
The Determinants Of Capital Structure Choice: Empirical Evidence From Turkish Non-Financial Firms

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ABSTRACT

The objective of this study is to examine the factors which affect the capital structure decisions of 115 non-financial firms quoted in Borsa İstanbul. Quarterly data for the period between 2003:Q1 and 2015:Q2 is used. Profitability (PROF), tangibility (TAN), non-debt tax shield (NDTS), volatility of earnings (VOL) and liquidity (LIQ) are the explanatory variables used. Two different models are built using two different dependent variables (LEV1 and LEV2), which use book value of equity and market value of equity in calculations respectively. Our research contributes to the literature by using up-to-date and quarterly data and by adding volatility of earnings and liquidity variables to the models as explanatory variables. As far as we examined, past research in Turkey have mostly used yearly rather than quarterly data and have not used volatility of earnings variable and liquidity variable. In the analysis, generalised method of moments (GMM) is used. In LEV1 model only coefficient of LIQ variable and in LEV2 model coefficients of LIQ and VOL are not significant statistically. NDTS is negatively related with both LEV1 and LEV2 and this supports trade-off theory. On the other hand, PROF and TAN are in negative association with both LEV1 and LEV2 and this finding supports pecking order theory. VOL affects LEV1 positively and this does not promote trade-off theory. So, although there are some findings which support trade-off theory, we can comment that pecking order theory is more successful in elucidating the relation in Turkey.

JEL Classification: A110; G100; C510; C120; C550.

Keywords: The Determinants Of Capital Structure; Borsa İstanbul; Trade-Off Theory; Pecking Order Theory.

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1. INTRODUCTION

The connection between financing decisions and firm value has been broadly examined in previous years in finance literature. The term 'Capital Structure' cites to the combination of different funding sources which form the total assets of a company. It is very important to understand the factors which drive the financing decisions of firm for both finance directors and academicians because correct selection of capital structure allows a firm to speed up its performance in a better manner, assure the sustainability of its actions and ultimately fulfil its strategic targets (Hossain and Hossain, 2015; Sheikh and Wang, 2011; Bayrakdaroğlu et al, 2013). In the last 50 years, researchers have attempted to empirically test the developed theories in the real world data. Most of the research focused on developed countries and large firms. Still, there is no universally agreed theory, which is applicable in all countries. In general, it is found in research that emerging countries partially differentiate from developed countries since there are cultural, legal and institutional differences between countries.

Most of the empirical research about the capital structure such as Titman and Wessels (1988), Rajan and Zingales (1995), Wald (1999), Güney (2002), Padron et al. (2005), Antoniou (2008) use data from developed economies (mainly the US) to report the capital structure determinants. The article of Booth et al. (2001) is one of the first

studies which examine the firm's capital structure decisions in developing countries. They analyse to see whether capital structure determinants in developing countries are alike the determinants in developed countries or not. Their conclusion is that some of factors also describe the financing decision in developing countries and tenacious differences between countries can be due to distinctive institutional structures of each country. Chen (2004), Chen and Strange (2005), Huang and Song (2006), Qian et al (2007) and Lim (2012) are some of the articles which examine the capital structure determinants in China. In Turkey, there are studies conducted by Sayılğan et al. (2006), Karadeniz et al. (2009), Çıtak and Ersoy (2012), Bayrakdaroğlu et al. (2013), Baltacı and Ayaydın (2014) and Acaravcı (2015) etc. These studies in Turkey mostly utilized yearly data rather than quarterly data (except for the study of Baltacı and Ayaydın (2014) who utilized quarterly data in their research, but focused on banking sector rather than non-financial sector). There are studies also in other emerging countries, for example Deesomsak (2004), Sheikh and Wang (2011) and Hossain and Hossain (2015) carried out research in Asia-Pacific Region, Pakistan and Bangladesh respectively.

In this paper, we aim to examine the determinants which affect capital structure decisions in Borsa İstanbul. Furthermore, we target to test two capital structure theories, which are "trade-off theory" and "pecking order theory". Particularly in our study below questions are endeavoured to be addressed:

1) Are determinants of capital structure which are related to leverage in developed countries also related to leverage in Turkey?

