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## The influence of profitability on firm value with capital structure as the mediator and firm size and industry as moderators

### Abstract

The influences of profitability and leverage on firm value have long been critical with regard to financial decision making. The greater the profitability of a firm, the more assignable profit there is, and the higher is the value of the company. Profitability thus has a significantly positive influence on firm value. The pecking order theory holds that highly profitable corporations are not over-dependent on external funds, and thus profitability has a significantly negative influence on leverage. However, when the leverage increases, both agency and bankruptcy costs increase rapidly as a result. Since leverage generally has a markedly negative influence on firm value, leverage becomes the mediator variable in the influence of profitability on firm value. In addition, two moderator variables exist in the research – industry type and firm size. It is noted that when industry type acts as a moderator variable, it interferes with the relationship between profitability and leverage. When firm size is the moderator variable, it also interferes with the relationship between profitability and leverage. The moderating effect happens in the first stage.

**Keywords:** leverage, performance, agency theory.

**JEL Classification:** G30, G31, G32.

### Introduction

During the last few decades, the influences of profitability and leverage on firm value have drawn significant attention with regard to financial decision making. In a fiercely competitive environment, in order to both survive and develop, companies must work to achieve the cheapest way to carry out their investment plans and to maximize firm value and shareholder wealth.

When a firm has financial needs, internal and external funds can be used to meet them. However, if internal funds are used, cash dividends will be reduced. The increases in debt are likely to improve manager-shareholder agency relation by limiting waste of free cash flow, increasing monitoring, increasing the pressure to perform associated with potential bankruptcy, and possibly allowing for a greater fraction of outstanding shares to be held by management.

The electronic industry in Taiwan plays a critical role in the global economy, and operates using a vertically integrated model consisting of upper, middle and lower elements. Due to these characteristics, and its highly competitive nature, this sector has attracted considerable attention from researchers. Compared to other industries, the electronic industry has a shorter life cycle and constantly needs to develop new products to attract customers, so capital intensity and creativity are at relatively higher levels than elsewhere in the economy.

Large enterprises often have multiple strategies and face fewer risks, and thus have better credit than small businesses. Large firms also often have better

reputations due to their greater popularity and proportionally lower expected bankruptcy cost as a fraction of assets. All these factors make it easier for large enterprises to enter the market for equity securities. Deis et al. (1995) claim that bankruptcy cost should be higher in the bigger companies. Consequently, this research anticipates that the influences of profitability and leverage on firm value are different for large and small enterprises.

In brief, the main contributions of this research to the literature are as follows:

1. Previous studies rarely take the relations between profitability, leverage and firm value into consideration at the same time. This research discusses the influence of profitability on firm value, and takes leverage as the mediator variable to see whether the mediation effect is significant.
2. Previous studies rarely examine whether industry type and firm size moderate the relations between profitability, leverage and firm value. In contrast, this research discusses the impact of industry type and firm size to investigate whether their related moderating effects are first stage, second stage, indirect or direct effect.

### 1. Literature review and research hypotheses

Modigliani and Miller (1958) proposed the capital structure irrelevance theory, which states that under the assumption of a perfect capital market, the choice of bonds or stocks makes no difference to firm value; in other words, capital structure has no influence on firm value. A perfect capital market does not have corporate tax or transaction costs, and when information asymmetry is not a concern, a firm's value is determined by its ability to create value, no matter whether the capital it uses is from internal or external sources.

Modigliani and Miller (1963) then extended their model, and assumed that there is corporate tax and issuing debts has no risk, because the interest charges from debt can reduce corporate tax, and thus act as tax shields. The weighted average fund cost will fall as capital structure rises, and companies would thus try to finance their operations by obtaining as much capital through raising loans as they can, and the higher the proportion of debt becomes, the more they gain from tax saving, and thus the more firm value rises.

