Analytical Study Of Pecking Order Theory Of Capital Stucture: Evidence From Malaysia

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***Abstract*— This paper tests the pecking order model. The Peking order theory of capital structure was first introduced by Donaldson (1961) and then it was revised by Stewart C. Mayers and Nicolas Majluf (1984). In the pecking order theory of capital structure, it is assumed that there is no optimum debt ratio; instead it states that in case of financial deficit, the firm should borrow and only when issuing more debt is not advisable, the firm will issue stock. Since then many researchers had investigated the Pecking Order theory and got different results. This paper investigates the validity of this model very precisely by applying strict restrictions to the sample to eliminate any interrupting factor.**

Sample is chosen from the Bursa Malaysia listed companies. The validity of pecking order model is investigated based on both current and anticipated deficiency. It is been shown that this theory responses to anticipated deficiency far better than current deficiency.

Keywords*— *Capital structure; Pecking order theory; Financing deficit; Leverage

INTRODUCTION

The Peking order theory of capital structure (PO) was first introduced by Donaldson (1961) and then it was revised by Stewart C. Mayers and Nicolas Majluf (1984) followed by an elaboration done by Sunder-Mayers (1998). Since then the major studies that have shown the performance of PO model have focused on a specific industry or specific company type (like: K. Goyal et al. (2001) and Hovakimian, et.al. (2003)). Although their researches are worthwhile, there seems to be some gaps in their studies which can be corrected in future studies.

In the PO theory of capital structure, it is assumed that there is no optimum debt ratio. Actually it states that only when internal fund is insufficient, firms should borrow and only when issuing more debt is not advisable, they should issue stock (Fig. 1).

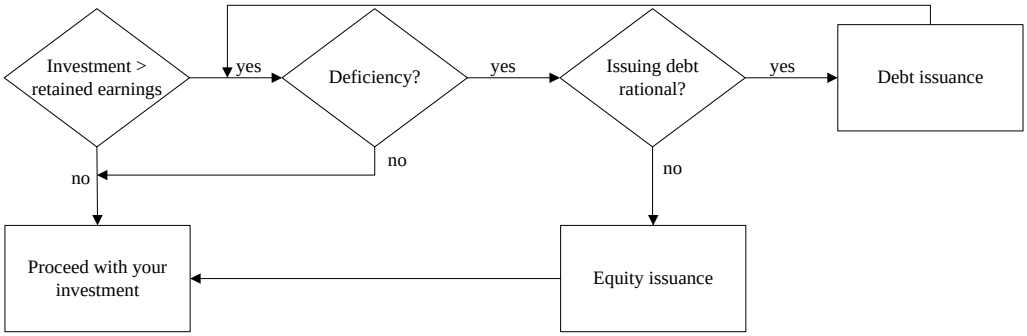

Fig. 1. An illustration of pecking order theory

This theory is derived from the effects of asymmetric information; Managers have more knowledge about firm's prospects and risks, rather than others, so issuing debt shows that the firm is profitable and also is a signal that shows the shares are undervalued. In contrast, issuing shares shows that the firm has some problem with productivity and will definitely decrease the share price. Due to these issues, firms try to use debt more than equity.

This paper employs a database from several listed companies in Bursa Malaysia to investigate the pecking order model. The main purpose of this study is to determine to what extend capital structures in Malaysia depend on the asymmetric information.

PRIOR WORK

Myers and Majluf (1984) introduced the PO for the first time. According to this model, the first preference level of fund is retained earnings. If this amount is insufficient, firms issue low risk debts. Just in case that this issuance is not preferred, the firms issue stocks. This model states that there is not any optimal debt ratio and it is mainly because of asymmetric information between company insiders and outsiders. Another description for absence of optimal debt ratio is that the amount of debt depends on deficiencies which consist of some factors (such as net investment, dividend, and sales) which is different between firms and even during each financial year for a single company.

