The Determinants of Capital Structure:
Evidence from the Turkish Manufacturing Sector

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ABSTRACT: This study investigates the determinants of capital structure in Turkey by using panel data methods. The sample period spans from 1993 to 2010 for 79 firms in the manufacturing sector traded on the Istanbul Stock Exchange. The base model was expanded with firm size and sector-specific effects. This study compares also effects on capital structure according to sectors and firm size of variables used in models. Growth opportunities, size, profitability, tangibility and non-debt tax shields are used as the firm-specific variables that affect a firm's capital structure decision. Empirical results present that there are significant relationships between growth opportunities, size, profitability, tangibility and leverage variables. But non-debt tax shields explanatory variable has insignificant effect on leverage 1 (book value of total debt / total assets) variable. Growth opportunity has effect on capital structure that this result supports the trade-off theory. Size, profitability and tangibility have effects and support the pecking order theory. On the other hand, profitability and growth opportunity variables have more significant effects than other variables on Leverage 1 and Leverage 2 (book value of total debt / book value of equity) for all sectors. Furthermore, in two leverage models, profitability variable of small and large firm groups has effect on capital structure and there is no a significant difference between two groups.

Keywords: Capital structure; leverage; financing choice; the determinants of capital structure; panel data analysis.
JEL Classifications: G32

1. Introduction

The question of a firm's optimal capital structure and the determinants of capital structure have been debated for many years in the corporate finance literature. The capital structure of a firm is a particular combination of short debt, long debt and equity. Firms can choose among many alternative capital structures.

Is there a way of dividing a firm's capital into dept and equity so as to maximize the value of the firm? This question is importance for corporate financial officers. Yet, the finance literature has not been very helpful to provide clear guidance on optimal capital structure (Drobetz and Fix, 2003).

Modigliani and Miller (1958) were the first authors who developed capital structure theory. Since then, many researchers followed MM's (1958) path to develop new theory on capital structure and tried to departure from MM's (1958) assumptions. Theory has clearly made some progress on the subject. However, the empirical evidence regarding the alternative theories is still inconclusive (Rajan and Zingales, 1995; Gill et al., 2009).

The main studies on capital structure examine invalid of MM propositions. In spite of determinants on capital structure are generally discussed for developed countries, most of research in recent years have focused on developing countries.

Turkey has many special features as an emerging market. Turkey can develop an international competitive advantage and succeed in attracting foreign direct investment. Turkey displays potential strength. The Turkish economy is dynamic and growing. The objective of this paper is to explore the significance of the firm-specific variables for both the small and large firms and investigate the

existence of the significant differences among subsectors of Turkish manufacturing sector or not. The previous studies investigate the determinants of capital structure for Turkish firms. But in this study, we explore the relationships between the capital structure and the firm-specific variables in Turkey by employing different panel data models, expanded model with sector-specific effects, and expanded model with size effects. Consequently, this paper is important in explaining the debt behaviors of manufacturing firms in Turkey.

The structure of this paper is as follows. Section 2 surveys the capital structure theories and literature; Section 3 explains the determinants of capital structure; Section 4 presents the model specification and data. Empirical results are given in Section 5, and Section 6 concludes the paper.

2. The Capital Structure Theories and Literature

The theory of capital structure starts with MM. They provided the formal proof of their famous MM irrelevance proposition. They showed that in the absence of bankruptcy costs, corporate income taxation, or other market imperfections, the firm value is independent of its financial structure in competitive capital markets. According to MM, debt-to-equity ratio has no impact on the total value of firm. In the literature, starting from this theory, the main theories of capital structure were developed which are the trade-off theory and the pecking-order theory. Each theory has tried to explain the reasons behind the choice between debt and equity finance (Drobetz and Fix, 2003; Bas et al., 2009).