2) Do trade-off and pecking order theories have robust explanatory power in Turkey?

The rest of this paper is organized as follows: Section two presents the theory of capital structure and section three includes the determinants of capital structure. Data set and model follow in section four and in the subsequent section method and empirical findings are provided. Finally, there is conclusion in section six.

2. THE THEORY OF CAPITAL STRUCTURE

The article of Modigliani and Miller (1958) is considered a groundbreaking study on capital structure. According to their debt irrelevance theorem, firm's capital structure (debt-equity ratio) has no material effect on firm value. Their theorem relied on some restrictive assumptions such as no taxes, no transaction costs, perfect and reliable disclosure of all information and homogenous expectations. Although these assumptions are not valid in real world, this theorem has been a good starting point for the following studies. In reality, when asymmetry cost, tax, transaction cost, agency cost etc. are taken into consideration, firm's capital structure decision affects its value. Later Modigliani and Miller (1963) relaxed the tax restriction and since interest can be deducted from profit, they claimed that firm should use maximum debt in order to increase its value. The theories of Modigliani and Miller (1958, 1963) have had profound effect on academicians. Although their assumptions do not hold in real world, it has been a starting point for the establishment of other capital structure theories and their empirical analysis.

With regard to the theoretical research, two broadly recognized competitive models of capital structure exist. These are trade-off model and pecking order model (Huang and Song, 2006). Bankruptcy and financial distress costs and agency costs form the fundamentals of the trade-off theory. The trade-off theory mentions that firms take as a loan up to the point where the tax thrift from an extra dolar in debt are precisely equal to the costs which come from the increased probability of financial distress. According to the trade-off theory, there is an optimal capital structure which maximizes its value, so firm sets a target debt ratio and moderately moves in the direction of this target. Since this theory justifies modest debt ratios, it has forceful practical attraction. Trade-off theory is also congruous with certain visible facts, for example, firms with comparatively safe tangible assets are inclined to borrow more than the firms with risky intangible assets (Sheikh and Wang, 2011).

Pecking order theory is developed as an alternative to the trade-off theory. Pecking order theory prioritizes asymmetric information and trade-off theory highlights taxes. According to the pecking order theory, firms prefer internal finance to external finance and if external finance is needed, firms issue the safest security first. This means firms start with debt, later possibly hybrid securities such as convertible bonds, afterwards equity as a last recourse. There is no target capital structure in this theory. Each firm's observed debt ratio shows its cumulative need for external finance (Myers, 1984). The information asymmetry may also describe the reason why existing investors may not advocate new equity financing since new investors may demand higher returns to reimburse for their investment's risks which dilute the existing investors' returns (Chen and Strange, 2006).

3. THE DETERMINANTS OF CAPITAL STRUCTURE

In our study, we use profitability, tangibility, non-debt tax shield, volatility of earnings and liquidity as firm-specific determinants of capital structure. Below information about these determinants are provided and postulations of trade-off theory and pecking order theory are given.

Profitability: The trade-off theory proposes that profitability is positively associated with leverage, since high profitability encourages debt utilization and supplies a motivation to firms to take advantage of tax shields on interest payments. However, pecking order theory suggests that firms choose to utilize internally generated resources when available and select debt over equity when there is a need for external finance. As a consequence, this theory argues that profitability (a source of internal resources) is negatively related to leverage (Sheikh and Wang, 2011). In previous studies about Turkish stock market different proxies such as ratio of earnings before interest, tax and depreciation to total assets (Sayilgan et al., 2006), ratio of net profit to total assets (Karadeniz et al., 2009), ratio of earnings before interest, tax, depreciation and amortization to total assets (Bayrakdaroglu et al., 2013), ratio of net income to total assets (Acaravci, 2015) were utilized for profitability. In this study, we use ratio of earnings before interest and tax to total assets as the proxy for profitability followed by Chen and Strange (2005).