Sunder-Mayers (1998) mentioned that pecking order can be considered as the best predictor of capital and also found that the use of debt issuance is not limited to only unanticipated but also on anticipated cash deficiency. In the same year a new study proved that PO model has the power to degrade the other famous CS model; Static Trade Off (TO). Lakshmi Shyam-Sunder, Stewart C. Myers (1998) investigated both PO and TO models and they showed that while both models have some explanatory power, the pecking order theory is a better predictor of capital structure. Overall result of this study implies that the pecking order is the first-order determinant of capital structure.

Till those days it was not clear whether if firm characteristics can influence the results significantly or not. Frank and Goyal (2001) and later on, Hovakimian, et al. (2003) found that pecking order is a very good model when the sample is narrowed down to large firms. Actually, small firms do not follow this model perfectly as they have serious adverse selection problems. Evidence on this issue was further investigated by Sreedhar T. Bharath (2006) which showed that PO model validity depends on severity of firm-level asymmetric information. Although some serious problems are found in the pecking order model, it does not mean that this model is totally irrelevant; this model works well in some degrees especially in large firms.

In support of PO model, Otavio R. de Medeiros (2004) did a survey in Brazilian industries on pecking order and found out that the Brazilian firms are more in line with the pecking order model than American firms (comparing with what Sunder, Myers (1998) and Frank, Goyal (2001) had found). This result was derivate from three main issues; first, serious problems of stock market, second, help of central bank to issue debt rather than stock, third difficulties in issuing equity. Further to the mentioned modifying factors, based on a survey done by D. Cumming (2006), PO model works differently in companies which are in different life phase and different industries. He showed that when uncertainty of expected return is high, especially in high-tech industries or companies which are in the start-up phase, the adverse selection effects are very high so the PO model becomes the dominant predictor of CSDs.

The function of over leveraged firms is another witness of PO model, Abe de Jong et al. (2009); where firms try to more issue debt than repurchasing equity. Even though this strategy leads managers to take higher risk of interest payment to debt holders, it helps them to avoid short-term decreases in share price. In this case the PO model is the dominant predictor of capital structures simply because this is a shield which protects firms against the effects of adverse selection.

Anton Miglo (2010) and Turki S. F. Alzomaia (2014) found a negative relation between bankruptcy costs and leverage as evidence allowed them to vote in favor of pecking order model. This issue empowers the predictions of PO model where managers tend to issue debt to decrease the effect of unpredicted bankruptcy. Furthermore as a verification of a researched done by Vasiliou et al. (2009) and Miglo, Fabian Kuehnhausen et al. (2014) emphasized on the negative relationship between profitability and leverage. This can lead us to an important issue: "the less risk taking a manager is, the more valid the pecking order is". Table I summarizes the effects of financial factors on PO model.

TABLE I. SOME DRIVERS OF CAPITAL STRUCTURE

Item	Impact on firm leverage	Effect on pecking order
Profitability	Negative	Negative
Firm size	Positive	Positive
Industry leverage	Positive	Negative
Bankruptcy costs	Negative	Positive

While testing PO model, some researchers reached surprising points which cast doubt against this model. Even though PO model works well in early years of Frank and Goyal's research (2001), they realized that over time more small firms tend to go public; therefore the amount of small firms which is publicly traded becomes larger so the support for the PO model degrades. This conclusion is based on the fact that small firms do not follow the PO model at all. This is not the only reason why the pecking order theory is degrading over time. Even when some author narrowed down their sample to large firms, the same problem exists; Fabian Kuehnhausen et al. (2014) found some signals of positive relation between industry leverage and firms leverage, which casts doubt in pecking order. In fact, some intervals, equity had been more popular among investors.