The MM model fails to predict it because it considers only the tax saving effect of debt and ignores the cost of financial risk and agency cost when debt increases. In practice no firm carries 100 percent debt. The Trade off theory states that when a firm issues debt, both the profit (tax shields) and costs (agency costs and bankruptcy cost) should be considered. When a firm first begins debt financing, the agency and bankruptcy costs the debt causes are low, and firm value increases as capital structure rises. However, as capital structure rises, so does the risk of bankruptcy. When the margin benefit equals the margin cost, firm value reaches its maximum, and this is the optimal capital structure (Jensen & Meckling, 1976; Myers, 1977; Harris & Raviv, 1990). Bankruptcy cost was first introduced by Stiglitz (1974), who stated that while issuing debt has a tax shield effect, as the debt increases the interest expense grows accordingly, and the possibility of encountering a financial crisis rises. Therefore, shareholders and creditors would require a higher return as compensation for the increasing risk, which increases the costs of both funding and bankruptcy.

The Agency Theory proposed by Jensen and Meckling (1976) holds that agency problems arise from conflicts of interest due to the different aims of stakeholders, bondholders and managers. The agency cost is the cost produced by the principle's monitoring, in which the principle is the stakeholders and creditors while the agent is the managers. There are two kinds of agency costs. One is called debt agency cost, which is produced in the conflict between the managers and creditors. Although issuing debt can save tax, as the debt ratio increases creditors would ask for a higher lending rate and increase the restrictions of the debt contract, and so the debt agency cost between the manager and creditors also increases. The other is called equity agency cost, which is based on the conflict between managers and stakeholders. Agency Theory claims that when the total agency costs are minimized, firm value is maximized. Jensen (1986) pointed out that debt financing will force managers to pledge interest payments to creditors, which therefore limits the activities of the firm, reduces the managers' exces-

sive investment, and decreases the agency cost between shareholders and managers.

Myers (1984) put forward the Pecking Order Theory, which states that the relation between capital structure and firm value can be attributed to information asymmetry, when the managers have more information than the creditors and equity investors. Therefore, when funds are needed undistributed earnings are used first, as there is no information asymmetry with internal funding. In this case, only when a firm is short of internal funds will it turn to debt financing and issue of new securities. Because issuing new securities may cause information asymmetry this may lead to the price of the new shares being underestimated, in addition, new shares could dilute the interest of existing shareholders and make the firm vulnerable to foreign investors (Myers, 1984; Shyam-Sunder & Myers, 1999; Frank & Goyal, 2003). This research will first look into the influence of profitability and capital structure on firm value and discusses its mediating effect, and finally moderator variables will be examined. The research hypotheses are as follows.

**1.1. Profitability and firm value.** Haugen and Baker (1996) and Yang et al. (2010) proved that the greater is firm profitability, the more distributable earnings there are for shareholders, and thus the expected firm value will be higher. ROA shows the management efficiency of the enterprise's assets, and is also a positive measure of firm value. Based on this, we present the first hypothesis.

*Hypotheses 1: Profitability has a positive effect on firm value.*

**1.2. Profitability and leverage.** Pecking Order Theory assumes that when a firm has a need for capital it will first consider the reserve surplus, and then debt, and the last choice is issuing new shares. Myers (1984) pointed out that with information asymmetry the issuing of new shares will cause a decline in stock price, which will cause an equity agency cost, and thus the issuing of new shares is the last choice in this situation. In addition, firm which has high profitability will not depend excessively on external funding for its development, because profitability has a negative effect on leverage. Baskin (1989) argued that internal funds do not need to bear the issue cost and prevent the double taxation. For these reasons, using internal funds is better than relying on external capital. In addition, many other scholars have proved empirically that profitability has a negative effect on leverage (Booth et al., 2001; Bevan & Danbolt, 2002; Mazur, 2007; Daskalakis & Psillaki, 2007; Ezeoha, 2008; Psillaki & Daskalakis, 2009; Akhthar & Oliver, 2009; Frank & Goyal, 2009), and thus the second hypothesis is as follows.

