

Pecking Order and Static Trade-Off Models of Capital Structure: An Empirical Examination of Sri Lankan Listed Companies

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Abstract

This study examines the applicability of pecking order and static trade-off models of capital structure to Sri Lankan listed companies. Using data for 103 non-financial companies from 2007/08 to 2016/17, we test the two models employing the Generalized Method of Moment method. We find that the magnitude of the relation between the financing deficit and change in debt is very low, and firms finance only a small portion of their financing requirement through debt, providing weak support to the pecking order model. Although more profitable as well as larger firms prefer less debt inconsistent with the trade-off model, high-growth firms seem to use less debt consistent with the trade-off model, giving weak evidence to support the trade-off model as well. The pecking order model seems more applicable because listed companies consider external debt finance when meeting the financing deficit.

JEL classification: G3, G32

Keywords: Capital structure, Debt ratio, Pecking order model, Trade-off model, Sri Lanka

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1. Introduction

The choice of the optimal balance of equity and debt in the capital structure remains a critical decision in corporate finance. This paper examines the extent to which the pecking order and static trade-off models explain the capital structure patterns in Sri Lanka. This study intends to shed new light as to which models of capital structure mostly reflect the capital structure decisions of listed firms in Sri Lanka.

Although the pecking order and static trade-off models have been tested in Sri Lanka, there has not been consistency in testing these models since each study has used different analytical techniques. Therefore, the motivation of the current study is to examine the predictions of the two models by applying a consistent methodology to a sample of 103 listed non-financial firms during the period from 2007/08 to 2016/17.

The results of the study show that Sri Lankan companies follow both the static trade-off and pecking order models of capital structure. However, the pecking order model is found to be more applicable because listed companies consider external debt finance for financing purposes when they have a financial deficit.

The rest of the paper is organized into five sections. Section 2 provides the review of relevant literature. Section 3 describes the data and methodology. Section 4 discusses the empirical results while Section 5 provides the conclusions of the study.

2. Literature review

One of the major corporate decisions that determine the firm value, growth, and sustainability is the capital structure choice (Jenson and Meckling, 1976). The main theories of capital structure include Modigliani and Miller (1958 and 1963) capital structure under perfect capital markets and corporate income tax, trade-off theory (Kraus and Litzenberger, 1973), agency theory (Jenson and Meckling, 1976), and the pecking order theory (Myers, 1984; Myers and Majluf, 1984). Myers (1984) classifies capital structure theories into two schools of thought. The first group includes theories that suggest an optimal debt-equity decision and the second group includes those suggesting an optimal hierarchy in raising funds. The first group is called trade-off while the second group is called pecking order theories. Since our paper focuses on testing the trade-off and pecking order models, we will discuss their rationale and predictions about the choice of capital structure.

2.1 *The pecking order theory*

The pecking order model of capital structure was proposed by Myers and Majluf (1984). Accordingly, asymmetric information gives rise to a pecking order of financing. External users, such as creditors and investors, often have less information about a firm's performance, prospects, risks, and outlook than corporate managers. As a result, external users seek a higher return to compensate for the risk they take. External providers of finance, in essence, demand a greater rate of return to compensate for the increased risk owing to information asymmetry (Shyam-Sundar and Myers, 1999; Cotei and Fathat, 2008).

Therefore, according to the pecking order theory, financing by retained earnings reduces information asymmetry. Internal finance is the cheapest and most convenient method of funding, as opposed to external financing such as debt or equity, which requires the company to pay fees.

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Further, internal funds do not incur floatation costs and do not require additional disclosure of proprietary financial information with the possible loss of significant competitive advantages (Rasiah and Kim, 2011). Therefore, companies can issue debt securities if the internal sources of the funds are not sufficient to finance projects. The issuance of equity should be the last financing option since equity capital is the most expensive of the three sources of capital.

The pecking order theory argues that there is no acceptable level of optimum capital structure, and the sources of external finance, information asymmetry, and signaling problems determine the capital mix (Myers and Majluf, 1984). Further, the pecking order theory underscores the important relations among capital structure, dividends, and investments. Therefore, the pecking order theory predicts that firms prioritize their financing sources from internal to external sources and use equity financing as the last resort. Since profitable firms can finance through retained earnings, the theory also predicts a negative relation between debt and profitability. This means that low profitable firms prefer more debt than high profitable firms.

