

An Empirical Investigation of Dynamic Trade-off Theory: Evidence from Sri Lankan Non Financial Firms

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ABSTRACT

This study intends to examine applicability of dynamic trade-off theory to the capital structure of nonfinancial institutions and to identify the determinant factors of speed of adjustment towards target capital structure of nonfinancial firms in Sri Lanka. Independent variables derived from static trade-off model are firm size, assets tangibility, profitability, growth opportunity and non-debt tax shield. Financial leverage is treated as dependent variable. Two step generalized method of movement (GMM) is used to measure speed of adjustment (SOA) towards target capital structure. Result of the study reveals that there is a strong evidence to show applicability of dynamic trade-off theory to the capital structure of non-financial firms in Sri Lanka. All independent variables have significant impact on speed of adjustment and capital structure has moderate speed of adjustment towards target capital structure in whole firms. High leveraged firms have greater speed of adjustment than low leveraged firms. Further, previous year leverage is found as powerful determinant factor of current year leverage than other firm specific factors. It can be concluded that non-financial institutions can increase firm value when they adjust firm specific factors at moderate level to reach target capital structure.

Keywords: Dynamic trade-off, Financial leverage, Speed of adjustment, Target capital structure

1. Introduction

Plenty of theories on capital structure were developed by scholars in different era. Each theory was proposed to solve limitations identified in previous theories. This study focuses on recent theory of capital structure of dynamic trade-off theory. The trade-off theory, in both its static and dynamic model implies that the firm can increase its value by maintaining optimum capital structure. It can be achieved with target leverage by balancing of advantage of tax saving in borrowing and costs of bankruptcy (Karus and Litzenberger, 1973). Dynamic trade-off theory developed for capital structure says that each firm may not be near to their target capital structure, but it will have adjustment behavior towards the respective target. When the cost of deviation from the target exceeds the cost of adjustment towards the target, adjustment behavior can be identified (Fischer et al., 1989). Major reason for motivating firms to follow the dynamic trade-off theory than other theories is that it reveals dynamic behavior towards target leverage.

Process of making financing decision in a firm is a challenging aspect as it is influenced by various internal and external factors. Most of the Sri Lankan studies related to the theories on capital structure revealed that proportion of debt and equity mix in the capital structure is decided by stakeholders and management of the organization as their wishes without any rational and some of other firms are following historical practices for making decision to finance the project. Major reason, which has been found by previous researchers that the management of the firm didn't have enough knowledge and relevant research about the theories of capital structure. Therefore, even they might not have tried to achieve their target capital structure to increase value of the firm as they didn't know the capital structure has a dynamics behavior in a long term. Considerable number of studies has been done in other countries but Sri Lanka has very limited study on it. This study will fill the gap on the particular aspect.

The purpose of this study is to analyze whether financing decision of Sri Lankan non-financial firms are made in terms of the predictions of dynamic trade-off theory. It leads to find speed of adjustment (SOA) of financial leverage towards target debt ratios and identify determinant factors of speed of adjustment towards target capital structure. Plenty of the studies carried out

in Sri Lanka analyzed determinants of capital structure and their impact on firm performance. However, very few studies were done to analyze speed of adjustment towards target capital structure. It is going to be analyzed among the capital structure of Sri Lankan non-financial firms. For the purpose of analysis, listed non-financial firms in Colombo Stock Exchange, Sri Lanka are categorized under high leveraged firms and low leveraged firms. The two step Generalized Method of Moments (GMM) is employed to estimate the SOA towards target capital structure. Financial leverage is considered as dependent variable which is measured using total debt ratio. According to the static trade-off theory, most suitable internal factors or firm specific factors to determine optimum capital structure are derived as independent variables. Result of analysis will be revealed that which one of high leveraged or low leveraged firms have high speed of adjustment towards target debt ratio and hence it expose most determinant factors of speed of adjustment towards target capital structure.

