How the Pecking-Order Theory Explain Capital Structure

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ABSTRACT

The pecking order theory of capital structure is one of the most influential theories of corporate finance. The purpose of this study is to explore the most important factors on a firm’s capital structure by pecking-order theory. Hierarchical regression is used as the analysis model. This study examines the determinants of debt decisions for 305 Taiwan electronic companies that are quoted on the Taiwan Stock Exchange of 2009. The results indicate that the determinants of capital structure are profitability and growth rate. The profitability negatively affects on capital structure. It implies that firms prefer to use their earnings to finance business activities and thus use less debt capital. Growth rate positively affects to capital structure. The greater growth opportunity will have more capital structure to finance the growth. Size is a moderator variable in this study. Size of firms moderates the effects of tax rate on capital structure. Large firms appear to take advantage of the tax deductibility of debt. The findings are important for management and investors.

Keywords: Corporate finance, Capital structure, Pecking order theory, Taiwan

INTRODUCTION

Effective financial management and what characters affect their capital structure are important for a firm to obtain better operational performance. A false decision about the capital structure may lead to financial distress and even to bankruptcy. There are numerous theories developed to analyze alternative capital structures. Among all these theories, the static trade off theory which derived by Modigliani and Miller (1963) was the earliest and most recognized which explains the formulation of capital structure. Their trade off theory assumed that there are optimal capital structures by trading off the benefits and cost of debt and equity. The main benefit of debt is tax deductibility of interest and the costs are bankruptcy cost (Kim, 1978) and agency cost (Jesen and Meckling, 1976; Myers, 1977). However, recent studies have shown a focus shift from the trade off theory to pecking order theory (Quan, 2002; Mazur, 2007).

The pecking order theory assumes that there is no target capital structure. The firms choose capitals according to the following preference order: internal finance, debt, equity. Myers and Majluf (1984) argued the existence of information asymmetry between managers (insiders) and investors (outsiders). They argued that managers have more inside information than investors and act in favor of old shareholders.

Using corporate data from Taiwan electronic firms, we analyzed the cross-sectional data of electronic firms of 2009 and examine whether they follow the financing pattern implied by the pecking order theory.
LITERATURE REVIEW

Modigliani and Miller (1958) were the pioneers in the theoretically examining the effect of capital structure on the firm value. In the perfect capital market, the capital structure does not affect a firm’s value. It is the theory of capital structure irrelevance that a firm’s value depends on the ability of its assets to create value, and is irrelevant if the assets originate in internal capital or external capital. Modigliani and Miller (1963) took taxation under consideration and proposed that the firms should employ as much debt as possible. Companies have an advantage in using debt rather than using internal capital, as they can benefit from debt tax shields. This tax shield allows firms to pay lower tax than they should, when using debt capital instead of using only their own capital. The theory argues that the more debt is, the more a firm’s value is created.

Jensen and Meckling (1976) identified the existence of the agency problem. They proposed that there are two kinds of agency costs - agency costs of equity and debt. The conflicts between managers and shareholders leads to agency costs of equity, and the conflicts between shareholders and debt-holders leads to agency costs of debt. Usually, managers are interested in accomplishing their own targets which may differ from the firm value. The owners may try to monitor and control the managers’ behaviors. These monitoring and control actions results in agency costs of equity. When a lender provides money to a firm, the interest rate is based on the risk of the firm. Manager may tempt to transfer value from creditors to shareholders. These monitoring and control actions results in agency cost of debt.

The trade off theory indicates the exposure of the firm to bankruptcy and agency cost against tax benefits associated with debt use. Bankruptcy cost is a cost directly incurred when the perceived probability that the firm will default on financing is greater than zero. One of the bankruptcy costs is liquidation cost, which represents the loss of value as a result of liquidating the net assets of the firm. Another bankruptcy cost is distress cost, which is the cost a firm incurs if stakeholders believe that the firm will discontinue. According to trade off theory, companies are expected to look for a target debt ratio (Jalilvand and Harris, 1984).

The pecking order theory suggests that firms have a particular preference order for capital used to finance their businesses (Myers and Majluf, 1984). Owing to the information asymmetries between the firm and potential investors, the firm will prefer retained earnings to debt, short-term debt over long-term debt and debt over equity. Myers and Majluf (1984) argued that if firms issue no new security but only use it’s retained earning to support the investment opportunities, the information asymmetric can be resolved. That implies that issuing equity becomes more expensive as asymmetric information insiders and outsiders increase. Firms which information asymmetry is large should issue debt to avoid selling under-priced securities. The capital structure decreasing events such as new stock offering leads to a firm’s stock price decline.

