An Empirical Analysis of the Financing Behavior of Listed Construction Firms in Korea Stock Market - focused on Testing Two Capital Structure Theories –

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ABSTRACT: The purpose of this study is identifying the relationship among the business strategy, order receiving capability and leverage variables of a construction company using industry characteristic variables, in addition to the explanation variables used in the previous studies. The samples of this study were limited to the construction companies listed in Korean stock market. This study built multiple regression analysis models, which have been frequently used in traditional previous studies, in the explanation of company capital structure. Empirical analysis on Static Trade-off Theory and Pecking Order Theory was done by the built model. The study results suggested that the capital structure determination behavior of a construction company generally follows Static Trade-off Theory; however, profitability was found to follow Pecking Order Theory. The explanation variables used in the previous capital structure studies mostly produced significant results; however, the variables, which this study experimentally used, did not produce significant results. It is believed that it implies that additional studies are required in the selection of variables and study methodology. Consequently, a case that unconditionally supports a particular theory is scarce. It has been also found that a case can support both theories at the same time. Therefore, it is believed that development study methodology or introduction of new study methodology that can identify the dynamic characteristic of construction company capital structure formation is required.

Keywords: Financing Behavior; Construction Firm; Capital Structure Theory; Panel Data Analysis

1. INTRODUCTION

The global financial crisis which started in 2008 with the collapse of Lehman Brothers Holdings gave substantially negative impacts on world financial market as well as on various industries. The worldwide economic recession has become a long term event as the financial crisis in Europe fell on top of global financial crisis started in United States.

Many companies at home and abroad are suffering difficulties because of this macro-impulse. Especially, construction industry was easily exposed to financial risk because of its industrial characteristic which sensitively responds to market situation at home and abroad [1].

The economic recession in macro-economy resulted in the decrease of new construction investment, rapid decrease in private sector order and recession in housing market. As the recession period becomes longer, construction industry faces decrease in profit, liquidity crisis caused by exhaustion of working capital, insolvency or business failure. The current situation is not limited to a bankruptcy of single company. There is even a concern on possible chain reaction bankruptcy of

general contractors and subcontractors. Though there had been supports from government and creditor financial companies including workout agreement, still insolvent construction companies keep appearing.

A construction company has a tendency to heavily rely on borrowed capital because of its business characteristic. Therefore, it is relatively difficult for a construction company to have financial soundness. Furthermore, a construction company suffers difficulty because of relatively long project period and uncertainty in production system such as heavy reliance on order and on production at site[2]. On the other hand, these difficulties become essential causes for a construction company in receiving discriminative treatment from creditor/financial institutions such as high interest on loan or demand of excessive collateral[1]. Accordingly, construction companies adopt business strategies such as diversification of business [3, 4], new market entry and order receiving capability improvement in order to overcome the business risk caused by the characteristic of construction industry.[4]

Meanwhile, there has been an argument that the excessive reliance on borrowed capital of construction

companies is the more direct cause of their insolvency than the change of business management environment caused by external reasons such as the macro-economy recession [5].

This argument directly leads us to questions such as "how a construction company would know its proper leverage ratio (or borrowed capital ratio)?" or "what are the important elements in the decision making of a construction company regarding capital structure[1]?"

There have been many studies in various fields in order to theoretically explain the behavior characteristics in which a company chooses its capital structure. The capital structure determination from microscopic viewpoint has been empirically interpreted by way of two opposing theories; which are the Static Trade-off Theory[6] and Pecking Order Theory[7]. The Static Trade-off Theory is that a company borrows capital until the tax saving effect achieved by debt increase becomes exactly equal to the cost incurred by financial risk increase of the company. On the other hand, Pecking Order Theory is that a company first uses internal fund when there is a realistic investment opportunity, then it would borrow capital or issue convertible bond if borrowed capital would be required. The last resort of a company for financing would be the issuance of new stock.

Consequently, the Static Trade-off Theory supports that there exists an optimal capital structure; while the Pecking Order Theory denies optimal capital structure and supports that a company simply finances required capital at each situation it faces at the time.