The rest of the article is structured as follows. Theoretical and empirical literatures are discussed in Section 2. Section 3 describes methodology of the study. In Section 4, data is analyzed using different statistical techniques and it is concluded with implication and recommendation in section 5.

2. Literature Review

Dynamic trade off theory is considered as most readily used capital structure theory. It states that the firm can adjust current leverage level towards the target leverage level for achieving optimum capital structure. Further, it says that it is costly to issue and repurchase debt in order to achieve target debt ratio. Therefore, firms which leverage is not equal to their target leverage, will adjust it when the benefits of doing outweigh costs of adjustment (Dudley, 2007). Hovakimian et al. (2001) found that target ratios may change through the time. Therefore, speed of adjustment towards target capital structure may vary time to time. Brennan and Schwartz (1978) formalized and tested first model static trade-off theory explaining achievement of optimum target capital structure by balancing the tax benefits of debt with the risks of bankruptcy. Further, it shows that firms can maximize value in accordance with moving towards target leverage ratio.

Even though most of the studies similar to this study have been carried out in foreign countries, very few studies have been done in recent year. Abdeljawad et.al (2017) employed GMM method and found that firms which are far from the target moves faster than the firms close to the target and high leveraged firm has high SoA than low leveraged firms in Malaysia. Dang, et.al (2015) had done a study using data derived from UK firms and found that firms with high dividend payments, profitability, growth opportunities, large investment and large deviation from their target leverage moves with slower speeds of adjustment than other firms with opposite behavior. Hence, high leveraged firms move quickly towards target leverage.

Baum et al. (2017) carried out a study on world scope global database and found that companies with over leveraged quickly move to the optimal level if macroeconomic risk is low and viz versa. Brav (2009) tested SoA between public and private companies in UK and found that Private companies had slower rate of adjustment to the optimal leverage level 10.2% than public companies 22.5%. Memon et.al (2015) revealed that firms in Pakistan can meet their target debt ratios with the speed of adjustment 60% per year approximately. It may take only less than 2 years to make complete adjustment towards target. Drobetz and Wanzenried (2006) analyzed Speed of Adjustment to the target capital structure of Swiss firms over the years 1991 to 2001 using dynamic adjustment model and panel methodology. It was found that firms which are away from their optimal capital structure and growing rapidly showed higher speed of adjustment. Further, they revealed notable relationship between adjustment speed and variables of popular business cycle. Getzmann, et al. (2010) intended to examine the determinant factors of speed of adjustment towards target capital structure using 1301 non-financial firms listed in Asian financial markets. It was found that Asian firms have target debt ratio. Profitability and assets tangibility are found as major determinants of capital structure of the firm.

Chaklader and Jaisinghani (2017) compared the dynamic behavior of capital structure across firms under the textile industry in India and China. It was confirmed that there is a partial applicability of dynamic trade-off theory for the Indian firms and strong applicability of the theory for the Chinese firms. Further, Indian textile companies have lower speed of adjustment compared to Chinese companies. Chairunnisa et al. (2018) investigated dynamic model on

financing decisions of non-financial listed firms in Indonesia. Generalized method of moments was used to estimate partial adjustment model. Result revealed that profitability, liquidity, and tangibility have significant impact while non-debt tax shield, business risk and size do not have significant effect on leverage decision of firms. Researchers identified high speed of adjustment across the firms. Schroder and Sosman (2016) revealed in that firm size, asset tangibility and profitability have the strong impact on capital structure dynamics in European firms. Fama and French (2002) found SOA to be between 7% and 18 % per year. However, Flannery and Rangan (2006) said that speed of adjustment should be more than 30% per year.