An announcement of increasing capital structure events is received by the market as good news because financial intermediaries like investment bank can become insiders to monitor the firm’s performance. Managers may have inside information that is not known to the market. Insider investors have more information about the true distribution of firm returns than outsiders. Insider investors tend to limit the use of equity in order to retain control of the firm (Hutchinson, 1995). Moreover, the risk of the firm’s return is unknown to investors. They are forced to rely on noisy signals such as the firm’s level of capital structure to determine the risk of their investment and firm’s value may be under-priced by the market (Myers and Majluf, 1984).
Transaction costs play an important role in a firm’s capital structure decision. Transaction costs associated with obtaining new external financing are higher than the costs of obtaining internal financing. Internal funds do not bear any transaction costs. Studies are consistent with the pecking order theory (Gaud et al., 2005; Mazur, 2007).

**HYPOTHESE**

We proposed some firm characteristics as the independent variables in the empirical research. They are profitability, growth, tax, asset structure and dividend.

**Profitability**

Corporate performance has been identified as a potential determinant of capital structure. According to the pecking order theory in the presence of asymmetric information, a firm will prefer internal finance, but would issue debt if internal finance was exhausted. The last alternative would be issue new equity. Myers (1984) prescribed a negative relation between profitability and debt. Profitable firms are likely to have more retained earnings. Successful companies do not need to depend so much on external finance. Empirical evidence from previous studies (Al-Sakran, 2001; Kayo and Kimura, 2010) appears to be consistent with the pecking order theory. Most studies found a negative relationship between profitability and debt financing (Myers and Majluf, 1984; Daskalakis and Psillaki, 2008, Vasiliou et al., 2009). The return on equity is used as an index for firm profitability in this study.

H1: Profitability will negatively affect capital structure.

**Growth**

As the firms grow, their requirement of finance tends to increase. The capacity to finance the increasing demand depends on internal finance. If a firm entirely relies on internal fund, then the growth may be restricted. Managers may forgo some profitable projects. If a firm goes for external finance, then chances of risk increases. Myers (1977) argues that firms with growth potential will tend to have less capital structure. Growth opportunities can produce moral hazard effects and push firms to take more risk. In order to mitigate this problem, growth opportunities should be financed with equity instead of debt. Smith and Watts (1992) find the predicted negative relation between debt and growth opportunity. On the other hand, firms with high growth will tend to look to external funds to fit the growth (Michaelas et al., 1999). Growth is likely to put a strain on retained earnings and push the firm into borrowing. Firms would look to short-term, less long-term for their financing needs. Studies found growth positively related to capital structure (Michaelas et al. 1999; Bevan and Danbolt, 2002; Eriotis, 2007).

H2: Growth opportunity will positively affect capital structure.

**Tax**

According to Modigliani and Miller (1963), companies should aim towards entire debt financing due to tax deductions associated with interest payments on debt. This effect encourages the use of debt by firms as more debt increases the after-tax earnings to the owner. MacKie-Mason (1990) studied the tax impact on the choice between debt and equity and concluded that changes in the marginal tax rate for any firm should affect financing decisions. Booth et al. (2001) use the average tax rate, arguing that it includes the impact of tax loss carry forwards and the use of the corporation as a conduit for income inflows. The average tax rate should affect financing decision.
H3: The average tax rate will positively affect capital structure.

Assets structure

Assets structure is an important determinant of the capital decision. The firm’s assets are tangible and have a greater liquidation value (Harris and Raviv, 1991). However, the more tangible assets are, the more collateral would be. The pecking order theory predicts that firms holding more tangible assets will be less prone to asymmetric information problems and reduce the agency cost. Agency costs of secured debt such as tangible assets are lower than those of unsecured debt. Some studies reveal that the capital structure is positively with the firm’s assets structure consisting with pecking order theory (Allen, 1995; Michaelas et al., 1999; Amidu, 2007).

H4: Assets structure will positively affect to capital structure.

Dividends

Bhaduris (2002) suggested that dividends are the signal of finance health to outsiders. A firm with a constant stream of dividends will face less asymmetric information when entering the equity market. Dividend payments decrease the amount of internal funds and increase the need for external financing. Dividend policy allows for releasing of resources when a firm has no profitable projects and conveys information about a firm’s future expectations to capital markets. There is a positive relationship between payout ratio and debt (Frank and Goyal, 2004).