RESEARCH METHODOLOGY

For testing the PO model, first of all we need to calculate the amount of deficiency a company face and then check whether this amount can be described by our model. Financing deficiency is to be calculated by the equation presented by Sunder and Myers (1998) and then extended by Frank and Goyal (2001). The following equations present the amount of deficiency in period t:

$$DEF_t = DIV_t + I_t + \Delta W_t + R_t - C_t \qquad (1)$$

$$DEF_t = DEF_{t-1} + Z_t \qquad (2)$$

Where:

DEF_t - Fund deficiency in period t
DIV_t - Amount of cash dividend, paid in period t
I_t - Net investment, in period t
ΔW_t - Change in working capital, in period t
R_t - Current portion of long-term debt, in period t
C_t - Cash flow after interest and tax, in period t
Z_t - Net fund inflow or outflow in period t

Some of these factors can be extracted easily from financial statements of the companies and some of them need to be calculated. In table II we have presented the way they have been calculated. The last column contains the concept of each factor.

TABLE II. COMPONENTS OF PROPOSED PECKING ORDER MODEL

(A)	factor	How to calculate	Remark
=	DEF_t	Refer to column (A)	Fund deficiency in year t
+	DIV_t	Extracted from income statement	Cash dividend paid in year t
+	I_t	Purchase of investment-sale of investment + capital expenditure	How much money the firm spent on capital items to handle operations
+	ΔW_t	$(\text{Current asset} - \text{current liabilities})_t$ $-$ $(\text{Current asset} - \text{current liabilities})_{t-1}$	Change in short term liquidity
+	R_t	Extracted from balance sheet	The amount of long-term debt which must be paid next year
-	C_t	Income after extraordinary items + depreciation + amortization	Shows company's ability to generate cash from operating activities

The hypotheses will be tested with the following equations:

$$\Delta D_{it} = a + b_{po} DEF_{it} + e_{it} \quad (3)$$

$$\Delta D_{it} = a + b_{po} (DEF_{it} - DEF_{it-1}) + e_{it} \quad (4)$$

Where;

ΔD_{it} -amount of debt issued or recalled for firm i in the period t
DEF_{it-1} -fund deficiency in the previous period for the firm i
b_{po} -pecking order coefficient

Eequation (3) is trying to relate that the amount of new debt issued, depends on the current amount of cash deficit. When ΔD_{it} is negative, it can be concluded that some amount of debt has been recalled. If the pecking order is completely true in these samples, it will show that a=0 and b_{po} =1. These numbers mean that the whole amount of new debt issuance or repurchase depends just on fund deficiency.

If the equity is hard to issue or retire in short notice, according to (5), the change in deficiency of each year can be a good predictor of the amount of debt change. It is of importance to notice that in this model, it has been assumed that the change in deficiency is the net unexpected inflow or outflow of fund in period of "*t*". Therefore, this model is not a new one or something separate from the pecking order model. In fact, the simplified pecking order model has been elaborated to get a more accurate result in the regression test. Based on the model, the fund surprises in period "t" will be broken down according to the (4).

PO model implies that issuance of equity is a last resort option so, since the purchase or repurchase of any equity have not been considered in calculating DEF_t , the second equation does not have any accounting characteristic.

This analysis has two important implications: first; if the costs of financial distress is ignored, the company will use the safest security it can for real investments. In practice, this statement means that firms tend to issue debt rather than equity. Secondly, the firm will issue some amount of equity when the cost of financial distress is high.

To simplify the PO's predictions, we do not consider the sign of DEF_{it}. In fact, in the case of fund surpluses, the company can be a lender and it can also repurchase shares if the costs of tax and other operating are very low while the debt ratio is very low or even negative. Although no balance sheet variables appear in (1), it does not mean that the balance sheet data has nothing to do with this analysis. Here, it is expected that firms issue equity when the debt ratio is too much and repurchase equity when debt ratio is getting closed to small numbers. Debt ratios cannot be compared to each other because of the nature of each company;

SAMPLE DESIGN

In this study we believe that one of the main flaws of previous studies is "inappropriate sample selection". As described earlier, there are some interrupting factors which may lead us to wrong results. To avoid, this article tries to eliminate companies with interrupting data from our sample.