Unfortunately, neither Static Trade-off Theory nor Pecking Order Theory clearly explains the capital structure of a construction company. Sometimes, they partially explain the situation dependent on macroscopic environment and company internal conditions. In certain case, a company shows both capital financing behaviors suggested by these two theories [8]. Barclay and Smith[9] suggested that, though the Static Trade-off Theory and Pecking Order Theory had independently advanced, the two theories should be applied in mutually complementary manner in order to effectively explain the capital financing behavior of a company. The behavior of a company in the determination of its capital structure has their ultimate purpose in the maximization of company value and increasing stockholder wealth[10]. More explanations on above theories will follow in the next chapter.

With above study background, this study is an empirical study on the direct causes such as internal capital financing characteristic of a construction company, excluding indirect causes of insolvency such as the recession of macro-economy.

Consequently, the capital financing behavior of a construction company is interpreted based on the variables used in the explanation of two capital structure theories.

The purpose of this study is identifying the relationship among the business strategy, order receiving capability and leverage variables of a construction company using industry characteristic variables, in addition to the explanation variables used in the previous studies.

2. THEORETICAL BACKGROUND

2.1 Theories of Capital structure

Modigliani and Miller suggested in their first study that the capital structure of a company and the value of a company (or the wealth of stockholders) have no relation with each other in perfect capital market[6]. Then later, because of insufficient reality of perfect capital market, the Static Trade-off Theory in imperfect capital market was suggested. Static Trade-off Theory is built on the studies on corporate tax[11], bankruptcy cost [2] and agency cost[3] caused by the asymmetry of information. The main stream efforts are explaining optimal capital structure by actualizing the presumption of perfect capital market. This theory is called Static Trade-off Theory because the theory takes asset and sales of a company as fixed and only considers the change of debt ratio. Then Harris and Raviv[14] attempted generalization of Static Trade-off Theory. After that, DeAngelo and Masulis[15] and Fama and French[16] suggested Static Trade-off Theory considered of non-debt tax shields. Meanwhile, Jensen and Meckling[13] and Myers[17] suggested a capital structure theory considered of agent cost; while Donaldson suggested Pecking Order Theory when he published research paper on the financial convention of large enterprises. Donaldson said that "Management of a company strongly prefers internal capital than borrowed capital as a source of new capital except the case of capital demand expansion which occasionally occurs" [18]. Later, Myer revised and complemented the study result of Donaldson. He called it Pecking Order Theory and suggested that there exists an order when a company finances its required capital [7]. Myer said that a company first prefers using internal capital, and then it would adjust dividend payment. If the company still needs more capital, it will decrease the portfolio of cash account or marketable securities. When it still requires external financing, the company first issues debt, then utilizes combined securities like convertible bond. As the last resort, the company would issue new stocks to finance required capital. Therefore, according to the Pecking Order Theory of Myer, there is no clearly defined optimum debt ratio because there are two capital sources in the company, that is, in and out of company.

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[1] Capital structure generally means the combination of own capital and borrowed capital. The weight of borrowed capital in total asset is used as proxy variable.

[2] Scott proved that an optimum capital structure can exist if the bankruptcy cost would be acknowledged by way of collateral value approach method [12]. Scott suggested that using debt exceeding certain level causes increase in bankruptcy cost and it again increases the capital cost of using borrowed capital which results in the decrease in company value.

[3] Jensen and Meckling used ownership structure theory in suggesting that, if there is no other barrier factor other than agent cost on borrowed capital financing of a company, it is possible for company management (who owns the company) to realize optimum capital structure when the agent cost occurring at each capital financing source would become minimum[13].

As a conclusion, Myer suggested that a company prefers internal capital compared to external capital.

After that, Myer and Majluf explained the relationship between investment and leverage using asymmetry effect and signaling effect hypothesis as following. 1) When specific investment level is assumed, a company with bigger cash flow with better profitability has lower leverage. 2) When specific cash flow level is assumed, a company with more investment has higher leverage. 3) When future investment opportunity would be also considered, a company with more investment opportunity has lower leverage. Consequently, the logic is that the capital financing behavior is determined hierarchically dependent on the profitability, growth possibility, asymmetry of information and the magnitude of capital financing cost[19]. Later, Shyam-Sunder and Myers (1999) and Frank and Goyal (2003) examined the Pecking Order Theory on capital financing by way of empirical studies.