H5: Dividends payout ratio will positively affect to capital structure.

Size

Size plays an important role in capital structure (Booth et al, 2001; Amidu, 2007; Abor and Biekpe, 2006; Abor and Biekpe, 2009). Small firms are often managed by very few managers whose main objective is to minimize the intrusion in their business and that is why internal funds will lie in the first place of their preference of finance. If internal funds are not enough, small firms will prefer debt to new equity mainly because debt means lower level of intrusion and lower risk of losing control. Hussain and Matlay (2007) assert that small firms strive for external sources of finance only if the internal sources are exhaust. Small firms try to meet their finance their finance needs with a pecking order of personal and retained earnings, debt and issuance of new equity. The pecking order theory can be easily applied in small firms because small firms borrow as their investment needs rather than an attempt to achieve an optimal capital structure (Daskalakis and Psillaki, 2008). Therefore, we consider size of a firm to be the moderator which will interacts with the relation between dependent variables and independent variables in the empirical model.

Profit interacts with size: Large firms are less susceptible to bankruptcy because they tend to be more diversified than smaller companies (Ang and McConnel, 1982). Therefore, lower expected bankruptcy costs enable large firms to take on more debts. The larger firms can reduce the level of information asymmetries in the market and obtain financial resources more easy (Padron et al. 2005). If two companies with same profitability, larger company will get more external finance.

Growth interacts with size: In small firms, managers are likely also the owners. Owners want to remain in control of their companies because they obtain private benefit over the financial return on their investment. They need to forgo some growth opportunities if the opportunities are too extensive to be realized and rely more on debt. The growth of small firms is more sensitive to internal finance than that of larger firms (Cressy and Olofsson, 1997). Small firms the probability of facing financial constraints is
higher and that makes it harder to gain access to banking resources. They are prepared to pay higher interest rates for additional loans and don’t consider issuing external equity in order to stay in control.

Tax interacts with size: Pettit and Singer (1985) have argued that tax considerations are of little attention for small firms because these firms are less likely to generate high profit and therefore are less likely to use debt for tax shields. Large firms have an incentive to employ more debt because they have tax deductible such as depreciation, research and development expense and investment deductions.

Fixed assets interacts with size: Small firms are more difficult to access financial services due to greater information and transaction costs (Ceston and White, 2003) Information cost can be considered nil for internal finance but are very high when issuing new capital, whereas debt lies in an intermediate. Fixed transaction costs prevent small firms from accessing financial services and disproportionately help large firms. Small firms do not bear higher business risk but also higher financial distress risk. Banks tend to respond to this risk by the value of collateral available. This creates a problem for small firms in that they often do not have significant fixed assets to secure. (Tucker and Lean, 2003) The existence of asymmetric information in small firms may induce lenders to require guarantees in collateral (Myers, 1977; Harris and Raviv, 1990).

Dividend interacts with size: Similar to the profitability factor, since large firms can obtain financial resources more easy (Padron et al. 2005), it is reasonable to assume that large firms, when issue more dividend to their stock holders, will tend to borrow less money from banks compared to small firms will do.

H6: Firm size will moderate the relationship between independent variables and capital structure.

The variables definition and predicted relationship are presented in table 1. According to pecking order theory, there are four variables are positively related with capital structure, including growth opportunity, asset structure, tax rate and dividend payment rate. Profitability is negatively related with capital structure. Size is the moderator in our study. Large firms can obtain financial resources more easy and whether there are some differences of decision capital structure between large and small firms.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Variable name</th>
<th>Definition</th>
<th>Predicted relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitability</td>
<td>ROE</td>
<td>Return of equity</td>
<td>-</td>
</tr>
<tr>
<td>Growth</td>
<td>GROW</td>
<td>Percentage change of net revenue</td>
<td>+</td>
</tr>
<tr>
<td>Tax</td>
<td>TAX</td>
<td>Tax/Profit before tax</td>
<td>+</td>
</tr>
<tr>
<td>Assets Structure</td>
<td>AST</td>
<td>Fixed assets/total assets</td>
<td>+</td>
</tr>
<tr>
<td>Dividend</td>
<td>DIV</td>
<td>Dividend/EPS</td>
<td>+</td>
</tr>
<tr>
<td>Size</td>
<td>SIZE</td>
<td>LOG(Net revenues)</td>
<td>+</td>
</tr>
</tbody>
</table>