2.2 The trade-off theory

The trade-off theories (Modigliani and Miller, 1963; Kraus and Litzenberger, 1973) argue that the optimal capital structure, which minimizes the weighted average cost of capital of the firm, involves a trade-off between tax benefits of interest payments and costs of financial distress. Higher debt benefits the firm with larger tax savings that arise from the deductibility of interest for tax purposes. However, higher debt increases the costs of financial distress and the probability of bankruptcy as well. The theory suggests that increasing levels of financial distress costs lead to low debt levels, and tax benefits lead to high debt levels. Further, increasing the level of marginal bondholder tax rate motivates reducing the debt level (Frank and Goyal, 2003). The optimal mix of debt and equity is challenging because of the trade-off between tax benefits and bankruptcy problems. Fama and French (2002) argue that highly profitable firms prefer more debt levels because they have a higher capacity to take advantage of the tax benefits of debt.

Therefore, the trade-off theory predicts that companies should balance the costs and benefits of debt through a mix of debt and equity. However, it should be noted, that a company's overall cost of capital cannot be continuously reduced by using debt after a certain extent. Shyam-Sundar and Myers (1999) proposed a simple pecking order model in which the financial deficit is the major determinant of the sources of finance.

2.3 Empirical evidence in Sri Lanka

Most studies conducted in Sri Lanka have focused more on factors that determine the capital structure, comparing firm-specific factors and capital structure and examining the impact of capital structure on profitability. Such studies include Samarakoon (1999), Jahfer (2009), Pratheepkanth (2011), Prahalathan and Ranjani (2011), Lingesiya and Premkanth (2011), Ajanthan (2013), Leon (2013), Safeena (2014), Dissanayake and Fernando (2015), Rajapaksha (2015), Hamidon and Ranjani (2015), Kuruvita and Jayamaha (2016), Tharangani and Wijesinghe (2016), and Gnanasooriyar (2017).

Banda and Rooly (2014) examined the practice of corporate financing decisions using the static trade-off theory among Sri Lankan firms. However, they did not use any specific model for their analysis. Mathararachchi et al. (2017) tested the pecking order theory of the capital

structure of listed non-financial companies in Sri Lanka and found weak evidence for the pecking order theory.

Dissanayake (2019) conducted a study using 232 non-financial firms listed on the Colombo Stock Exchange for the period from 2011 to 2017 to assess the relevance and applicability of the pecking order and trade-off theories. They found that there was no well-defined debt-equity target and that there were two types of equity, internal and external, one at the top and the other at the bottom of the pecking order. They suggested that while there is evidence for both theories, the pecking order model is more dominant in Sri Lanka.

Recently, Rathnasingha and Heiyanthuduwa (2019) conducted a study to see if the pecking order theory accurately describes financing decisions in Sri Lanka. Using a unique dataset of Sri Lankan listed companies across multiple industrial sectors from 2011 to 2017, they found that corporations adhere to the original pecking order in which debt is preferred over equity when selecting the capital structure. Further, Senaratne (1998) argued that Sri Lankan companies choose debt finance than equity to fulfill the financing deficit, which is the primary factor in determining the hierarchy of financing decisions.

These two theories have been tested separately and together using different sectors and statistical techniques in Sri Lanka. Therefore, the current study's objective is to see whether the static trade-off model or the pecking order model can better explain the capital structure decisions of Sri Lankan firms.

3. Data and methodology

3.1 Data

The data were collected from the published annual reports of listed companies in the Colombo Stock Exchange (CSE) of Sri Lanka. As of 31st December 2007, the CSE had 235 listed companies representing 20 business sectors. The period of our study is 11 years from the financial year 2007/08 to 2016/17. The Banking Finance and Insurance sector was excluded because its applicable regulations vastly differ from other sectors which narrowed the sample to 219 non-financial firms.

The data included dividend payments, capital expenditure, working capital, total debt, total assets, total tangible assets, total depreciation, earnings before interest and tax, market and book value of shares, and cash flow after interest and tax. Firms for which the published financial statements were unavailable for the sample period were excluded. This resulted in a final panel data set of 103 companies. The source of annual reports is the CSE.