2.2 Capital structure in Construction industry

As stated in Introduction, a construction company can have tax decrease or exemption effect if it would excessively rely on borrowed capital. However, high leverage ratio has the dilemma of having the company falling into difficulty by increasing bankruptcy cost. In addition, it is believed that there would be an agent issue because of information asymmetry and uncertainty in the forecast of construction project progress/performance; therefore, a construction company will show capital structure behavior in accordance with Static Trade-off Theory. On the other hand, since the capital financing cost of internal capital is relatively low than the financing cost of borrowed capital under Pecking Order Theory, it is believed that a construction company would prefer internal capital than borrowed capital; however, since a construction company also prefers borrowed capital (dependency on debt) than internal capital. Therefore, it is believed that it is not possible to theoretically explain the capital financing behavior of a construction company. Since Modigliani and Miller, there have been many studies in various fields analyzing capital structure on a specific country or on whole industries; however, empirical studies on the capital structure of construction companies (or construction industry) is definitely insufficient. Myer suggested that the debt ratio of a company gets more influence from the necessity of capital financing than from the industrial characteristic. However, there have been suggestions that the capital structure of companies in the same industry is similar to each other. Accordingly, interpretations of capital structure by each industry are being tried now[14, 20]. However, studies that empirically analyzed construction company capital structure determinants are very few compared to other industry.

Feidakis and Rovolis did empirical study on large construction company capital structure determinants by taking the construction industry in 9 EU countries from 1996 to 2004. In their study, they explored the relationship between capital structure determinant and leverage (or long term, short term debt) by using variables such as company scale, profitability, liquidity, fixedness, asset utilization, growth opportunity, risk, share price performance and GDP growth rate. As the result of the study, Feidakis and Rovolis suggested that all variables used in the explanation of capital structure showed strong effect in all 9 EU countries. However, they could not confirm company behavior pattern that consistently supports specific theory suggested by previous studies[21]. Meanwhile, Chiang, Cheng and Lam did questionnaire survey on the potential capital structure determinants with construction contractors in Hong Kong. As the study result, they suggested that long term debts have statistically significant relation with the fixedness of asset; however, they could not confirm the determinants that can explain short term loans. They suggested that the reason is that short term loan request was determined by more complex determinant than expected[22].

Studies on insolvency forecast of construction companies or profitability related studies on construction companies also approached capital structure subject, though those studies were limited in scope. Debt ratio, which is the dependent variable in capital structure theory, has been used in most insolvency forecast and tender evaluation related studies [1, 4, 23-25].

3. METHODOLOGY

This study built multi-regression model, which have been frequently used in traditional previous studies, in the explanation of construction company capital structure. Empirical analysis on Static Trade-off Theory and Pecking Order Theory was done by the built model.

The objects of this study were limited to the construction companies listed in Korean stock market. The reason is that listed construction companies have bigger impact on national economy by their scale and operating area. In addition, it is easier to get their financial information than unlisted companies and their information is more reliable.

The period of study was from 2000 to 2010; therefore, total year of observation is 11 years (T=11).

Construction companies that had capital impairment, bankruptcy or were listed on Work-out Companies List were excluded from study scope. In addition, construction companies whose financial or non-financial information did not meet study requirement or construction companies that do not enable the calculation of industrial characteristic variables and capital structure determinants were excluded from study scope.

The final number of construction companies chosen through the filtering steps was 43 companies (N = 43) and the total number of observed value was 473 each (N × T). The data structure used in this study utilized balanced panel data structure which combines time series data with cross-sectional data. The basic model of regression equation used in the empirical analysis is Formula 1.

$$Y_{it} = a_1 + \sum_{k=2}^{K} a_k X_{kit} + \epsilon_{it}, i = 1, 2, \dots, N, t = 1, 2, \dots, T \qquad (1)$$

