model 2] has a significant negative effect on the leverage ratio at 1% level and The leverage ratio decreases. And, in [Model 3] and [Model 4], the inverse exponential MB ratio (β_3 = 0.439, 0.431) has a significant positive effect on the leverage ratio at 1% level, which means that the leverage ratio decreases as the growth option measured at the reverse index MB ratio increases. This result implies that the growth options of the diversified firms have a convex curvature effect rather than linearity in the leverage ratio, even under the dynamic capital structure model. As a result of measuring the rate of leverage adjustment of diversified firms, the leverage adjustment speed is measured as 0.298 and 0.306, respectively, because the coefficients of the one parallax leverage ratio (β_1) in [Model 1] and [Model 2] are 0.702 and 0.694, respectively. The leverage adjustment speed (θ) is 0.298, which means that if the actual leverage ratio deviates from the target leverage ratio, the gap is partially adjusted by 29.8% per year. In this case, it can be seen that it takes about three to four years for an entity to fully adjust the gap between the target and the actual leverage ratios. In addition, the estimated leverage adjustment speed of less than 1 indicates that a leverage adjustment expense exists, which means that the entity partially adjusts the actual leverage ratio towards the target leverage ratio, reflecting the adjustment cost over time. Moreover, the adjustment speeds for [Model 1] and [Model 2] were 0.298 and 0.306, which were larger than the adjustment speeds of [Model 3] and [Model 4], which were larger than 0.291 and 0.267 respectively, indicating that the growth option measured at the ratio of MB was a convex curve but the growth option measured at the rate of capital structure adjustment.

<Table 3>Effects of Growth Options on the Adjustment Speed of the Capital Structure of Diversified Enterprises

Variable	Coefficient	Diversified Enterprise			
		Model 1	Model 2	Model 3	Model 4
Constant	β_0	0.248*** (17.14)	0.226*** (15.55)	-0.053*** (-3.62)	-0.048*** (-3.54)
$L_{i,t-1}$	β_1	0.702*** (69.40)	0.694*** (63.51)	0.709*** (71.35)	0.733*** (65.19)
$MB_{i,t-1}$	β_2	-0.091*** (-23.23)	-0.092*** (-23.07)		
$\exp^{-MB\,i,t-1}$	β_3			0.439*** (24.27)	0.431*** (25.53)
$TANG_{t-1}$	β_4	0.001** (2.19)	0.001** (2.23)	0.001** (2.06)	0.001** (2.15)
$PROFIT_{t-1}$	β_5	-0.171*** (-6.20)	-0.180*** (-6.56)	-0.167*** (-6.09)	-0.172*** (-6.33)
$SIZE_{t-1}$	β_6	0.001** (4.76)	0.001** (4.82)	0.002*** (4.97)	0.002*** (5.10)

$DEFA_{t-1}$	β_7		0.055* (1.93)		0.046* (1.89)
$M/B_{IGB\,t-1}$	β_8		-0.142*** (-6.96)		-0.135*** (-6.62)
SPE_{t-1}	β_9		0.206*** (8.84)		0.218*** (9.16)
Adjustment Speed	$1-\beta_1$	0.298	0.306	0.291	0.267
Economic Sig.	MB ratio	-0.006	-0.005		
	Inverse exponential MB ratio			0.025	0.020
No. of observations		4,271	4,271	4,271	4,271
$Adjusted-R^2$		0.6733	0.6955	0.6767	0.7086
$F-value$		1761.21***	1807.40***	1788.10***	1819.82***

( ) shows the t-value using the corrected standard errors of White (1980), and the economic significance of MB ratio or inverse exponential MB ratio is measured by multiplying each regression coefficient by the standard deviation, and ***, **, * each indicate significance at the 1%, 5%, and 10% levels, respectively.

<Table 4> shows the results of an analysis of the effect of the growth options of a diversification enterprise on the adjustment speed its capital structure under financial constraints. [Model 1] and [Model 2] are the models that analyzed the effect of the inverse exponential MB ratio on the leverage ratio of a financial, pharmaceutical company measured by the credit rating level or HP index, respectively. First, the reverse index MB ratio (γ_2=0.360) in [Model 1] has a significant positive effect on the leverage ratio at 1%, which means that the leverage ratio decreases as the growth option measured in the inverse exponential MB ratio increases. However, the interaction variables between the financial constraint dummy estimated at the credit rating level and the inverse exponential MB ratio offset the effect of positive (-) in the inverse exponential MB ratio through a significant negative (-) effect at the 1% level of the leverage ratio, which means that as the financial constraint measured at the credit rating level increases, the negative (-) effect of the growth option on the leverage ratio is mitigated. In [Model 2], the inverse exponential MB ratio (γ_2=0.397) has a significant positive effect on the leverage ratio at 1%, but the interaction variable between the inverse index MB ratio and the financial constraint measured by the HP index offset the effect of the positive (+) of the inverse exponential MB ratio at 5% level with the effect of the negative effect on the leverage ratio, which is measured by the greater the HP index. Thus, as the financial constraint increases, the effect of the negative (-) of the growth option on the lean curve to the leverage ratio is eased.