3.2 Methodology

3.2.1 Pecking order model

The pecking order model argues that the financing decision is driven by asymmetric information. Managers know more about the firm value and risk and prefer internal funds over external funds to satisfy financing requirements. If managers need external capital, they are more

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likely to seek debt than equity. We test the predictions of the pecking order model through model (1) below:

$$CDE_{it} = \alpha + \beta FDE_{it} + \varepsilon_{it} \quad (1)$$

where,

CDE_{it} is the change in debt or net long-term debt

FDE_{it} is the financing deficit (+) or surplus (-)

ε_{it} is the regression error term.

The subscripts i and t denote the firm and time. If the financing deficit is financed by debt capital, then the intercept (α) and the slope (β) coefficients are expected to be zero and one, respectively. The financing deficit or surplus is calculated as follows:

$$FDE_{it}^{\pm} = (DIV_{it} + CE_{it} + \Delta WC_{it} - CF_{it}) \quad (2)$$

where,

DIV_{it} = Dividend payment

CE_{it} = Capital Expenditure

ΔWC_{it} = Net Changes in working capital

CF_{it} = Cash flow after interest and tax

3.2.2 Trade-off model

According to the trade-off model, firms prefer an optimum capital structure that balances the benefits of tax shields and costs of bankruptcy. The implication is that firms set a target debt level and adjust debt towards the target. Therefore, the trade-off theory is tested by the partial adjustment model of Fama and French (2002), as specified in Eqn. (3) below:

$$D_{it} - D_{it-1} = \sigma + \beta(D_{it}^* - D_{it-1}) + \varepsilon_{it} \quad (3)$$

where,

D_{it} = Actual debt ratio of firm i , time t

D_{it-1} = Actual debt ratio of firm i , time $t - 1$

D_{it}^* = Target debt ratio of firm i , time t

β = Speed of adjustment

The trade-off model predicts that β will be greater than zero and less than one, indicating partially adjusting to the target debt level. The target debt ratio is calculated as:

$$D_{it}^* = \sum_{k=1}^n \delta_k X_{kit} + \partial_i + \lambda_t + e_{it} \quad (4)$$

where,

- δ_k = Coefficient of each determinant factor of debt
 X_{kit} = Determinant factors that include the collateral value of assets (CVAS), non-debt tax shield (NDTS), profitability, firm size, and Tobin's Q
 θ_i = the specific influence on the company that does not depend on the time
 λ_t = the specific influence of the time that is independent of the company

Both models are estimated using the Generalized Method of Moments (GMM) method. Pooled ordinary least square estimation does not consider endogeneity issues with the dependent variable. The endogeneity arises because of autoregression with autocorrelated and omitted variables errors. Table 1 provides details of the measurement of variables used in this study along with previous empirical evidence.

The GMM method eliminates the specific effects of unobserved variables in the model and applies instruments that are uncorrelated with error terms. Therefore, the GMM is more appropriate to estimate both models (Jarallah, et al., 2018; Pesaran and Smith, 1995). Jarallah et al. (2018) used the system GMM estimation method, which used lagged levels of debt measures as instruments. This added instrument boosts the efficiency of the basic first-differenced GMM estimators.

4. Empirical results

The descriptive statistics of the variables are presented in Table 2. Accordingly, the debt capital as a percent of total assets is very low with a mean of 4%, suggesting that Sri Lankan companies do not use much debt capital for financing purposes. This result is consistent with the findings of Samarakoon (1999) and Rathnasingha and Heiyanthuwa (2019). The average financing deficit is Rs. 128 million. The mean collateral value of assets is 27% and provides evidence of companies' ability to obtain debt financing to meet the financing deficit. The mean value of profitability and Tobin Q are 9% and 1.5 respectively. The mean value of non-debt tax shield (NDTS) is 2%, and the average firm size (measured as natural log) is 21.38, indicating evidence of lower benefits from non-debt tax shields and smaller firm size.

The correlations among the variables are shown in Table 3. The correlation of debt with the firm size is 0.25 and significant indicating that larger firms tend to have more debt capital. Profitability and Tobin Q are significantly negatively correlated with debt, showing that more profitable and valuable firms prefer equity capital over debt. Tangible assets show a weak negative correlation with firm size indicating that investments by large firms in tangible assets are relatively lower than small firms. Non-debt tax shield is negatively correlated with size, Tobin Q, and debt capital, and such correlations are not large. The positive correlation between profitability and firm size reveals that larger firms are more profitable. Tobin Q and profitability are also positively related.