*Hypothesis 2: The profitability has a negative effect on leverage.*

**1.3. Leverage and firm value.** Modigliani and Miller (1958) first claimed that there is no connection between leverage and firm value. However, in 1963, after they took the influence of tax on firm value into consideration, they revised this opinion and stated that that issuing debt can help to increase firm value. In addition, by also considering the financial distress cost, DeAngelo & Masulis (1980) stated that the balance of profits and costs will lead to the optimal leverage.

The benefits of issuing debt come from both tax shield and non-tax shield effects. The former is the tax saving benefit of the interest on the debt, while the latter is the decrease in tax deriving from non-debt related elements, such as depreciation and investment tax credit. The higher a firm's leverage is, the higher the bankruptcy cost will be, and thus creditors will charge a higher interest rate. Moreover, the risk for a creditor is relatively high in this situation, which will lead to agency problems. When a firm's leverage remains at a low level, the tax shield benefits will surpass the cost, but as the debt rises, the cost will also rapidly increase. Therefore, the leverage generally has a negative effect on firm value.

*Hypothesis 3: The leverage has a negative effect on firm value.*

**1.4. Industrial type.** Each industry has its special characteristics, which will directly influence the changes in leverage and firm value (Talberg et al., 2008; Ovtchinnikov, 2010). This study wants to examine whether the industry type will influence the relationships among profitability, leverage and firm value. The characteristics of Taiwan's electronic sector include its rapid growth, short production lifecycle, large investment in research and development, and many tax incentives, making it different from other industries. We thus divide the industry type into electronic and non-electronic firms, and present the following hypothesis.

*Hypothesis 4: Industry type has moderating effect.*

**1.5. Firm size.** The size of the firm will determine its leverage (Hol & Wijst, 2008). Rajan and Zingales (1995) found that large firms are more diversified than small ones, and face lower risk. In addition, large firms have a low bankruptcy cost and are well known, which makes it easier to enter the stock market. When firms have the same profitability, the larger firm will have a relatively low level of debt (Panno, 2003; Ojah & Manrique, 2005). Myers and Majluf (1984) pointed out that the problem of in-

formation asymmetry is not as severe in big firms, and the information cost is also lower than for small firms. Moreover, large firms prefer to use equity capital rather than debt capital, with Titman and Wessels (1988) arguing that small firms rely on the former because they have to face a high issue cost. This research wants to analyze whether firm size will influence the relationships among profitability, leverage and firm value.

*Hypothesis 5: The size of the firm has a moderating effect.*

## 2. Research approaches

In this study, the choice of independent variables is based on the Capital Structure Theory and previous empirical studies. The empirical studies show that the value of the firm is based on the profitability and leverage, while the leverage is the mediating variable by which the profitability will influence the leverage first, and then influence the value. In addition, the type of industry and size of the firm are the moderating variables.

**2.1. Sample data.** This study chose Taiwanese listed companies in 2005 to 2009 as the research objects, because they have a relatively complete and reliable set of financial data. This study uses the average data to proxy the variable. After the deletion of the incomplete data, there are a total of 647 samples, including 302 companies categorized as belonging to the electronic industry and 345 companies belong to other industry.

**2.2. Variable definitions.** *2.2.1. Profitability.* Friend and Lang (1988), Rajan and Zingales (1995) and Booth et al., (2001) adopted return of assets as the measure of profitability, and this research also adopts this as the proxy variable for profitability. The return of assets equals the ratio of earnings before interests and taxes on total assets.

*2.2.2. Leverage.* There are two measures for the leverage; one is the debt-equity ratio, which stands for the ratio of liabilities to shareholders' equity, while the other is the liability capitalization ratio, which stands for the ratio of liabilities to capital. Burgman (1996) and Wald (1999) adopted the liability capitalization ratio as the measure in their empirical research on leverage, and this study follows the same practice.

*2.2.3. Firm value.* This study adopts market value as the proxy variable, and this is defined as the stock price per share at the end of the year. In Taiwan the book value per share is NT\$10, share cannot split when the share price is over a great range. The stock price per share is modified when companies give stock dividends.