Where,

Table 1. Result of literature review on determinants of capital structure

Variable	Coefficients Sign under Static Trade-off Theory	Related literatures	Coefficients Sign under Pecking Order Theory	Related literatures	Expected sign of Coefficients
Firm's Size, (SIZE)	+	Scott and Martin(1975), Warner(1977), Friend and Lang(1988), Frank and Goyal (2009)	-	Kim and Sorenson(1986), Titman and Wessels(1988), Barclay and Smith(1995),	+
Growth Opportunities, (MTB)	-	Myers(1977), Kim and Sorensen(1986)	Short-term Debt: + Long-term Debt: -	Myers(1984), Titman and Wessels(1988), Fama French(2000),	+
Non-debt Tax Shields, (NDTS)	-	Miller(1977), DeAngelo and Masulis(1980), Fama French(2000)	+	Titman and Wessels(1988)	+
Tangibility, (COLL)	+	Myers(1977), Galai and Masulis(1976), Scott(1977), Stulz and Johnson(1985)	-	Myers and Majluf(1984), Harris and Raviv(1991)	+
Profitability, (PROF)	+	Kaplan(1989), Stulz(1990)	-	Myers and Majluf(1984), Jensen(1986), Titman and Wessels(1988), Fama and French(2000), Hovakimian et al.,(2004)	-
Stability, (LIQDT)	+	Graham(2000)	-	Myers and Majluf(1984)	-
Business Diversification, (BDIV)	+	Scott and Martin(1975)			+
Capability for Ordering Contract, (ODBL)	Unknown				-

Y_{it} is dependent variable combined of N ea of cross-sectional data and T ea of time series data, X_{kit} is explanation variable combined of N each of cross-sectional data and T each of time series data, a_1 is constant term, ϵ_{it} is error with 0 mean and σ^2 variance, and, K is the number of explanation variables.

Panel data has an advantage that it can solve the issue of multicollinearity because the number of observed value increases by temporal continuity of cross-sectional data. It also has the advantage of decreasing bias estimation on omitted variables. However, in order for regression model to be a Best Linear Unbiased Estimator (BLUE), the model should satisfy basic Ordinary Least Square (OLS) assumption[4].

In general, panel data have a possibility that there can be heteroscedasticity like cross-sectional data. There can be also the issue of serial correlation caused by the combined time series data. In order to solve these issues, this study built Pooled-Ordinary Least Square (POLS) model and Generalized Least Square (GLS) model at the same time by using same variables. Then the two models were compared to choose one model, which can consider the heteroscedasticity and autocorrelation. Determinant analysis was done by the chosen model[26].

There were extreme values because of financial data characteristics. In order to minimize data loss, extreme values in the range of upper 1% and lower 1% of individual explanation variables were removed. The Winsorization[27, 28] method derived from Charles P. Winsor method was used in the removal of extreme values.

In addition, natural log conversion was done on the dependent variables and independent variables in order to decrease the heteroscedasticity of explanation variables. The coefficients estimated in this way became to have

4 Regarding the basic assumption of OLS, please refer to Basic Econometrics authored by Gujarati.

elasticity (for example, when X_{kit} increases 1%, Y_{it} changes a_k per cent).

STATA 11, Microsoft Excel 2010 and PASW Statistics 18 were used in building the empirical models. Variables used in the study were common variables used in the two capital structure theories.

In addition, characteristic variables of construction industry were introduced to learn the impact of construction company business strategy on capital structure. In next chapter, explanation on variables follows.

3.2 Variable selection of determinants of capital structure

Variables used in the empirical analysis can be classified as following, dependent on the properties of each variable. The hypotheses on the independent variables suggested in this study are described in detail in Table 1, together with the suggestions in previous study literatures.

1) Dependent Variable
- Leverage

Financial leverage ratio can be measured as various proxy variables dependent on the purpose of study. In this study, the weight of total debt in total asset was taken as the proxy value of capital structure. Total debt includes both long term debt and short term debt; because this study focuses on capital borrowing behavior rather than debt expiration structure.

2) Independent variables
- Firm Size

As the scale of a company becomes bigger, the business of the company becomes more diversified and the possibility of bankruptcy also decreases. Also, when the scale of a company becomes bigger and the business of a company becomes more diversified, approach to capital market becomes easier[29]. Consequently, a large

scale company will use more debt because it can utilize debt with relatively low cost. Titman and Wessel suggested that as the scale of a company becomes bigger, the company will have scale economics in debt issue cost[8]. Therefore, natural log value of total asset was used as the proxy variable on company scale in this study.

- Growth Opportunity

In general, a company with high growth potential has more diversified investment opportunities. Since the debt cost increase caused by the growth opportunity of a company is recognized as the agent cost which decreases company value, company management would prefer own capital than borrowed capital in order to avoid agent cost. Therefore, this study chose MTB (ratio of market value to book value) as the proxy variable of growth opportunity. MTB was measured as the weight of market value in book value.