The trade-off and the pecking order theories try to explain the financing decisions in firms. The trade-off theory assumes that the optimal capital structure can be visualized as a trade-off between the benefit of debt financing and the costs of debt financing. Each firm should set its target capital structure such that its costs and benefits of leverage are balanced at the margin, because such a structure will maximize its value (K. Acaravci, 2007). The trade-off theory of the capital structure suggests that a firm's target leverage is driven by three competing forces: (i) taxes, (ii) costs of financial distress (bankruptcy costs), and (iii) agency conflicts. Adding debt to a firm's capital structure lowers its (corporate) tax liability and increases the after-tax cash flow available to the providers of capital. Thus, there is a positive relationship between the tax shield and the value of the firm. Firms attempt to balance the tax benefits of higher leverage and the greater probability of financial distress (Drobetz and Fix, 2003).

Bradley et al. (1984) develop a model that synthesizes the modern balancing theory of optimal capital structure. In this study is examined the cross-sectional behavior of 20 year average firm leverage ratios for 851 firms covering 25 two-digit SIC industries in the United States. This study shows that optimal firm leverage is related inversely to expected costs of financial distress and to the amount of non-debt tax shields. If costs of financial distress are significant, optimal firm leverage is related inversely to the variability of firm earnings. Long and Malitz (1985) and Titman and Wessels (1988) support bankruptcy costs or agency costs as partial determinants of optimal capital structure. Kester (1986), Titman and Wessels (1988) and Rajan and Zingales (1995) find strong negative relationships between debt ratios and past profitability. Bowen et al. (1982) provide additional evidence on the relationship between leverage and industry classifications. Furthermore, they test empirically the DeAngelo and Masulis (1980) propositions concerning the role of non-cash tax shelters in determining an optimal capital structure. In this study is used 1.800 firms in the United States over 1951-1969 and 9 industries. There are four major conclusions in this study.

First, there is a statistically significant difference between mean industry financial structures. Second, the rankings of mean industry financial structures demonstrated a statistically significant stability over the entire time period studies. Third, firms exhibit a statistically significant tendency to move toward their industry mean over both five and ten year time periods. Fourth, the study provides evidence consistent with the DeAngelo and Masulis (1980) proposition that the level of tax shelters plays a significant role in determining the optimal use of debt in the capital structure of non-regulated firms at the industry level. Chen and Jiang (2001) empirically test the determinants of capital structure choice for Dutch firms. The variables are analyzed over the period 1992 through 1997. Empirical results shed many important insights on Dutch firms' financing behavior. Non-debt tax shield is shown to be a very important factor of Dutch capital structure choice, for both long-term leverage and short-term leverage. Firms with higher level of flexibility tend to have significantly lower leverage.

While both tangibility and size are positively related to long-term leverage, size has no significant relationship with short-term debt, and tangibility is negatively related to short-term leverage. Furthermore, results provide evidence supporting the trade-off hypothesis.

On the other hand, the pecking order theory assumes that firm prefers internal to external financing and debt to equity if it issues securities. Firm has no well-defined target debt-to-value ratio (K. Acaravci, 2007). The pecking order theory was first suggested by Donaldson (1961) but it received its rigorous theoretical foundation by Myers and Majluf (1984). In Myers's (1984) and Myers and Majluf's (1984) pecking order model there is no optimal debt ratio. They stipulate the pecking order theory as an alternative model to the trade-off theory.

Theory explains that why most profitable firms use source of internal funding and low profitable firms use debt financing due to insufficient internal funds. Unlike MM's theory, the pecking order theory weighted less to tax shield in capital structure. The pecking order theory discusses the relationship between asymmetric information and investment and financing decisions. According to this theory, informational asymmetry, which firm's managers or insiders have inside information about the firm's returns or investment opportunities, increases the leverage of the firm with the same extent. So due to the asymmetric information and signaling problems associated with external financing, the financing choices of firms follow an order, with a preference for internal over external finance and for debt over equity. This theory is applicable for large firms as well as small firms (Bas et al., 2009). Various research studies have been conducted to test the pecking order theory (see, for example, Ihamuotila, 1997; Shyam-Sunder and Myers, 1999; Fama and French, 2000; Bevan and Danbolt, 2000; Ozkan, 2001; Zoppa and McMahon, 2002; Watson and Wilson, 2002; Fan and So, 2004; Ramlall, 2009; Jensen, 2013).