2.2.4. *Industry type.* The industry type is used as the classifying variable. According to the classification system of the stock exchange, there are non-electronic and electronic industries. In order to decrease the collinearity between the variables, the variable needs to be centralized, and thus we set the non-electronic stocks as -1 while electronic ones as +1.

2.2.5. *Firm size.* The firm size is a continuous variable, which is presented by the logarithm of the total assets.

2.3. **Research approach.** The typical mediating model has three regressions, which are listed as follows:

$$Y = c_0 + c'X + z_1, \tag{1}$$

$$ME = a_0 + aX + z_2, \tag{2}$$

$$Y = b_0 + cX + bME + z_3. \tag{3}$$

Substitute the regression (2) in regression (3) to get regression (4):

$$Y = (b_0 + a_0b) + (c + ab)X + (bz_2 + z_3). \tag{4}$$

Analyzing the coefficient of  $X$  in regressions (1) and (4), we can get:

$$c' = c + ab \tag{5}$$

$$\text{which means: } c' - c = ab. \tag{6}$$

This is the basic equation of the mediating model, and thus the evaluation of the mediating effect should be based on whether the coefficient of the independent variable  $X$  to dependent variable  $Y$  will become smaller when the mediating variable is added, and whether  $c$  is smaller than  $c'$  in the basic equation.

Since  $c$  and  $c'$  belong to two path diagrams, it is difficult to measure the value, and thus the evaluation can be adjusted based on whether the variable  $ab$  is bigger than 0. The Sobel Test is frequently applied in the evaluation of mediating effects (Sobel, 1982), and the standard error approximation of  $ab$  is:

$$z = \frac{\hat{a}\hat{b}}{\sqrt{\hat{a}^2\sigma_b^2 + \hat{b}^2\sigma_a^2}}. \tag{7}$$

It just tests the difference in a given value when compares the 25th and 75th percentiles in outcomes. This method cannot test the slope of regression equation. Baron and Kenny (1986) first came up with the analytical model of mediated moderation and moderated mediation, which is called the moderated causal steps approach. It is based on the mediation model, and emphasizes the moderation and interactive effects. It is represented by the following three regressions:

$$Y = c_0 + c_1X + c_2MO + c_3XMO + z_1, \tag{8}$$

$$ME = a_0 + a_1X + a_2MO + a_3XMO + z_2, \tag{9}$$

$$Y = b_0 + b_1X + b_2MO + b_3XMO + b_4ME + b_5MEMO + z_3. \tag{10}$$

The combined analysis of moderation and mediating in this research is based on the moderated causal steps approach put forward by Edwards and Lambert in 2007. This approach is based on the mediating model, and takes the moderating factor into consideration. It can be presented as follows:

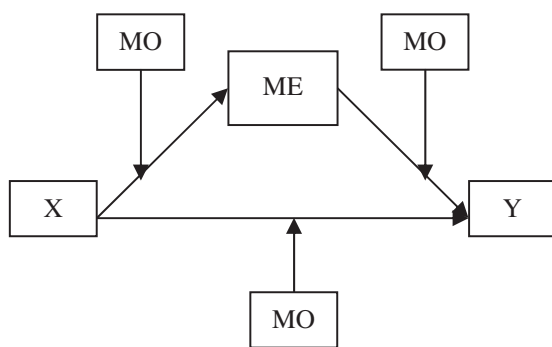


Fig. 1. The combined analysis of moderator and mediator factors

Each path has two cases: one interfered with by the moderating factor and one undisturbed by it, and altogether there are eight possibilities. Regression (9) analyzes whether the effect of the independent variable on the mediating variable will be influenced by the moderating factor. If  $a_3$  is significant, it represents that the first stage of the mediating effect of  $X$  on  $Y$  is significant. Regre-

ssion (10) analyzes whether the effect of moderating factor on the independent variable and dependent variable will be influenced when the mediating variable is added. If  $b_5$  is significant, it represents that the second stage of the mediating effect of  $X$  on  $Y$  is significant; if  $b_3$  is significant, it represents that the direct effect of  $X$  on  $Y$  is significant.