- Non-debt Tax Shields

DeAngelo and Masulis suggested Non-debt Tax Shields, in which a company can save tax by interest cost and deduction of investment tax by way of non-cash expenses such as depreciation cost [15]. The suggestion is that when an investment decision of a company is fixed, tax saving effect by investment tax deduction and non-cash cost offset the tax saving effect caused by debt issue; therefore, a company with bigger non-debt tax saving effect would have less reason which would induce the company to issue more debt (it is the extension of Static Trade-off Theory). Therefore, the proxy variable of non-debt tax saving effect was measured as the weight of depreciation cost in total asset.

- Asset Tangibility

Myers and Majuluf suggested that when a company put up collaterals for debt issue, it can save cost related to the asymmetry of information. They suggested that owning tangible fixed asset consequently improves collateral capability and relieves the asymmetry of information; therefore, a company would use borrowed capital instead of own capital[19]. In this study, the proxy variable of asset fixedness was set up as the weight of tangible fixed asset in total asset.

- Profitability

Profitability is one of the proxy variables which is most discussed in Static Trade-off Theory and Pecking Order Theory. According to Static Trade-off Theory, when profit of a company increases, tax burden of the company also increases; therefore, management borrows certain extent of capital in order to utilize the non-debt tax saving effect of interest cost. On the other hand, Pecking Order Theory suggests that the increase in profitability increases internally retained earnings; therefore, a company would avoid financing by borrowed capital. In this study, the proxy variable of profitability was measured as the weight of operation profit in sales revenue.

- Stability

Stability is the capability of a company to make cash out of asset within short period and at definite price. The stability ratio indicates company's capability in repaying short term debt. Current ratio and acid test ratio are used in the measurement of short term stability. In this study, current ratio is used in the measurement of short term

stability. The current ratio was measured as the weight of current asset in current debt.

- Business Diversification

This study also used business diversification variable in order to find out the determinant of capital structure and how the business strategy variable of a construction company works in the determination of debt 5. The meaning of diversification is different dependent on the viewpoint of researcher. In this study, diversification was defined as the extent of business strategy diversification of a construction company such as government-ordered projects, private sector projects, overseas projects, own projects and other projects. Therefore, businesses of a construction company not related to construction business such as transportation, sightseeing or broadcasting were excluded in the measurement of construction company diversification measurement. This study used Berry-Herfindahl Index [6] calculation method in the measurement of business diversification extent.

- Order receiving capability

This study also introduced the order receiving capability variable which judges the business capability of a construction company in addition to the diversification variable, in order to learn the particularity of construction industry and the relationship with capital structure. Information related to the order receiving of construction project is not stated in the financial statement; however, the information is disclosed as the off-the-book item for investor protection. In general, orders on hand or order receiving capability of a company are used as important items in the evaluation of company value [34] and construction industry is not an exception. It is believed that the capital structure strategy of a company would change in accordance with the change in orders on hand because it is possible to forecast future construction revenue or operation profit if a construction company has many orders on hand. Therefore, this study measured the order receiving capability of a construction company as the weight of total order amount on hand at the end of this period in the sales revenue.

4. RESULT OF EMPIRICAL ANALYSIS

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5 According to the operation efficiency hypothesis of Chandler, a diversified company can operate more efficiently than single business company; therefore, the diversified company becomes to have better profitability in the business sector. The diversified company can maximize the scale economics in this way [30]. In addition, according to the joint insurance effect hypothesis of Lewellen, a company improves the debt burden carrying capability by decreasing the variability of profit by way of building a portfolio made of different businesses from each other. It is known that the company can increase the company value because of non-debt tax reduction effect caused by the increase in debt utilization [31].

On the other hand, there is a study which suggested that a diversified company has the issue of excess investment [32] and its company value would decrease when the company would invest in a business which has low performance[33].

[6] $BHI = 1 - \left[\sum_{i=1}^{n} S_i^2 / (\sum_{i=1}^{n} S_i)^2 \right]$, where, n is the number of business and S_i is the sales revenue of i th business. As BHI index approaches 0, the diversification extent becomes smaller. On the other hand, when BHI approaches 1, the diversification extent becomes bigger.