Tangibility: According to the trade-off theory, tangibility is positively related to the leverage, since tangible assets generally supply high collateral value in comparison to the intangible assets and diminish the cost of financial distress. This means that these tangible assets can sustain more debt (Acaravci, 2015). On the other hand, pecking order theory postulates that tangibility is negatively associated with leverage. Firms which have more fixed assets are subject to less asymmetrical information. For that reason, they are inclined to rely on equity financing (Karadeniz et al., 2009). In previous studies about Turkish stock market different proxies such as ratio of tangible assets plus inventories to total assets (Sayilgan et al., 2006), ratio of net fixed tangible assets to total assets (Karadeniz et al., 2009), ratio of tangible fixed assets to total assets (Bayrakdaroglu et al., 2013), ratio of net fixed assets to total assets (Acaravci, 2015) were utilized for tangibility. In this study, we follow Chen (2004) in using ratio of tangible assets (the sum of fixed assets and inventories) to total assets as a proxy for tangibility.

Non-Debt Tax Shield: Trade-off theory asserts that the main incentive for utilizing debt rather than equity is to save corporate tax. Nevertheless, firms can utilize non-debt tax shields such as depreciation and investment tax credits to decrease corporate tax. Consequently, high amount of non-debt tax shield decreases the potential tax advantage of debt. So, we can expect that non-debt tax shield should be in negative relation with leverage (Deesomsak et al., 2004; Lim, 2012). In previous studies about Turkish stock market, different proxies such as ratio of annual depreciation expense to total assets (Sayilgan et al., 2006; Karadeniz et al., 2009; Acaravci, 2015), ratio of yearly depreciation and amortization amount to total assets (Bayrakdaroglu et al., 2013) were used for non-debt tax shield. In our study, ratio of depreciation expense to total assets is used as the proxy for non-debt tax shield followed by Sheikh and Wang (2011).

Volatility of Earnings: Higher volatility of earnings may cause the firm not to be capable of accomplishing its debt commitments and higher volatility of earnings elevates the probability of financial distress. For these reasons, trade-off theory argues that volatility of earnings has negative relationship with leverage. In other words, firms with safe earnings are inclined to borrow more and firms with unsafe earnings (ie. volatile earning) are inclined to borrow less (Deesomsak et al., 2004; Sheikh and Wang, 2011). In previous studies about Turkish stock market (Sayilgan et al., 2006; Karadeniz et al., 2009; Çıtak and Ersoy, 2012; Bayrakdaroglu et al., 2013; Baltacı and Ayaydm, 2014; Acaravci, 2015) volatility of earnings has not been considered as firm-specific determinant of capital structure. In our study, absolute difference between the annual percentage change in earnings before interest and taxes and the average of this change over the sample period is used as the proxy for volatility of earnings followed by Deesomsak et al. (2004).

Liquidity: According to the trade-off theory, firms which have higher liquidity ratios should borrow more because of their capability to pay contractual duties on time. For this reason, this theory asserts that liquidity should be positively related to leverage. However, the pecking order theory argues that liquidity should have negative connection with leverage, since a firm which has higher liquidity ratios would rather utilize internally generated resources when it finances new investments (Sheikh and Wang, 2011). In previous studies about Turkish stock market (Sayilgan et al., 2006; Karadeniz et al., 2009; Çıtak and Ersoy, 2012; Bayrakdaroglu et al., 2013; Baltacı and Ayaydm, 2014; Acaravci, 2015) liquidity has not been taken into account as firm-specific determinant of capital structure. In this study, liquidity is defined as current assets scaled by current liabilities followed by Deesomsak et al. (2004).

4. DATA SET AND MODEL

In this study, the financial data described in Table 1 is analysed for the 115 non-financial firms quoted in Borsa İstanbul by using quarterly data for the period between 2003:Q1 and 2015:Q2. The data is obtained from FINNET database. Firms active in financial sector are excluded from the sample, since they have different characteristics. Some non-financial firms are also omitted from the sample due to missing data. The information about the variables used in the analysis is summarised in Table 1.