SoA towards target capital structure among Sri Lankan firms were examined by only one researcher (Buvanendra, 2017). Researcher categorized firms under near and off target firms and used two step Generalized Method of Moments to find the result. Result of the study revealed that the adjustment speeds for near target firms are about 59%, 54% and 60% respectively to total debt ratio, long term debt ratio and short term debt ratio, while off target firms are about 67%, 66 % and 86% respectively to the leverage ratios. Therefore, it was concluded that off target firms adjust quickly than near target firms in Sri Lanka.

3. Methodology

This is one of the quantitative studies, where secondary data was collected and analyzed. The target population of the study is 225 non-financial institutions listed on Colombo Stock Exchange, Sri Lanka. It includes firms listed in Colombo Stock Exchange under the sectors of beverage food and tobacco, chemicals and pharmaceuticals, construction and engineering, diversified holdings, footwear and textile, health care, hotels and travels, information technology, investment trusts, land and property, manufacturing, motors, oil palms, plantations, power and energy, services, store supplies, telecommunications and trading. Stratified sampling method was used to select sample of the study among them. Which Means 45% of population of each sector was selected. It is explained clearly in the table 1.

Table 1. Sampling Frameworks

Name of the Sectors	Total Number of firms	Approximately 45% of total population
Beverage Food and Tobacco	22	10
Chemicals and Pharmaceuticals	10	5
Construction and Engineering	4	2
Diversified Holdings	16	7
Footwear and Textile	2	1
Health Care	6	2
Hotels and Travels	36	16
Information Technology	2	1
Investment Trusts	9	4
Land and Property	19	9
Manufacturing	38	17
Motors	6	2
Oil Palm	5	2
Plantations	19	9
Power and Energy	9	4
Services	8	3
Stores Supplies	4	2
Telecommunications	2	1
Trading	8	3
Total Population and sample	225	100

Firms listed under the sector of bank, finance and insurance were eliminated from the total firms listed in CSE as their different requirement of leverage level by monitored institutions like Central Bank of Sri Lanka. According to the existing dynamic trade-off model, firm size, assets tangibility, profitability, growth opportunity and non-debt tax shield are considered as predictor variables while financial leverage was used as dependent variable. The data used in this study was panel in nature collected from secondary source such as the audited financial statements published in the annual report of selected firms for 06 years from 2013 to 2018. Descriptive statistics, unit root analysis and generalized method of movement regression analysis were employed to reveal result of the study.

For the purpose analyzing different speed of adjustment among higher leveraged and low leveraged firms, total sample was divided into two groups based on the mean of total sample 0.37. The firms below mean value is considered as low leveraged firms while firms above mean value is defined as high leveraged firms. This categorization was done based on the study done by Buvanendra (2017) in Sri Lanka.

According to the Fama and French (2002), Flannery and Rangan (2006) the target leverage is calculated using model for static trade – off theory.

$$LEV_{i,t}^* = \beta_0 + \beta_1 FZ_{i,t} + \beta_2 AT_{i,t} + \beta_3 PROF_{i,t} + \beta_4 GO_{i,t} + \beta_5 NDTs_{i,t} + r_t + n_i \quad (1)$$

Leverage (LEV) calculated with total debt ratio. Firm size (FZ), Assets tangibility (AT), Profitability (PROF), Growth opportunity (GO) and Non debt tax shield (NDTS) are explanatory variables considered as firm specific factors.

Partial adjustment model is used to measure to find speed of adjustment towards the target capital structure is as follows:

$$Lev_{i,t} - Lev_{i,t-1} = \delta(Lev_{i,t}^* - Lev_{i,t-1}) + \varepsilon_{i,t} \quad (2)$$

Where:

$Lev_{i,t}$ = current leverage ratio

$Lev_{i,t-1}$ = leverage of lagged 1 period

δ = average speed of adjustment to the target

The partial adjustment model says that the actual adjustment of leverage should be between and 1. When $\delta = 0$ or 1, it means no adjustment takes place.