Table 2. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Standard Error	Standard Deviation
LEVR (%)	427	19.810	97.050	60.829	0.760	15.696
SIZE (KR ₩1,000)	429	33,794,670	8,144,000,000	1,274,432,080	87,464,774	1,811,597,965
MTB (%)	429	24.499	1132.761	259.585	11.624	240.758
NDTS (%)	429	0.002	0.552	0.145	0.006	0.129
COLL (%)	429	1.217	38.980	14.341	0.454	9.413
PROF (%)	427	-14.510	15.270	5.586	0.228	4.704
LIQDT (%)	427	63.810	569.440	173.795	4.347	89.817
BDIV	423	0.162	0.745	0.526	0.006	0.126
ODRC (%)	399	0.026	778.355	260.432	8.085	161.492

Table 3. Result of Pearson's Correlation Analysis

Variable	LEVR	SIZE	MTB	NDTS	COLL	PROF	LIQDT	BDIV	ODBL
LEVR	1								
SIZE	0.444**	1							
MTB	-0.391**	0.089	1						
NDTS	-0.057	-0.459**	0.002	1					
COLL	-0.206**	-0.137**	-0.104*	0.309**	1				
PROF	-0.228**	0.083	0.219**	-0.220**	-0.069	1			
LIQDT	-0.591**	-0.425**	0.138**	0.135**	-0.002	-0.058	1		
BDIV	0.229**	0.422**	-0.031	-0.233**	-0.185**	0.109*	-0.153**	1	
ODRC	0.128*	0.325**	-0.014	-0.235**	-0.132**	-0.072	-0.132**	0.013	1

Note: **. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Table 2 is the descriptive statistics of dependent variables and independent variables used in this study. The data before they were converted to natural log were used in the calculation of descriptive statistics.

Correlation analysis was done before the building of multi-regression model in order to analyze the relationship between dependent variables and independent variables. The result of analysis is in Table 3. It is possible to see that there is positive relation between the scale of a company and leverage ratio at significance level 1%. It means that when the scale of a company is bigger, the leverage ratio also increases in proportion to the scale of company. Regarding MTB, which indicates the growth potential of a company, it is possible to see that there is negative relation between the scale of a company and MTB at significance level 1%.

The non-debt tax saving effect variable was analyzed as having no relation with leverage ratio; however, it was not statistically significant. COLL and PROF LIQDT variables were analyzed as having positive relation between with leverage ratio at significance level 1%. BDIV and ODRC were analyzed as having weak correlation with leverage ratio. Consequently, it is believed that there would not be the issue of multicollinearity because remaining variables, excluding LIQDT, have weak correlation with leverage ratio. The multicollinearity issue is discussed in detail in the model estimation result.

POLS panel model and GLS panel model were built to examine the hypotheses on the construction company capital structure determinants.

As mentioned in previous discussion on study methodology, various test methods were used to verify the existence of heteroscedasticity and self-correlation in the models and the models were estimated while considering this.

First, Likelihood Ratio test was applied on the GLS model and White's chi square test was applied on POLS model in order to verify the existence of heteroscedasticity in each model. The test results suggested that both model have heteroscedasticity.

First, Wooldridge F-test was applied to verify the existence of self-correlation. It was confirmed that there is first tier self-correlation because the test statistic was rejected at the significance level of 1%.

The heteroscedasticity and self-correlation can distort the model estimation result. Therefore, the POLS model was built while considering only the heteroscedasticity (It is not possible to assume self-correlation in POLS model). On the other hand, the GLS model was estimated by assuming both heteroscedasticity and self-correlation at the same time. The estimation results of two models are in Table 4. It is believed that the interpretation of two models is acceptable because the properness of two models was verified since the null hypotheses were rejected at the significance level of 1%. The result of multicollinearity analysis suggested that there would not be multicollinearity because the mean variance inflation factor was 1.30, while the maximum value is 1.88. Consequently, since POLS model does not allow estimation considering self-correlation, the analysis of capital structure determinant of a construction company was done by GLS model.