<**Table 4**>Effects of Growth Options of a Diversified Enterprise on the Capital Structure Adjustment Speed and Capital Structure under Financial Constraints

Variable	Coefficient	Diversified Enterprise	
		Model 1	Model 2
Constant	γ_0	-0.109 (-1.60)	-0.062 (-0.83)
$L_{i,t-1}$	γ_1	0.748*** (30.67)	0.716*** (28.75)
$\exp^{-MB_{i,t-1}}$	γ_2	0.360*** (6.46)	0.397*** (6.82)
$Credit_{i,t-1}{}^{fcd}$	γ_3	0.329*** (3.02)	
$HP_{i,t-1}{}^{fcd}$	γ_4		0.350*** (2.88)
$Credit_{i,t-1}{}^{fcd} \times \exp^{-MB_{i,t-1}}$	γ_5	-0.351*** (-2.83)	
$HP_{i,t-1}{}^{fcd} \times \exp^{-MB_{i,t-1}}$	γ_6		-0.327** (-2.51)
$TANG_{t-1}$	γ_7	0.006** (2.33)	0.005** (2.27)
$PROFIT_{t-1}$	γ_8	-0.204*** (-3.12)	-0.199*** (-2.95)

$SIZE_{t-1}$	γ_9	0.004*** (2.87)	0.003*** (2.71)
$DEFA_{t-1}$	γ_{10}		0.048 (1.63)
$M/B_{IGB_{t-1}}$	γ_{11}		-0.169*** (-2.60)
SPE_{t-1}	γ_{12}		0.284*** (3.82)
Adjustment Speed	$1-\gamma_1$	0.252	0.284
No. of observations		4,271	4,271
$Adjusted-R^2$		0.6176	0.6453
$F-value$		1742.93***	1786.50***

( ) shows the t-value using the corrected standard errors of White (1980), and the economic significance of MB ratio or inverse exponential MB ratio is measured by multiplying each regression coefficient by the standard deviation, and ***, **, * each indicate significance at the 1%, 5%, and 10% levels, respectively.

Ⅳ. Conclusions and Discussion

This study demonstrated and analyzed the effect of growth options on the capital structure theory and the capital structure adjustment speed on the diversified enterprises listed on the Korea Exchange. The main results are, first, the leverage ratio decreases as the growth option measured in MB increases, and the leverage ratio decreases as the growth option measured in inverse exponential MB ratio increases. It means that the growth option has a negative (-) effect in a convex curve rather than linear in the leverage ratio. In addition, variables in Conflicting Theory, Pecking Order Model, Initial Growth Theory, and Inertia Theory of Capital Structure were found to have a significant impact on leverage, and enterprises that have diversified have factors that determine capital structure will lead to cost reduction and increase corporate value by increasing profit, even within the process of profit creation and outward expansion. Second, as a result of measuring the leverage adjustment rate of diversified firms, it is found that the actual leverage ratio partially shifts the gap by 29.8% every year when the actual leverage ratio deviates from the target leverage ratio, and it took about three to four years for a diversified enterprise to fully adjust the gap between the target leverage ratio and the actual leverage ratio. In addition, although diversified enterprises' growth options are curvilinear, the growth rate measured by the MB ratio has been found to adjust the debt more quickly than the growth option measured by the inverse exponential MB ratio. Third, as a result of analyzing the effects of the growth options of the diversified enterprise on the rate of capital restructuring under the financial constraint, the leverage ratio decreased as the growth options measured by the inverse exponential MB ratio increased, but the negative effect of the growth option on the curve of the leverage ratio was mitigated as the financial restriction measured by the credit rating level increased. In addition, the increased financial constraints measured by the HP index indicated that the negative effect of the growth option on the ratio of leverage would be mitigated, indicating that the increased financial limitation would mitigate the negative (-) effect of the growth option on the ratio of the leverage. In conclusion, it has been shown that in a situation where entities are always interested in expanding their appearance through business diversification and expanding their business to generate revenue, diversified enterprises have significant effects on the equity structure variables of Conflicting Theory, Pecking Order Model, Initial Growth Theory, and Inertia Theory of Capital Structure, as well as their adjustment speed. It can be said that the growth option of a diversified company has adverse effects in a convex curve rather than linear in its capital structure, and its effect is mitigated under financial constraints. These results suggest that it is necessary to refine capital structure policies in recognition of the fact that growth options affect negative (-) in a convex curve rather than linearly in the capital structure, and are expected to contribute to the research literature on the fields of capital structure and capital structure adjustment speed. However, since this study was only conducted on diversified companies listed on the Korea Exchange and analyzed only those are subject to the strict sampling criteria, there are many limitations in generalizing the interpretation of the analysis results. It is also necessary to supplement the variables that affect the capital structure adjustment speed and diversify the analytical technique to expand the sample enterprises for more precise research in the future.

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