Table 1: Data Set and Specification

Variable	Description
LEV1	(short term debt + long term debt) / (short term debt + long term debt + book value of equity)
LEV2	(short term debt + long term debt) / (short term debt + long term debt + market value of equity)
NDTS	(Depreciation expense) / (Total Assets)
PROF	(Earnings before interest and tax) / Total Assets
TAN	(Fixed assets + Inventories) / Total Assets
VOL	Volatility of Earnings
LIQ	Current Assets / Current Liabilities

The modelling of the empirical analysis is constructed by 2 basic models. These two different models occur since each model's dependent variable is different. Consequently models are built as below:

$$LEV1_{i,t} = \alpha_0 + \alpha_1 LEV1_{i,t-1} + \alpha_2 PROF_{i,t} + \alpha_3 TAN_{i,t} + \alpha_4 NDTS_{i,t} + \alpha_5 LIQ_{i,t} + \alpha_6 VOL_{i,t} + e_{it} \quad LEV2_{i,t} = \alpha_0 + \alpha_1 LEV2_{i,t-1} + \alpha_2 PROF_{i,t} + \alpha_3 TAN_{i,t} + \alpha_4 NDTS_{i,t} + \alpha_5 LIQ_{i,t} + \alpha_6 VOL_{i,t} + e_{it}$$

In the models i represent firms and t represent time dimension. A dynamic structure is built in the model by including dependent variable's one period lagged value ($t-1$) in the analysis, since an economic situation in period t is under influence of past experience and behaviour forms to a large extent and since dynamic structure is achieved by using lagged value of dependent variable as explanatory variable (Baltagi, 2014). For model estimation, Eviews 8.1 econometrics package programme is utilized. The theoretical outcomes expected from trade-off theory are negative and significant coefficients for NDTS and VOL; positive and significant coefficients for PROF, TAN and LIQ. On the other hand, theoretical results anticipated from pecking order theory are negative and significant coefficients for PROF, TAN and LIQ.

5. METHOD AND EMPIRICAL FINDINGS

In order to examine the firms included in the analysis as a whole, to consider the variability in the firms and unobservable heterogeneity in the model in this integrity, to decrease the estimate's deviation, to reduce the multicollinearity problem, to prevent the deterioration in degree of freedom, panel data method is preferred. Because this method is quite advantageous for these mentioned situations. Before the model estimate, it is important to specify if variables used in estimation have unit root or not in order to achieve healthy and reliable results. If the series have unit root, even if there is not any relation between dependent variable and independent variables, the significance degrees of estimated coefficients and the model as a whole can be high and the analysis can transform to a pseudo regression relation. Hence unit root analysis of the variables is made firstly in the study. Levin, Lin and Chu (2002) LLC unit root test, Im, Pesaran and Shin (2003) IPS test and Fisher ADF and PP tests, which are developed by Maddala and Wu (1999) and Choi (2001) using the Fisher (1932) method, are utilized, since they are used widely in the literature for the stationary level first generation unit root tests of the variables. Results are provided in Table 2.

Table 2: Panel Unit Root Test Results

	LLC	IPS	Fisher ADF	Fisher PP
LEV1	-7.91191 [0.0000]	-9.86538 [0.0000]	550.397 [0.0000]	609.597 [0.0000]
LEV2	-8.23725 [0.0000]	-10.6173 [0.0000]	511.412 [0.0000]	530.344 [0.0000]
NDTS	-43.1974 [0.0000]	-45.1347 [0.0000]	2260.19 [0.0000]	2884.60 [0.0000]
PROF	-31.0817 [0.0000]	-30.6256 [0.0000]	1415.56 [0.0000]	1526.00 [0.0000]
TAN	-9.15659 [0.0000]	-12.1972 [0.0000]	580.847 [0.0000]	745.652 [0.0000]
VOL	-115.078 [0.0000]	-54.0399 [0.0000]	2111.69 [0.0000]	3932.02 [0.0000]
LIQ	-5.35771 [0.0000]	-8.97992 [0.0000]	504.948 [0.0000]	670.276 [0.0000]

Brackets contain probability values.