**Table 1: variables definition and predicted relationship**

**RESEARCH METHODS**

The database of the Taiwan Stock Exchange is used as the basis for the analysis. The electronic companies were selected because they are the most important industry in Taiwan. They count for nearly 50% export account and nearly 60% of the whole stock market value. After eliminating the companies with insufficient data, there are 305 Taiwan electronic companies which are quoted on the Taiwan Stock Exchange of 2009. The dependent variable is capital structure (DEBT) which is calculated from total debts divided by total capital. The independent variables include profitability (ROE), asset structure (AST), tax (TAX), dividend payment ratio (DIV) and sales growth (GROW). Specially, we consider size
SIZE) as the moderator variable which will interact with the other independent variables. Their correlation coefficients are presented in Table 2.

**Table 2: The correlation of variables**

<table>
<thead>
<tr>
<th></th>
<th>DEBT</th>
<th>ROE</th>
<th>GROW</th>
<th>AST</th>
<th>TAX</th>
<th>DIV</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBT</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>-0.309**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROW</td>
<td>0.113*</td>
<td>0.243**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AST</td>
<td>0.068</td>
<td>-0.147**</td>
<td>0.057</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAX</td>
<td>-0.038</td>
<td>0.051</td>
<td>-0.124*</td>
<td>-0.125*</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIV</td>
<td>0.004</td>
<td>0.018</td>
<td>-0.064</td>
<td>-0.054</td>
<td>0.069</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>0.280**</td>
<td>0.146**</td>
<td>0.052</td>
<td>0.012</td>
<td>0.240**</td>
<td>-0.015</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01

In the data analysis stage, we utilize block regression as the analysis tool. First, capital structure is regressed on the five explanatory variables to see their respective significance. Then the moderator variable (SIZE) and its interaction with all the explanatory variables are included into the regression model to see the moderating effects. The block regression output is listed in Table 3.

**Table 3: Hierarchical Regression results**

<table>
<thead>
<tr>
<th>Model</th>
<th>Un-standardized Coefficients</th>
<th>T value</th>
<th>P value</th>
<th>Adjusted R²</th>
<th>ΔR²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>S. E.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>34.821</td>
<td>1.311</td>
<td>26.569</td>
<td>0.000</td>
<td>0.120</td>
</tr>
<tr>
<td>ROE</td>
<td>-0.241</td>
<td>0.038</td>
<td>-6.354</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>GROW</td>
<td>0.129</td>
<td>0.036</td>
<td>3.586</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>AST</td>
<td>0.489</td>
<td>5.140</td>
<td>0.095</td>
<td>0.924</td>
<td></td>
</tr>
<tr>
<td>TAX</td>
<td>0.078</td>
<td>1.146</td>
<td>0.068</td>
<td>0.946</td>
<td></td>
</tr>
<tr>
<td>DIV</td>
<td>0.059</td>
<td>0.137</td>
<td>0.427</td>
<td>0.670</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>35.492</td>
<td>1.453</td>
<td>24.433</td>
<td>0.000</td>
<td>0.247</td>
</tr>
<tr>
<td>ROE</td>
<td>-0.299</td>
<td>0.040</td>
<td>-7.459</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>GROW</td>
<td>0.122</td>
<td>0.034</td>
<td>3.544</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>AST</td>
<td>-2.220</td>
<td>5.079</td>
<td>-0.437</td>
<td>0.662</td>
<td></td>
</tr>
<tr>
<td>TAX</td>
<td>3.850</td>
<td>2.196</td>
<td>1.753</td>
<td>0.081</td>
<td></td>
</tr>
<tr>
<td>DIV</td>
<td>-0.881</td>
<td>1.005</td>
<td>-0.876</td>
<td>0.382</td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>10.403</td>
<td>2.269</td>
<td>4.585</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>SIZE*ROE</td>
<td>-0.062</td>
<td>0.054</td>
<td>-1.136</td>
<td>0.257</td>
<td></td>
</tr>
<tr>
<td>SIZE*GROW</td>
<td>0.029</td>
<td>0.040</td>
<td>0.723</td>
<td>0.470</td>
<td></td>
</tr>
<tr>
<td>SIZE*AST</td>
<td>-3.799</td>
<td>6.431</td>
<td>-0.591</td>
<td>0.555</td>
<td></td>
</tr>
<tr>
<td>SIZE*TAX</td>
<td>2.153</td>
<td>0.745</td>
<td>2.888</td>
<td>0.004</td>
<td></td>
</tr>
<tr>
<td>SIZE*DIV</td>
<td>-3.060</td>
<td>3.279</td>
<td>-0.933</td>
<td>0.351</td>
<td></td>
</tr>
</tbody>
</table>