Combining direct effect moderation with second stage moderation yields the second stage and direct effect moderation model, and thus we can get:

$$Y = b_0 + b_1X + b_2MO + b_3XMO + b_4(a_0 + a_1X + a_2MO + a_3XMO + z_2) + b_5(a_0 + a_1X + a_2MO + a_3XMO + z_2)MO + z_3. \quad (11)$$

Simplifying and rearranging regression (11), we can get:

$$Y = [(b_0 + b_2MO) + (a_0 + a_2MO)(b_4 + b_5MO)] + \{(b_1 + b_3MO) + (a_1 + a_3MO)(b_4 + b_5MO)\}X + [(z_3 + b_2z_2 + b_5MOz_2)] \quad (12)$$

Equation (12) shows that *MO* affects the two paths that constitute the indirect effect of *X* on *Y*, as indicated by the term  $(a_1+a_3MO)(b_4+b_5MO)$ . Indirect effect slope = first stage effect slope\* second stage effect =  $(a_1+a_3MO)(b_4+b_5MO)$ . Total effect slope = direct effect slope + indirect effect slope =  $(b_1+b_3MO)+(a_1+a_3MO)(b_4+b_5MO)$ . Combined with regression (8), we can get the coefficient of *XMO* and the basic equation:  $c_3 = b_3 + (a_1b_5+a_3b_4)$ . Rearranging this we get:  $c_3-b_3 = (a_1b_5+a_3b_4)$ . The verification of the overall effect of the moderation and mediation model can be obtained by the adjustment of the basic equation:  $H_0: a_1b_5 + a_3b_4$ .

### 3. Data analysis

This research collects the financial data of companies listed in Taiwan from 2005 to 2009. After the deletion of companies with incomplete data, there are a total of 647 companies. The average *ROA* is 5.79%, the debt ratio is 38.08%, and market price per share is US\$1.03. Table 1 shows the matrix of each variable. The independent variable *ROA* and mediating variable *DEBT* have a significant negative correlation, *ROA* and *VALUE* have significant positive correlation, and *DEBT* and *VALUE* a significant negative correlation.

Table 1. The correlation matrix

Variables	X(ROA)	ME(DEBT)	Y(VALUE)	MO <sub>2</sub> (SIZE)
X(ROA)	1			
ME(DEBT)	-0.37**	1		
Y(VALUE)	0.62**	-0.33**	1	
MO <sub>2</sub> (SIZE)	0.09**	0.26**	0.28**	1

Note: \*\* if P < 0.01.

We take regressions (2) and (3) into the mediating test. Independent variable (*ROA*) has a significant effect on dependent variable (*VALUE*) and the coefficient *c'* is 0.69 (p = 0.00). Independent variable (*ROA*) influences mediator variable (*DEBT*)

significantly and the coefficient *a* is -0.37 (p = 0.00). Mediator variable (*DEBT*) has a significant effect on dependent variable (*VALUE*) and the coefficient *b* is -0.12 (p = 0.00). The number of samples in this research is 647, which can be viewed as a large sample. Therefore, according to the criterion given in Sobel (1982), since the critical ratio of the independent variable (*ROA*) to the mediating variable (*DEBT*) and dependent variable (*VALUE*) are both larger than 3, it thus a significant mediating effect.

Regression (12) examines whether the effect of interdependent variable *ROA* on mediating variable *DEBT* will be influenced by the influential factors – *TYPE* and *SIZE*. However, in the analysis of moderating effects, we usually get a high related coefficient between interdependent variable *X* and intercept *XZ*. Therefore, in order to solve the problem of collinearity, the variables need to be centralized using the following method. If the variable is measurable, then deduct the average from it; if the variable is dichotomous, set it as +1 and -1. Then run regression (12) to analyze whether the effect of the interdependent variable *ROA* on the mediating variable *DEBT* will be influenced by the influential factors – *TYPE* and *SIZE*. We can obtain the following path coefficients.