When Table 2 is examined, it is noticed that null hypothesis which mentions that series have unit root is strongly rejected according to all tests. Then, it can be passed to constructed models' estimation stage directly. In the analysis, it is purposed to construct a dynamic model by using dependent variable's lagged value as explanatory variable. But in dynamic models, fixed effects estimator is not consistent since it requires to take the first difference (Han and Phillips, 2010). In these situations, Anderson and Hsiao (1981) instrumental variables estimator or Arellano and Bond (1991) generalised method of moments (GMM) is widely used. Arellano and Bond (1991) GMM approach is essentially also an instrumental variables method and it is preferable for the analysis in which cross-section dimension is greater than the time dimension as it is case in this study (Cameron and Trivedi, 2009). Also in this method when two-stage estimation is preferred, the fact that heteroscedasticity problem may occur, is taken into account (Khadravou, 2012). Application results are given in Table 3.

Table 3: Panel GMM Estimate Results

EXPLANATORY VARIABLES	DEPENDENT VARIABLES	
	LEV1	LEV2
<i>LEV_{t-1}</i>	0.679118***	0.753215***
<i>LIQ</i>	-0.000133	-0.000656
<i>NDTS</i>	-0.002274**	-0.045440***
<i>PROF</i>	-0.319658***	-0.239596***
<i>TAN</i>	-0.155366***	-0.074770***
<i>VOL</i>	0.000115**	-0.000497
F TEST	93633.2 [0.0000]	16119.8 [0.0000]
Wald (χ^2)	561799 [0.0000]	96719.3 [0.0000]
Sargan (χ^2)	112.382 [0.3418]	112.689 [0.3850]
AR(1)	-3.1908 [0.0014]	-1.60282 [0.1090]
AR(2)	-1.7280 [0.0840]	-1.14695 [0.2514]

*, **, *** denotes 10%, 5% ve 1% significance level respectively and brackets contain probability values.

According to the Wald and F test results, both models are statistically significant when considered as a whole. Apart from that, the null hypothesis, which tests if the instrumental variables are valid, is not rejected in Sargan test in GMM model. Besides, AR(1) and AR(2) tests, which test the first degree and second degree autocorrelation in the model, show that autocorrelation problem does not exist in the model. Hereby, especially the results of AR(2) test should be considered (Baltagi, 2014). When the coefficients obtained in the estimation result are examined, it is noticed that in LEV1 model only liquidity (LIQ) variable is not significant statistically. So, in this model regarding the association between LEV1 and LIQ, our results do not support trade-off theory or pecking order theory. The increase in the one-lagged value of LEV1 increases LEV1 by 0,679. For the LEV1 model, according to the findings, negative relation is found between non-debt tax shield (NDTS) and LEV1 and this result supports trade-off theory. Because according to the trade-off theory, high amount of non-debt tax shield diminishes the potential tax advantage of debt and there is negative association between non-debt tax shield and leverage (Deesomsak et al., 2004; Lim, 2012).

Results also show a negative relation between profitability (PROF) and LEV1 and this finding supports pecking order theory, since it advocates that firms choose to utilize internally generated resources when available and choose debt over equity when there is a requirement for external finance (Sheikh and Wang, 2011). About the association between TAN and LEV1, our findings promote pecking order theory, since the relation is found as negative in the analysis and pecking order theory suggests that tangibility is negatively related with leverage. Firms that have more fixed assets are subject to less asymmetrical information. Therefore, they are inclined to depend on equity financing (Karadeniz et al., 2009). Analysis outcomes show positive relation between volatility of earnings (VOL) and LEV1 and this finding does not support the trade-off theory, since this theory asserts negative relation between VOL and LEV1. According to this theory, higher volatility of earnings may induce the firm not to be competent of achieving its debt commitments and higher volatility of earnings raises the probability of financial distress (Deesomsak et al., 2004; Sheikh and Wang, 2011). Overall, in the LEV1 model, the increase in NDTS, PROF, TAN decrease LEV1 by -0,002, -0,319, -0,155 respectively and the increase in VOL increases LEV1 by 0,0001.