According to Jensen and Meckling (1976), capital structure is determined by agency costs. Agency theory focuses on the costs which are created due to conflicts of interest between shareholders, managers and debt holders. The conflicts between managers and shareholders occur due to disagreements over an operating decision. Harris and Raviv (1990) adopt that even if shareholders or debt holders prefer liquidation of the firm, managers always choose to continue the firm's business. On the other hand, Stulz (1990) assumes managers always prefer to invest all usable funds even if paying out cash is better for shareholders. So debt constrains the amount of free cash flow available for profitable payments. Therefore, capital structure is determined by the conflicts of interest between inside and outside investors (Bas et al., 2009).

Many empirical studies have tried to explain the factors that affect on capital structure's choice. One of the most renowned initial empirical studies is made by Rajan and Zingales (1995) and they explain the various institutional factors of firm's capital structure in G-7 countries. They found that the factors that affect on the firms' capital structures in the United States and other industrialized countries were similar, although they failed to provide an underpinning theory. Booth et al. (2001) investigated firms' capital structures in developing countries, to see whether there were similar determinants as in developed economies. Their major finding was that a similar group of factors could explain capital structures, but that the persistent differences between the countries could only be understood with reference to the unique institutional structures of each country (Chen and Strange, 2005).

3. The Determinants of Capital Structure

In this section, we present a brief discussion of explanatory attributes as proxy for the determinants of the firm's debt-equity choice. These attributes are denoted growth opportunities, size, profitability, tangibility and non-debt tax shields. These determinants and indicators are discussed below.

3.1. Growth Opportunities

Jensen and Meckling (1976), Myers and Majluf (1984), and Fama and French (2000) argue that firms with high future growth opportunities should use more equity financing, because a higher leveraged company is more likely to pass up profitable investment opportunities. The trade-off model predicts that firms with more investment opportunities have less leverage because they have stronger incentives to avoid underinvestment and asset substitution that can arise from stockholder-bondholder agency conflicts. The trade-off theory predicts a negative relationship between leverage and investment opportunities. Pecking order theory suggests also that a firm's growth is negatively related

to its capital structure. Growth opportunities may be considered assets that add value to a firm, but cannot be collateralized and are not subject to taxable income. The agency problem suggests a negative relationship between capital structure and a firm's growth. As a result, firms with high growth opportunities may not issue debt in the first place, and leverage is expected to be negatively related to growth opportunities (Rajan and Zingales, 1995; De Miguel and Pindado, 2001; Chen and Jiang, 2001; Bevan and Danbolt, 2001; Drobetz and Fix, 2003; Nguyen and Neelakantan, 2006).

Some empirical studies confirm the theoretical prediction, such as (Kim and Sorensen, 1986; Titman and Wessels, 1988; Rajan and Zingales, 1995) report. However, some studies demonstrate a positive relation between growth opportunities and leverage (Titman and Wessels, 1988; Chang and Rhee, 1990; Banerjee et al., 2000; Fattouh et al., 2002; Schargrodsky, 2002).

3.2. Size

Many authors have suggested that the leverage ratio may be related to firm size. However, there are conflicting results on the relationship between firm's size and leverage. The trade-off theory predicts that larger firms tend to be more diversified, less risky and less prone to bankruptcy. Firms may prefer debt rather than equity financing for control. Control considerations support positive correlation between size and leverage. Thus, large firms should be more highly leveraged. Some of the studies consisted with the view of trade-off theory (Fischer et al., 1989; Chang and Rhee, 1990; Chen et al., 1998; Banerjee et al., 2000; Bevan and Danbolt, 2001; Fattouh et al., 2002; Padron et al., 2005; Gaud et al., 2005; Tomak, 2013). However, Titman and Wessels (1988), Ooi (1999), Chen (2003), Yolanda and Soekarno (2012) and Wahap and Ramli (2014) report a contrary negative relationship between debt ratios and firm size. Kale et al. (1991), Wanzenried (2002) and Ghazouani (2013) find no significant effect of size on capital structure.