If the moderator variable is *TYPE*, according to the Path Analysis put forward by Edwards and Lambert (2007), we arrive at this regression:

$$DEBTC = -0.581 - 0.906(ROAC) - 2.279(TYPE) + 0.293(ROAC*TYPE). \quad (13)$$

Then, solving the regression (8), we get:

$$VALUE = 17.470 + 0.646(ROAC) + 1.073(TYPE) + 0.062(ROAC*TYPE) - 0.051(DEBTC) + 0.007(DEBTC*TYPE). \quad (14)$$

The result shows that only the first stage effect is disturbed ( $a_3 = 0.29, p = 0.00$ ), while the second stage effect is not ( $b_5 = 0.06, p = 0.14$ ), and neither is the direct effect ( $b_3 = -0.01, p = 0.72$ ).

If the moderating variable is *SIZE*, which is a continuous variable, and regression (12) is solved according to the Path Analysis put forward in Edwards and Lambert (2007), we obtain the following regression:

$$DEBT = 0.11 - 0.992(ROAC) + 8.325(SIZEC) - 0.422(ROAC*SIZEC). \quad (15)$$

Then by solving regression (8), we get:

$$VALUE = 17.177 + 0.675(ROAC) + 4.564(SIZEC) + 0.427(ROAC * SIZEC) - 0.1(DEBTC) + 0.023(DEBTC * SIZEC) \quad (16)$$

The results, as shown in Table 2, indicate that the first stage effect is disturbed ( $a_3 = -0.42, p = 0.00$ ), the second stage effect is not ( $b_5 = 0.02, p = 0.21$ ), and the direct effect is disturbed ( $b_3 = 0.43, p = 0.00$ ).

Table 2. Coefficient estimates

Moderating variable	$a_1$	$a_2$	$a_3$	$R_2$	$b_1$	$b_2$	$b_3$	$b_4$	$b_5$	$R_2$
TYPE	-0.91**	-2.28**	0.29**	0.17	0.65**	1.07**	0.06	-0.05**	-0.01	0.40
SIZE	-0.99**	8.33**	-0.42**	0.24	0.69**	4.56**	0.43**	-0.10**	0.02	0.51

Note: N = 647, \* if P < 0.05, \*\* if P < 0.01.

The regression analysis cannot evaluate whether the difference between two groups is salient, or the indirect effect is salient or not. This research adopts the CNLR (constrained nonlinear regression) put forward by Edwards and Lambert (2007), runs the bootstrap procedure, and repeats the sampling 1,000 times. The path coefficient solved by the quadratic regression of the samples is then put into the MS Excel application to calculate the first stage, second stage, direct, indirect and total effects. The confidence intervals are also examined to judge whether the effects are significant or not. Moderating variable (TYPE) is dichotomous variable, so we set the electronic industry as +1, and non-electronic industry as -1. Moderating variable (SIZE) is a continuous variable, so we set standard deviation of +1 (0.61) for a large firm, and the standard deviation of -1 (-0.61) for small firm as the judging standard. The results are given in Table 3.

Table 3. Analysis of simple effects

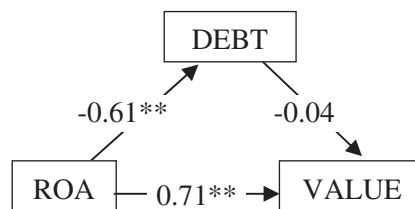
Moderating variable	Stage		Effect		
	First	Second	Indirect	Direct	Total
Type					
Electronic	-0.61**	-0.04	0.03	0.71**	0.74**
Non-electronic	-1.20**	-0.06**	0.07**	0.58**	0.65**
Differences	0.59**	0.02	0.05	0.12	0.08

Size					
Large	-1.25**	-0.09**	0.11**	0.94**	1.04**
Small	-0.73**	-0.11**	0.08**	0.41**	0.50**
Differences	-0.51**	0.03	0.02	0.52**	0.54**

Note: \* if P < 0.05, \*\* if P < 0.01.