When the coefficients derived in the LEV2 model are considered, it is seen that in LEV2 model, liquidity (LIQ) and volatility of earnings (VOL) variables are not significant statistically. For this reason, regarding the relation between LEV2 and LIQ and the relation between LEV2 and VOL, our findings do not support trade-off theory or pecking order theory. The increase in the one-lagged value of LEV2 increases LEV2 by 0,753. For the LEV2 model, according to the results, again negative relation is found between non-debt tax shield (NDTS) and LEV2 (as it is the case for the relation between NDTS and LEV1) and this finding again reinforces trade-off theory. Because the trade-off theory asserts that high amount of non-debt tax shield lessens the likely tax advantage of debt and negative relation between non-debt tax shield and leverage exists according to this theory (Deesomsak et al., 2004; Lim, 2012). Analysis findings indicate again a negative relation between profitability (PROF) and LEV2 (as it is the case for the relation between PROF and LEV1) and this again reinforces pecking order theory. Because this theory asserts that firms prefer to use internally generated resources when available and use debt over equity when there is a need for external finance (Sheikh and Wang, 2011).

Regarding the relation between tangibility (TAN) and LEV2, negative relation found between these supports pecking order theory (as it is the case for the relation between TAN and LEV1). Because pecking order theory mentions that tangibility is in negative relation with leverage. Firms which have more fixed assets are subject to less asymmetrical information. For that reason, they are inclined to lean on equity financing (Karadeniz et al., 2009). Alltogether, in the LEV2 model, the increase in NDTS, PROF, TAN decrease LEV2 by -0,045, -0,239 and -0,074 respectively. Overall, although there are some findings which support trade-off theory, we can comment that pecking order theory is more successful in elucidating the relation between the determinants and leverage in Turkey. Our findings of negative coefficients for PROF and TAN are in line with the results of Acaravcı (2015) and Bayrakdaroğlu et al. (2013). Acaravcı (2015) reports insignificant coefficient for NDTS and Bayrakdaroğlu et al. (2013) reach positive coefficient for NDTS and these are in contradictory with our results. Karadeniz et al. (2009) report negative coefficient for TAN and this is in line with our results. However, they reach insignificant coefficient for NDTS. The results of Sayılğan et al. (2006) are consistent with ours since they report negative relation between leverage and NDTS, PROF and TAN.

6. CONCLUSION

The aim of this study is to investigate the factors which affect the capital structure decisions of 115 non-financial firms quoted in Borsa İstanbul. It is also analysed whether trade-off theory or pecking order theory is valid or not

according to the significance and sign of each explanatory variable examined. Quarterly data for the period between 2003:Q1 and 2015:Q2 is utilized. Profitability (PROF), tangibility (TAN), non-debt tax shield (NDTS), volatility of earnings (VOL) and liquidity (LIQ) are the explanatory variables which are used in the analysis. Two different models are formed utilizing two different dependent variables (LEV1 and LEV2), which use book value of equity and market value of equity in calculations respectively. Our study contributes to the literature by utilizing up-to-date and quarterly data and by adding volatility of earnings and liquidity variables to the models as explanatory variables. As far as we examined, past studies in Turkey have mostly utilized yearly rather than quarterly data and have not used volatility of earnings variable and liquidity variable. In the analysis, generalised method of moments (GMM) is employed.

When the coefficients obtained in the estimate result are examined, it is noticed that LIQ variable is not significant statistically both in LEV1 and LEV2 model and this finding does not support trade-off theory or pecking order theory. VOL variable is only significant in LEV1 model and since it has positive relation with LEV1, this does not promote trade-off theory. NDTS affects leverage negatively in both LEV1 and LEV2 model and this supports trade-off theory. PROF and TAN again affect debt ratio in a negative way in LEV1 and LEV2 model and this favours pecking order theory. Overall, in the LEV1 model, the increase in NDTS, PROF, TAN decrease LEV1 by -0,002, -0,319, -0,155 respectively and the increase in VOL increases LEV1 by 0,0001. In the LEV2 model, the increase in NDTS, PROF, TAN decrease LEV2 by -0,045, -0,239 and -0,074 respectively. Generally, although there are some results which support trade-off theory, we can mention that pecking order theory is more successful in clarifying the relation between the determinants and leverage for listed non-financial firms in Turkey.

Since the validity of trade-off theory and pecking order theory have been tested in our study, in future studies other capital structure theories (such as signaling effect theory, agency cost theory) can be tested for Turkish firms. Also, some other explanatory variables (potential capital structure determinants) can be added to the analysis and it can be examined if estimate results differ when these variables are taken into consideration.

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