In the literature, the natural logarithm of net sales or total assets, average value of total assets, total assets at book value and the market value of the firm were used as measure firm size (Sayilgan et al., 2006).

3.3. Profitability

Most of the empirical studies show that there are no consistent theoretical predictions on the effects of profitability on leverage. In the trade-off theory, more profitable firms should have higher leverage because they have more income to shield from taxes. The free cash-flow theory would suggest that more profitable firms should use more debt in order to discipline managers, to induce them to pay out cash instead of spending money on inefficient projects (Bauer, 2004). Thus, some of empirical studies observe a positive relationship between leverage and profitability, for example (Taub, 1975; Fattouh et al., 2002). However, in the pecking-order theory, firms prefer internal financing to external. So more profitable firms have a lower need for external financing and therefore should have lower leverage (Bauer, 2004). Most empirical studies observe a negative relationship between leverage and profitability (for example Myers and Majluf, 1984; Titman and Wessels, 1988; Jensen et al., 1992; Bathala et al., 1994; Rajan and Zingales, 1995; Demirgüç-Kunt and Maksimovic 1996; De Miguel and Pindado, 2001; Schargrodsky, 2002; Huang and Song, 2005; Wahab et al., 2012; Yolanda and Soekarno, 2012, Tomak, 2013; Wahap and Ramli 2014).

3.4. Tangibility

Most capital structure theories argue that the type of assets owned by a firm in some way affects its capital structure choice. Titman and Wessels (1988) predict that the assets include the ratio of intangible assets to total assets and the ratio of inventory plus gross plant and equipment to total assets. There are a positive relationship between tangibility and leverage and a negative relationship between intangibility and leverage. The trade off theory predicts a positive relationship between leverage and tangible assets. Tangible assets normally provide high collateral value relative to intangible assets, which implies that these assets can support more debt. Tangible assets reduce the cost of financial distress. Most empirical studies observe a positive relationship between leverage and tangibility (for example Jensen and Meckling, 1976; Titman and Wessels, 1988; Jensen et al., 1992; Rajan and Zingales, 1995; Demirgüç-Kunt and Maksimovic, 1996; Chen et al., 1998; Banerjee et al., 2000; Chen and Jiang, 2001; Bevan and Danbolt, 2001; Zabri, 2012; Wahab et al., 2012; Wahab and Ramli, 2014). On the other hand, agency theory predicts a negative relationship between tangibility of assets and leverage.

3.5. Non-Debt Tax Shields

Interest expenses contribute to a decrease in firm's taxable income. But, there are also other methods of reducing firm tax burdens. Depreciation on tangibles and intangibles are also tax deductable. DeAngelo and Masulis (1980) argue that tax deductions for depreciation and investment tax credits are substitutes for the tax benefits of debt financing. As a result, firms with large non-debt tax shields relative to their expected cash flow include less debt in their capital structures (Titman and Wessels, 1988). Furthermore, according to the pecking order theory, there is a negative relationship between non-debt tax shields and leverage. Most empirical studies observe a negative relationship between leverage and non-debt tax shields (for example Kim and Sorensen, 1986; Titman and Wessels, 1988; Mackie-Mason, 1990; Demirguc-Kunt and Maksimovic, 1996; De Miguel and Pindado, 2001; Schargrodsky, 2002; Zabri 2012). Yet, Scott (1977) and Moore (1986) argue that substantial non-debt tax shield can act as attractive collateral and so it can induce high debt levels. Consequently, in this case a positive relationship is expected (Kale et al., 1991; Ramlall, 2009).