From Table 3, we can interpret the result via the first and second block of models. In the first model, main effects of the explanatory variables are examined. Significant and negative correlation between capital structure and profitability is in compliance with the pecking order theory. There is also significant positive relation between capital structure and growth opportunity. There is no significant positive relation between capital structure and tangible assets. The results indicate that there is a linear relationship between the debt ratio and the explanatory variables. The value of R² is 27.5%. It suggests that 27.5% of
the variation in capital structure in the analyzed companies is explained. The regression coefficients of profitability and grow opportunity are in line with the pecking order theory. The variables of assets structure, tax and dividend are not predicted by this theory.

The most significant variable enter the final model is profitability which coefficient of profitability is negative. More profitable firms have more internal financing available. That suggests when firms lacking internal funds are using more debt financing. This supports the pecking order theory and confirms the findings of some earlier studies (Gaud et al., 2005; Amidu, 2007; Chakraborty, 2010; Vanacker and Manigart, 2010).

The coefficient of growth opportunity and capital structure is significant positive. Firms with high growth are more likely to exhaust internal funds and require additional capital (Michaelas et al., 1999). Growth is likely to put a strain on retained earnings and push the firm into borrowing.

The coefficient of fixed assets structure and capital structure is not significant in this study. In the pecking order theory the relation is positive. It means that higher proportion of fixed assets in total assets will lower asymmetric information problems and should issue more debt. But in this empirical study the pecking order theory is not support. The assets structure is not correlated with capital structure which is not consistent with other empirical study such as Portugal (Psillaki and Daskalakis, 2009). However, Hall et al. (2004) find a negative relationship between the short-term debt and the asset structure and a positive relationship between long-term debt and asset structure. In our study, we do not differentiate between long-term and short-term debt. Thus the relationship between asset structure and debt is not significant in this study.

The coefficient of tax and capital structure is not significant in this study. In the pecking order theory the relation is positive. Firms can use non-debt tax shields such as depreciation to reduce corporate tax. The financial crisis in 2008 influenced most of Taiwan electronic companies. The benefits are curtailed then they are less likely to use debt for tax shields.

The dividend policy is not correlated with capital structure. This is not lined with pecking order theory. In the financial storm influences most of the companies. The companies with good financial health may pay most of their profitability to keep the level of previous dividend policy. But one to third companies, they have no money to pay dividends.

When it comes to financial distress, size is an importance factor of capital structure. Could the size factor explain any differences on capital structure? The size is a moderator variable in this study. The path from tax to capital structure is moderated by the size of company. The moderator coefficient is positive that mean the path coefficient is bigger in the bigger companies. In bigger companies the tax rate affects positively the capital structure. The bigger companies raise finance from formal institutions to take advantage of the tax deductibility of debt.

**CONCLUSIONS**

This paper presents an analysis of the determinants of capital structure choices of Taiwan firms based on the data of 305 electronic listed firms of 2009. The study contributes to the empirical literature on capital structure in two ways. First, it belongs to the limited number of studies which analysis the capital structure of emerging stock market. Second, it compares the influence of firm size to the determinants.

In conclusion, the empirical evidence from this study suggests that profitability and growth opportunity are important variables that influence company’s capital structure. Profitability negatively
affects to capital structure that firms prefer internal financing from external. Firms use internal capital to finance new projects. When the internal capital is insufficient, firms issue debt. Equity is issued as a last resort. Profitable firms are more likely to generate internal, firms leverage decrease with profitability. Growth opportunity positively affects capital structure. Applying pecking order theory, growing firms place a greater demand on financial funds. They will tend to look to external funds to finance the growth.

The assets structure is not correlated with capital structure, perhaps because it affects long-term debt. The dividend policy is not correlated with capital structure in 2009, perhaps the financial crisis moderate the results. Size of firms is the moderator of the path between tax rate and capital structure. The tax rate affects positively leverage. Large firms appear to take advantage of the tax deductibility of debt. Large firms face a relative advantage to raise finance from formal institutions because they have lower information asymmetry, more diversified and lower risk.

REFERENCES