An estimation of partial adjustment model would be done by substituting the target leverage from equation 2 into equation 1 and following model is derived by rearranging the terms. Set of determinant variables of target leverage in equation 2 is appeared as $X_{i,t}$

$$Lev_{i,t} = \delta \beta X_{i,t} + (1 - \delta) Lev_{i,t-1} + r_t + n_i + \varepsilon_{i,t} \quad (3)$$

Table 2. Measurement of Variables

Variables	Measurement	Cited authors
Firm size	Log (total sales)	Hovakimian et al. (2001)
Assets Tangibility	$\frac{\text{Fixed assets}}{\text{Total assets}}$	Fama & French (2002)
Profitability	$\frac{\text{EBITD}}{\text{Total assets}}$	Fama & French (2002)
Growth Opportunity	$\frac{\text{Market value of the firm}}{\text{Book value of the firm}}$	Fama & French (2002); Titman & Wessel (1988)
Non debt tax shields	$\frac{\text{Depreciation}}{\text{Total assets}}$	Fama & French (2002)
Financial Leverage	$\frac{\text{Total debt}}{\text{Total assets}}$	Fama & French (2002)

Source: Survey data 2018

4. Data Analysis

4.1. Descriptive Statistics

Descriptive statistics present summary statistics of each dependent and independent variables for 600 observations. It lets researcher to carry out other major analysis to test the hypothesis of the study.

Table 3. Descriptive Statistics

Variables	Obs	Mean	Std. Deviation	Minimum	Maximum
Firm size	600	9.203	.796	6.023	10.961
Assets tangibility	600	.628	.244	.036	1.005
Profitability	600	.112	.159	-1.901	1.005

Growth opportunity	600	1.691	1.697	.038	15.343
Non debt tax shield	600	.018	.017	.0001	.092
Leverage	600	.370	.227	.002	.970

Source: Survey data 2018

According to the table 3, most of the firms have higher total sales revenue as mean value is very closest to maximum value. Assets tangibility of higher number of firms is at the middle level. Because mean value can be identified near to middle value of minimum and maximum value. Even though minimum value of profitability shows negative value, mean value is identified positive value. It says most of firms in sample are profitable firms. Market value of higher number of firms is higher than book value as mean value of growth opportunity is 1.691. Non debt tax shield shows smaller standard deviation. It says that non debt tax shield of all firms are near to mean value. Mean value 0.371 implies that the larger number of non-financial institutions in Sri Lanka is categorized under low leverage firms.

4.2. Unit Root Test

It is used to test stationary in time series in panel data. The test which is proposed by Levi, Lin & Chu (LLC) is used in this study.

Table 4. Unit Root Test

Levi, Lin & Chu (LLC)	
Firm size	-12.5824*
Assets tangibility	-1.4e+02*
Profitability	-40.8459*
Growth opportunity	-31.1554*
Non debt tax shield	-58.4807*
Leverage	-4.2e+02*

Source : Survey data 2018

Result appears in table 4 says that null hypothesis states data contains unit root is rejected in all variables as they are significance at 5%. Therefore, LLC model revealed that panel data of all variables are stationary.

4.3. Result of Generalized Method of Movement

Generalized method of movement is a statistical method, which is used when lagged dependent variable is used as independent variable. Table 5 presents result of two step generalized method of movements, which determine speed of adjustment towards target capital structure of non-financial institutions in Sri Lanka for whole firms, low leveraged firms and high leveraged firms.