Table 1

Definition of Variables Used in the Study

Variables	Acronym	Measurement	Expected sign	Empirical evidence
Pecking order model				
Change in Debt	CDE	$Debt_t - Debt_{t-1}$		
Deficit	FDE	Dividend + Capital Expenditure + Working Capital – Cash flow after interest and Tax	+/-	Zang and Kanazaki (2007); Cotei and Farhat (2009); Culata and Gunarsih (2012); Shyam-Sunder and Myers (1999)
Debt to Total Assets	DE	Total Debt / Total Assets		
Trade-off model				
Collateral value of assets	CVAS	Total Tangible Assets / Total Assets	+	Zang and Kanazaki (2007); Cotei and Farhat (2009); Serrasqueiro and Caetano (2015); Rajan and Zingales (1995); Booth et al., (2001); Culata and Gunarsih (2012)
Non-debt tax shield	NDTS	Total Depreciation / Total Assets	+	Zang and Kanazaki (2007); Jarallah et al. (2018)
Profitability	PROF	Earnings Before Interest and Taxes/ Total Assets	+	Jarallah et al. (2018); Rajan and Zingales (1995); Booth et al., (2001)
Tobin's Q	TQ	(Market Value of Equity + Book Value of Debt) / Total Assets	(-)	
Size	SIZE	Ln (Total Assets)	+	

Table 2*Descriptive Statistics*

	Minimum	Maximum	Mean	Standard deviation
CVAS	0	0.95	0.27	0.26
NDTS	0	0.14	0.02	0.02
PROF	-0.69	0.99	0.09	0.13
TQ	0.06	19.14	1.51	1.80
SIZE	15.82	25.61	21.38	1.55
FDE (Rs. Million)	-260,306	50,869	-128	9,449
DE	0	0.97	0.04	0.08

Note. CVAS is the collateral value of assets, NDTS is the non-debt tax shield, PROF is the profitability, TQ is the Tobin's Q ratio, SIZE is the firm size, FDE is the financial deficit, and DE is the total debt to total assets.

Table 3*Correlation Matrix*

	DE	CVAS	NDTS	PROF	SIZE	TQ	CDE
CVAS	0.0283						
NDTS	0.0936*	0.464*					
PROF	-0.094*	-0.089*	0.014				
SIZE	0.252*	-0.014	-0.069*	0.183*			
TQ	-0.081*	-0.175*	-0.206*	0.291*	-0.090*		
CDE	0.016	-0.003	-0.028	-0.003	0.050	-0.022	
FDE	0.046	-0.041	-0.033	-0.038	-0.030	0.016	-0.001

Note. This table presents the Pearson correlation coefficients. DE is total debt to total assets. CVAS is the collateral value of assets, NDTS is the non-debt tax shield, PROF is the profitability, TQ is the Tobin's Q ratio, SIZE is the firm size, CDE is the change in debt, and FDE is the financial deficit. * denotes significant level at 5% or more.

The GMM results relating to the pecking order model are presented in Table 4. The simple pecking order theory expects $\alpha=0$ and $\beta=1$. If the debt is exclusively used to finance the deficit, then the coefficient for the financing deficit (FDE) should be equal to one. We find that the coefficient for the financing deficit is 0.006, suggesting that the deficit is financed by sources other than debt. Although it is statistically significant, the magnitude of the coefficient is very low. This suggests that only a very small portion of the financing requirements is financed through debt. Thus, there is no compelling empirical support for the pecking order model in Sri Lanka. According to Samarakoon (1999), the use of debt is lower because of the underdevelopment of the debt market. This result is also consistent with Fama and French (2002), Frank and Goyal (2003), and Culata and Gunarsih (2012).

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The instrument validity and reliability were tested by the 1st and 2nd order serial correlation test. The *p-value* of serial correlation indicates that there is no 1st and 2nd order serial correlation of the pecking order model. The appropriateness of the model was tested by the Sargen test (*J*-statistics). The *p-value* shows that the null hypothesis of over-identifying restrictions is accepted. Therefore, the result proves there is no significant correlation between error terms and instruments.