It has been found out that the scale of a company has positive relation with leverage ratio. 1% increase of company scale variable resulted in 0.06% increase of leverage ratio. This result is consistent with the expected signal value suggested in this study. Therefore, it is

Table 4. Estimation result of two different panel regression models

Dependent Variable : LEVR	Panel Generalized Least Square(GLS) Model	Panel Pooled Ordinary Least Square(POLS) Model
Variable	Coefficient	Coefficient
Constant	4.17676***	5.09196***
SIZE	0.06892***	0.07356***
MTB	-0.05305***	-0.08629***
NDTS	0.01626*	0.02793***
COLL	-0.07796***	-0.09926***
PROF	-0.02434***	-0.02282
LIQDT	-0.19336***	-0.35714***
BDIV	-0.04265	-0.06463*
ODRC	0.00001	0.00016***
Number of observation	384	384
Wald chi square test(DF: 8)	276.03***	-
Likelihood ratio test(DF: 38) for Heteroskedasticity	157.44*** (H0: Homoskedasticity)	-
R-squared	-	0.6171
F-test(DF: 8, 375)	-	45.14***
White's chi square test for Heteroskedasticity(DF:44)	-	175.15*** (H0: Homoskedasticity)
Wooldridge F test for serial correlation(DF: 1, 38) in panel data	52.010*** (H0 hypothesis: no first order autocorrelation)	

possible to interpret that the scale of a construction company increases debt ratio; because it is easy to finance capital from financial institutions because the company has less bankruptcy risk under Static Trade-off Theory.

The growth potential was found to have negative relation with leverage ratio; though it had been suggested as positive relation in this study. It is believed that this implies that the growth potential of a construction company supports the Static Trade-off Theory. The reason is believed that a construction company tries to avoid using borrowed capital in order to decrease the agent cost incurred with borrowed capital financing. Another reason is believed that a construction company tries to maintain relatively low debt ratio in order to minimize the cost which would incur with future less investment. The non-debt tax saving effect was found to have positive relation with leverage ratio and it was consistent with study hypothesis; however, the explanation capability was relatively poor because the significance level exceeded 5%.

The tangibility of asset is the weight of owned tangible fixed asset that can be set up as collateral. It is believed that more debt can be issued if this weight is higher because the collateral value is also bigger. However, the study result suggested that it has negative relation with leverage ratio at the significance level of 1%. The tangible fixed assets of construction companies are mostly real estate for construction business; therefore, it is believed that additional debt could not be issued because of poor usability of asset though the weight of tangible fixed asset is high.

Profitability was expected to have negative relation with leverage ratio. The analysis result was that it has negative relation with leverage ratio at the significance level of 1%. The profitability variable takes two capital structure theories and it is acknowledged as the most important variable. It is believed that a construction company shows negative behavior on additional borrowed capital financing because construction companies normally invest the profit from construction business in next project as capital. Therefore, it is believed that the capital financing behavior of a construction company follows the Pecking Order Theory. However, such dynamic interpretation is a bit excessive or too advanced because of the static characteristic of study methodology.

The business diversification and order receiving capability are the construction industry characteristic variables. It was believed that these two could be utilized as the determinants on leverage; however, it was not possible to obtain statistically significant result values. The reason is believed that there is certain correlation between business diversification and company scale. And the motivation for diversification would be bigger when the scale of company is bigger. Order receiving capability was expected to have relationship with company profitability with some time lag and it would have association with capital structure; however, consequently, it could not be selected as a variable that has impact on capital structure.

5. CONCLUSION

This study explained the capital financing behavior of a construction company by way of two capital structure theories and attempted to explain the unique business structure of construction industry by way of industry characteristic variables. The explanation variables used in the previous capital structure studies mostly produced significant results; however, the variables, which this study experimentally used, did not produce significant results. It is believed that it implies that additional studies are required in the selection of variables and study methodology.

It is believed that the business diversification and order receiving capability variables require theoretical examination on their relationship with profitability. It also implies the necessity of more empirical analyses.

The study results suggested that the capital structure determination behavior of a construction company generally follows Static Trade-off Theory; however, profitability was found to follow Pecking Order Theory.

Consequently, a case that unconditionally supports a particular theory is scarce. It has been also found that a case can support both theories at the same time. Therefore, it is believed that development study methodology or introduction of new study methodology that can identify the dynamic characteristic of construction company capital structure formation is required.

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