Table 5. Two step GMM result

	Whole firms	Low leveraged firms	High leveraged firms
$LEV_{(t-1)}$	0.684*** (0.000)	0.553*** 0.000	0.211*** (0.000)
Firm size	0.036*** (0.000)	0.013 (0.201)	0.043*** (0.000)
Assets tangibility	-0.985*** (0.000)	-0.061*** (0.033)	-0.084*** 0.008
Profitability	-0.244** 0.000	-0.176*** (0.000)	-0.199*** (0.005)
Growth opportunity	0.019*** 0.000	0.021*** (0.000)	0.019*** (0.000)
Non debt tax shield	0.723*** 0.000	0.003 (0.995)	1.944*** (0.000)
Speed of adjustment (SOA)	31.6%	44.7%	78.8%
Number of observation	600	300	300
Number of institutions	100	50	50
Significance of AR (1)	0.000	0.000	0.000

Significance of AR (2)	0.844	0.812	0.698
Wald Chi ²	8459.22***	5446.48***	4255.36***

*** Correlation is significant at the 0.01 level (2tailed)

Source: Survey data 2018

According to the table 5, It can be identified that all selected independent variables in this study imply joint significant as per the Wald Chi² test. Significance value of AR1 and AR2 are presented in the table, where insignificant value of AR2 revealed absence of 2nd order autocorrelation as required for GMM estimation. Lagged leveraged of Whole firm is appeared as most important factor to determine current leverage. When all independent variables are constant, about 68.4% changes in current leverage is resulted from 100% changes in lagged leverage. The speed of adjustment for whole firms indicates 31.6% difference between expected and actual leverage in one year. Speed of adjustment in high leveraged firms 78.8% is higher than low leveraged firms 44.7%. The result consistent with previous findings (Buvanendra, 2017; Flannery and Hankins, 2007; Dang, 2009 and Lemmon et al., 2008). It indicates extremely notable variance speed of adjustment between low and high leverage firms. As per the result of whole sample, firm size, growth opportunity and non-debt tax shield positively impact on speed of adjustment while profitability and assets tangibility negatively impact on speed of adjustment. Similarities and dissimilarities of significant in firm specific factors or independent variables can be identified between low leverage and high leverage firms. Firm size and non-debt tax shield in low leverage firm does not have any significant impact while high leverage firms have positive and significant impact. Assets tangibility and profitability of both samples indicate significant negative impact and growth opportunity of both samples reveals significant positive impact on speed of adjustment. It proves applicability of dynamic trade-off theory in capital structure of non-financial institutions in Sri Lanka.

5. Conclusion

Capital structure is one of the key aspects in financing decision of firms to increase their firm value and maximize share holders' wealth. Various

theories on capital structure were proposed by scholars. This study mainly analyses applicability of dynamic trade-off theory to the capital structure of non-financial institutions in Sri Lanka. 100 non-financial institutions were selected as sample and relevant panel data was collected for six years from 2013 to 2018 for the purpose of analysis. Two step generalized method of movement was used to find the result of the study. It revealed that there is strong evidence to show that dynamic trade – off theory explains capital structure of non-financial institutions in Sri Lanka. It says that non-financial firms can reach their target leverage ratio at moderate speed. Lagged leverage is identified as most important determinant of current year leverage and firm size, assets tangibility, profitability, growth opportunity and non-debt tax shield significantly affect speed of adjustment, since p value of each is below 0.05 level. Higher leveraged firms have high speed of adjustment than low leveraged firms. According to the result of the study, it can be concluded that management of the non-financial institutions should pay more attention on lagged leverage, firm size, assets tangibility, profitability, growth opportunity and non-debt tax shield when they make financing decision to increase firm value. The firms which make decisions without any knowledge of theory on capital structure are motivated to follow dynamic trade – off theory here after to maximize shareholders wealth. New investors are motivated to invest in shares of high leveraged firms to earn more as they have high speed of adjustment to reach optimum capital structure. Limitation of the study is Most of the non-financial institutions listed in Sri Lanka were found to consider as low leveraged firms as they have the lower debt to total assets ratio. Because Sri Lankan debt market is not developed up to the expected level compared to the equity market. Therefore, finding of the study may not be compared with the findings of the studies done in other countries. The result of the study can be generalized only within Sri Lanka. Similar to this study can be conducted on financial institutions in Sri Lanka like bank, insurance and finance companies to test speed of adjustment towards target debt ratio.

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