Table 4

GMM Results for the Pecking Order Model

Variables	Coefficient	SE	<i>t</i> -stat	p-value
Alpha	-0.416	0.0002	-2496.93	0.0000
FDE	0.006	8.31E-05	73.29	0.0000
<i>p</i> -value-1 st Order Serial Correlation				0.2031
<i>p</i> -value- 2 nd Order Serial Correlation				0.2035
J-statistic				35.52
J-statistic <i>p</i> -value				0.16

Note. FDE is the financial deficit.

Table 5 provides GMM results for testing the static trade-off model. The association between the change in debt and profitability is negative and statistically significant at a 5% level. This implies that the more profitable firms prefer less debt. This result is in line with previous evidence of Zhang and Kanazaki (2007) and Jarallah et al. (2018). Firm size also negatively impacts the change in debt ratio, and this result is statistically significant at a 5% level. However, according to the trade-off theory, a positive relation is predicted for at least two reasons. First, large firms can borrow more at a lower cost of debt. Second, large firms prefer to have a more diversified financing policy to avoid bankruptcy problems. But contrary to predictions, large firms in Sri Lanka seem to rely on less debt.

Further, growth, as measured by Tobin's Q, has a negative relation with change in debt ratio and is statistically significant at a 5% level. This is consistent with the theory which suggests that high-growth firms prefer less debt to avoid the risk of bankruptcy. Myers (1977) argues that high-growth firms prefer low debt to avoid the underinvestment problem. This result is also consistent with Zhang and Kanazaki (2007) and Frank and Goyal (2003). The instrument validity and reliability were tested by the 1st and 2nd order serial correlation test and Sargen test (*J*-statistics) which indicate that the instruments are valid and there is no misspecification in the model.

Table 5*GMM Results for the Trade-Off Model*

Variable	Coefficient	SE	<i>t</i> -stat	p-value
DE _{t-1}	0.4395	0.0230	19.13	0.0000
CVAS	-0.0009	0.0115	-0.08	0.9347
NDTS	-0.0495	0.1110	-0.45	0.6556
PROF	-0.0251	0.0100	-2.51	0.0122
SIZE	-0.0090	0.0045	-2.01	0.0445
TQ	-0.0013	0.0005	-2.53	0.0117
1 st Order Serial Correlation <i>p</i> -value				0.0047
2 nd Order Serial Correlation <i>p</i> -value				0.9219
J-statistic				30.16
J-statistic <i>p</i> -value				0.3072

Note. DE is debt to total assets, CAVS is the collateral value of assets, NDTS is the non-debt tax shield, PROF is the profitability, TQ is the Tobin's Q ratio, and SIZE is the firm size.

5. Conclusions

This paper tests the pecking order and the static trade-off models of capital structure in the Sri Lankan stock market. The sample consists of 103 non-financial companies from 2007 to 2017, and the study uses the panel GMM method to estimate the parameters of the models.

The average debt ratio of Sri Lankan firms is very low with a mean of 4%. As for the pecking order theory, we find that the magnitude of the relation between the financing deficit and change in debt is very low. Hence, there is weak evidence to support the pecking order model in Sri Lanka, and Sri Lankan companies do not use much debt capital for financing purposes. This most likely is the result of a lack of a more developed and vibrant debt market in Sri Lanka.

As for the trade-off model, we find that the more profitable firms and larger firms prefer less debt. These results are inconsistent with the model's predictions. However, high-growth firms seem to use less debt consistent with the trade-off model. Therefore, there is weak evidence to support the trade-off model in Sri Lanka as well.

Developing deep and liquid debt markets will likely lead to more use of debt by Sri Lankan firms. The policymakers and regulators need to take the steps to develop a more vibrant debt market to provide more financing choices for firms. The corporate bond market in Sri Lanka is relatively small; therefore, most profitable as well as large companies use less debt to meet their financing needs. Our study was limited to non-financial firms only, and further research is needed to understand the capital structure dynamics of the financial firms. Further, the non-financial sector consists of many industry categories, and further research focusing on specific sectors will provide more evidence on the capital structure choice across industries in Sri Lanka.

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