Two main interrupting factors which we avoid them in our study are: extreme high or low debt ratio and low total asset. In other word, firms with moderate debt ratio and large ones are selected as ideal members of our sample. Furthermore, financial institutions and insurance companies are excluded from this sample, because they might be under heavy financial regulations.

Deep understanding of our model helps us to identify and eliminate interrupting factors. The pecking order model states that because of adverse selection, the firms prefer to issue debt as the first attempt to compensate deficiencies. Adverse selection is caused by the phenomenon called asymmetric information which can be defined as the severity of knowledge contrast between insiders and outsiders. As it can be concluded from this definition, the more people know about the company's affairs, the weaker is the adverse selection. That's why large firms respond to PO model better than small firms.

To enhance the reliability of results, sample members are chosen from eighteen different industries. This helps us avoid the short-time effect of external moderators on a specific industry. The main source of data is "*ISI emerging market*" website for companies listed in "*Bursa Malaysia*" from years 2011 to 2014.

DATA ANALYSIS

A. Descriptive analysis

As mentioned earlier, sample designation has to be done precisely so that outcomes will be satisfactorily reliable. By measuring statistics of main financial ratios of sample, this section shows how efficient the data collection has been done. Three main ratios are chosen; debt to equity, return on total asset (ROTA) and debt ratio.

The first ratio (debt to equity) is calculated by dividing total interest bearing, long-term debt by total equity of firm. This ratio shows how much the company is levered. The more the ratio, the more the company is financed by debt and therefore the more levered the company is.

The second ratio (ROTA) is calculated by dividing earnings before interest and tax (EBIT) by total asset of the company. EBIT can be calculated by summing back the amount of interest expenses and taxes to the net income (EBIT = net income + interest expense + taxes). This ratio shows how well and efficient the firm has processed its assets to generate earning. The more the ROAT, the more efficient the firm is.

The third ratio (debt ratio) can be calculated by dividing total debt of the firm by total asset. This ratio gives not only an outlook of the firm's leverage but also a measure of risk for debt holders. In other words, when the amount of debt gets closer to the amount of total asset, the firm would have trouble in paying its obligation to debt holders, in case of bankruptcy. Table III shows the descriptive statistics of these three ratios.

As it can be seen within statistics in table III debt to equity ratio has been increased over study horizon which can show the popularity of debt over equity. Although the return on total asset has been decreased, this might be because of external moderators. our sample has a moderate debt ratio which shows the perfectness of our data collection.

TABLE III. DESCRIPTIVE ANALYSIS FOR 62 FIRMS BETWEEN YEARS 2011 AND 2014;

	2011	2012	2013	2014
Debt to equity				
mean	0.67	0.77	0.90	0.80
median	0.48	0.51	0.61	0.59
maximum	6.33	5.83	5.33	6.49
minimum	0.01	0.03	0.01	0.01
standard deviation	.90	0.97	1.05	1
Return on total asset				
mean	6.76	6.22	3.35	5.71
median	6.32	5.20	3.14	4.51
maximum	27.4	24.5	21.14	22.93
minimum	-8.49	-5.28	-16.35	-7.65
standard deviation	5.72	5.77	6.34	5.62
Debt ratio				
mean	0.25	0.27	0.29	0.27
median	0.24	0.27	0.31	0.27
maximum	.59	0.70	0.67	0.63
minimum	0.00	0.03	0.01	0.01
standard deviation	0.15	0.15	0.15	0.15

B. Bivariate correlation

Correlation is a statistical entity which shows how two variables change, regarding each other. In fact, correlation shows how well changes in one variable depends on changes in the other variable. This static can vary from 1 to -1. Correlation of 1 shows that if one variable increases, the other variable also increases and this increase is proportionately. Correlation of 0 shows that the two variables own independent changes from each other. Finally, having a correlation of -1 shows that the variables are perfectly dependent on each other's moves but the movement is opposite. Every correlation between -1 and 1 can be interpreted by understanding the extremes. The correlation has been calculated between each of the two variables which are dealt with in this paper. Table IV represents the results of the correlation analysis.