The data for the moderating variable (TYPE) shows that among the mediating models in the two subgroups, for electronic industry subgroup, the path coefficient of the independent variable (ROA) on the mediating variable (DEBT) is -0.61, the path coefficient of (DEBT) on the dependent variable (VALUE) is -0.04, and the path coefficient of ROA on VALUE is 0.71. For non-electronic industry subgroup, the path coefficient of the independent variable (ROA) on the mediating variable (DEBT) is -1.20, and the path of mediating variable (DEBT) on dependent variable (VALUE) is 0.58. The model shows that the first stage effect is moderated, as when profit for the electronic industry increases by 1%, the leverage decreases by 0.61%, and when profit for the non-electronic industry increases by 1%, the leverage decreases by 1.20%. The results suggest that leverage has a significantly stronger negative relation with profitability in the electronic industry than in other industries.

A. Simple effects for electronic firms



B. Simple effects for non-electronic firms

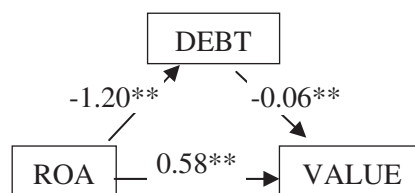


Fig. 2. Mediating models for different industry type

The moderating variable (*SIZE*) data shows that in the mediating model, for large firms the path coefficient of *ROA* on *DEBT* is -1.25, the path coefficient of *DEBT* on *VALUE* is -0.11, and the path coefficient of *ROA* on *VALUE* is 0.94; for small firm, the path coefficient of *ROA* on *DEBT* is -0.73, the path coefficient of *DEBT* on *VALUE* is -0.09, and the path coefficient of *ROA* on *VALUE* is 0.41. The model shows that first stage effect is disturbed, as when profit for a large firm increases by 1%, the leverage decreases by 1.25%; in contrast, when profit for a small firm increases by 1%, the leverage decreases by 0.73%, and there is a significant differ-

ence between the two subgroups. It is thus easier for a large firm to issue equity securities, while keeping a relatively low leverage. The second stage effect is not disturbed, which shows that when the profitability is equal, the size of the firm will not influence the effect of leverage on firm value. However, the direct effect is disturbed, which means that given the same leverage, when the profitability for a large firm increases by 1%, the firm value will increase \$0.94; however, when the profitability for a small firm increases by 1%, the firm value will only increase \$0.41, and this represents a significant difference between the two subgroups.

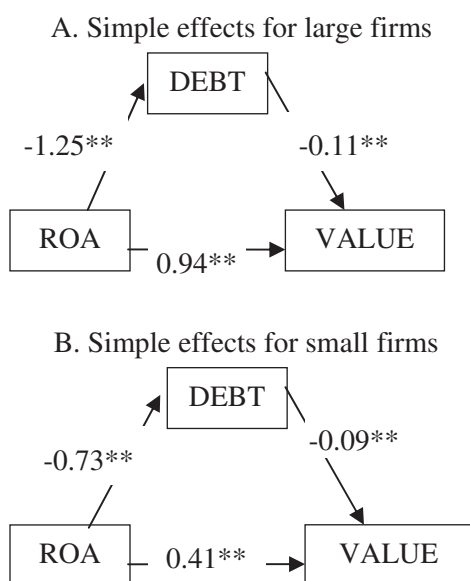


Fig. 3. Mediating models for different size firms

## Conclusions

This study focused on the relationships between these three variables. Based on the data of 647 listed companies in Taiwan for the years 2005-2009, this research investigated whether leverage is a mediating variable for profitability and corporate performance. In addition, with the aid of two regressions, this work examined if the moderating variables are *TYPE* and *SIZE*, as well as the relationships among the three variables, as mentioned above. The results confirmed that profitability has a positive effect on firm value, and a negative effect on the leverage, while the leverage has a negative effect on the value, and profitability has a significant mediating effect. When investors consider the influence of profitability on firm value, they cannot ignore the leverage's negative effect on the firm value, because a high level of debt may cancel the positive effect of profitability on firm value.

This research also analyzes whether the difference in industries will influence the mediating effect. The results show that the first stage effect is disturbed, and the regression coefficient of profita-

bility on leverage is negative. The difference here is significant, which shows that for non-electronic firms profitability has a stronger negative effect on leverage when compared with electronic firms, which means that the Pecking Order Theory is more suitable for the former group. When the profits of non-electronic industry firms increase, such companies tend to use their revenue reserves instead of looking for the bank financing. This may be due to relatively more severe information asymmetry existing in the non-electronic industry. The results of this study also show that the second stage effect is not disturbed, which means when firms have the same level of profitability, the difference in industry has no significant effect on firm value. This study also shows that the direct effect has not been disturbed, which means when firms have the same leverage, the difference in profitability has no significant effect on firm value.

We have also analyzed the influence of firm size on the mediating effect. The research shows that the first stage effect is disturbed, and though the regression coefficient of profitability on leverage

is negative for both cases, there is a significant difference between them. The results show that for large firms, the negative effect of profitability on leverage is stronger compared to the situation with small firms, which means the Pecking Order Theory is more applicable for large firms. This can be explained by the proposition that a large firm to issue equity securities to maintain a relatively low leverage. The results also show that the second stage effect is not disturbed, which means given the same profitability, the size of the firm has no significant effect on firm value. In addition,

they show that the direct effect is disturbed, which means that given the same leverage, the size of the company will significantly influence firm value. A large firm has a higher reputation and a lower bankruptcy risk, and so given the same profitability will have a higher value.

The various conflicting results of the previous empirical studies may due to the influence of other factors. This study includes both mediating and moderating variables into the analysis, which help us to obtain a better understanding of the role of leverage.

## Appendix

The following SPSS syntax produces results for profit (*ROAC*) as the independent variable, capital structure (*DEBTC*) as the mediating variable, firm value (*VALUEC*) as the outcome variable, industry type (*TYPE*) as the first moderating variable, and firm size (*SIZEC*). All continuous variables are mean-centered, as indicated by the letter C in their names. Product variables use names that concatenate the names of the variables that constitute the product (e.g., *ROACTYPE*). Bootstrap estimates are generated by the constrained nonlinear regression (*CNLR*) procedure. The *CNLR* syntax should specify the same random number seed (e.g., 54,321) for equations (11) and (12) in the *SET* lines and use coefficient estimates from the *REGRESSION* procedure as starting values in the *MODEL PROGRAM* line. The *COMPUTE PRED* and *CNLR* lines specify the independent and dependent variables, respectively. Each *OUTFILE* produces 1,001 rows of coefficient estimates, the first containing estimates from the full sample and the remaining rows containing estimates from the 1,000 bootstrap samples.

*SET RNG = MT MTINDEX = 54321.*

*MODEL PROGRAM a<sub>0</sub> = -0.581 a<sub>1</sub> = -0.906 a<sub>2</sub> = -2.279 a<sub>3</sub> = -0.293.*

*COMPUTE PRED = a<sub>0</sub> + a<sub>1</sub>\*ROAC + a<sub>2</sub>\*TYPE + a<sub>3</sub>\*ROACTYPE.*

*CNLR DEBTC/OUTFILE = 'D:TYPE13.SAV'/BOOTSTRAP = 1000.*

*SET RNG = MT MTINDEX = 54321.*

*MODEL PROGRAM b<sub>0</sub> = 17.47 b<sub>1</sub> = 0.646 b<sub>2</sub> = 1.073 b<sub>3</sub> = 0.062 b<sub>4</sub> = -0.051 b<sub>5</sub> = 0.007.*

*COMPUTE PRED = b<sub>0</sub> + b<sub>1</sub>\*ROAC + b<sub>2</sub>\*TYPE + b<sub>3</sub>\*ROACTYPE + b<sub>4</sub>\*DEBTC + b<sub>5</sub>\*DEBTC\*TYPE .*

*CNLR VALUE/OUTFILE = 'D:TYPE14.SAV'/BOOTSTRAP = 1000.*

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