TABLE IV. PEARSON CORRELATIONS AMONG FINANCIAL FACTORS

variables	Total asset	Debt ratio	deficiency	Scaled deficiency	Scaled change in debt	Scaled change in deficiency
Total asset	1					
Debt ratio	.406	1				
Deficiency	.476	.494	1			
Scaled deficiency	-.061	-.008	.031	1		
Scaled change in debt	-.073	.005	.055	.419	1	
Scaled change in deficiency	.001	.008	.047	.376	.196	1

C. Results

Although the sample members have been selected with extreme scrutiny to eliminate interrupting factors, the sampling method is still on random basis (and of course, the availability of continuous data), the regression validity might not be satisfactory. For this reason, some restrictions have been applied to the data, which declines the sample size. The data survived after applying these restrictions, will match with the regression model pretty well. The important point is how to apply restrictions to avoid any change in overall characteristic data. For this purpose, the *Latest Outlier Analysis* (LOA) has been used to eliminate outlier points from our sample to get a higher validity of the test.

The coefficient of (3) and (4) using regression analysis has been calculated. Change in long-term debt was the dependent variable and the amount of deficiency/change in deficiency was the independent variable. All variables were scaled by total asset to eliminate the effect of firm size. Table V summarizes the results of regression analysis based on equations 3 and 4.

TABLE V. REGRESSION RESULTS OF PROPOSED MODELS

Model	**Coefficient** (b_{po})	**Constant** (e_{it})	**R square**
$\Delta D_{it} = a + b_{po} DEF_{it} + e_{it}$	0.423	0.003	0.671
$\Delta D_{it} = a + b_{po} (DEF_{it} - DEF_{it-1}) + e_{it}$	0.821	0.00	0.807

Based on the simplified model of PO, in about 67% of observations, the issuance of 42% of new long-term debts depended on the current amount of deficiencies. This model cannot be reliable enough to make any conclusion about the pecking order model

This is while the evidences of regression analysis of elaborated model were perfectly satisfactory; 80% of firms in our sample, controlled 82% of their long-term debt according to the amount of changes in deficiency (anticipated deficiency). To be clear, in our sample, companies preferred to issue debt with a look at anticipated deficiency rather than based on current deficiency.

DISCUSSION

The PO model is tested in a purified sample which contains “Bursa Malaysian” listed companies from years 2011 to 2014. Extreme attention is paid to eliminate interrupting factor enabling us to get a valid and reliable outcome.

Based on findings, firms do not issue debt for current deficiencies, which can pose a serious problem in pecking order at the first glance. But when we traced changes debt and anticipated deficiencies (between period t and t-1), a great support for PO model appeared.

In our sample, we showed companies preferred to trace anticipated deficiency rather than the actual (short-term) deficiency, while issuing or retiring debt. Managers with growth perceptions tended to follow the pecking order model rather than ones who have risk perceptions, Dirk Hackbarth (2007), so it can be said that Malaysian managers are mostly biased toward growth. This issue is consistent with the fact of Malaysia’s rapid growth in economy and finance industry in recent years. It’s speculated that the growth atmosphere of Malaysian industries might have triggered managers’ minds to move toward growth opportunities.

The main description of small deviation of sample from our model (20%) can be described by help of Frank and Goyal’s (2001) findings; increasing the popularity of equity and changing characteristics of small firms. It’s believed within recent years, more managers (comparing to 2000s) are becoming risk taker with the hope of getting more from business even in long term horizon which automatically robust the popularity of equity. Furthermore, especially in recent years, newly-grown firms are traded publically in which severity of asymmetric information problems might be still high which causes results move further away from PO model.

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