In addition, empirical studies use different indicators to be proxy for non-debt tax shield, including annual depreciation expenses plus investment credit tax deflated by earnings before interests, taxes and depreciation (Bradley et al., 1984); ratio of depreciation to total assets (Wald, 1999); ratio of depreciation and amortization expenses scaled by total assets (Huang and Song, 2005).

4. The Model Specification and Data
4.1. The Model

Table I presents the suggested proxies for the determinants of capital structure by the trade-off theory and the pecking order theory. It also indicates that their expected signs are mixed. By using capital structure theories and empirical literature, the linear relationship between the capital structure and the firm-specific variables in Turkey may be expressed as Equation (1) at form of balanced panel data. The results of the panel unit root tests, the Hausman test and LR test suggest that the fixed effects estimator is more efficient than the other static panel data methods such as pooled OLS or the random effects model (see 5.Empirical Results). The equation for base model may follows as:

$$LEVERAGE_{it} = \beta_1 GROWTH_{it} + \beta_2 SIZE_{it} + \beta_3 PROFIT_{it} + \beta_4 TANG_{it} + \beta_5 NDTS_{it} + i\alpha_i + \varepsilon_{it} \quad (1)$$

Table 1. The Suggested Proxies for the Determinants of the Capital Structure and their Expected Signs

Determinants	The Trade-Off Theory	The Pecking Order Theory	Proxies
Growth opportunities	-	+ / -	market-to-book ratio
Size	+	-	the natural log. of total assets
Profitability	+ /-	-	net income to total assets
Tangibility	+	-	net fixed assets to total assets
Non-Debt Tax Shields	-	-	depreciation to total assets

In Equation (1) LEVERAGE is the capital structure variables: LEVERAGE1 is calculated as the ratio of book value of total debt to total assets and LEVERAGE2 is calculated as the ratio of book value of total debt to book value of equity; GROWTH is the growth opportunities that is calculated as the market-to-book ratio; SIZE is the natural logarithm of total assets; PROFIT is the profitability variables that is calculated as the ratio of net income to total asset; TANG is the tangibility variable that is calculated as the ratio of net fixed assets to total assets; and NDTS is the non-debt tax shields variable that is calculated as the ratio of depreciation to total assets. i=1,2,…N firm, t=1,2,…T time, α_i are individual effects of firms, and ε_{it} is the error term. Annual data for 79 firms in the manufacturing sector traded on the Istanbul Stock Exchange (ISE) are obtained from the Public Disclosure Platform (www.kap.gov.tr) for the 1993-2010 periods. These firms in seven sub-sectors are selected according to data availability. Sub-sectors are: Sector 1 is the food, beverage and tobacco sector; Sector 2 is the textile, wearing apparel and leather sector; Sector 3 is the paper, printing and publishing sector; Sector 4 is the chemical and petroleum, rubber and plastic product sector; Sector 5 is the non-metallic mineral products sector; Sector 6 is the basic metal sector; and Sector 7 is the fabricated metal products, machinery and equipment sector.

4.2. Expanded Model with Sector-Specific Effects

All coefficients of the firm-specific variables for all sectors may predict separately to investigate the existence of the significant differences among subsectors of manufacturing sector or not. For this purpose Equation (1) may expand with sector-specific dummy variables as:

$$LEVERAGE_{it} = \sum_{j=1}^{7}\delta_{1j}GROWTH_{it} + \sum_{j=1}^{7}\delta_{2j}SIZE_{it} + \sum_{j=1}^{7}\delta_{3j}PROFIT_{it} + \sum_{j=1}^{7}\delta_{4j}TANG_{it}$$
$$+ \sum_{j=1}^{7}\delta_{5j}NDTS_{it} + \sum_{j=1}^{7}S_{j} + \upsilon_{it}$$

$$(2)$$

where j=1,…,7 sectors; δ_{1j}, δ_{2j}, δ_{3j}, δ_{4j} ve δ_{5j} are coefficients of variables for each sector; S_j are the sector-specific effects dummy variables, and υ_{it} is the error term.

4.3. Expanded Model with Firm Size Effects

Firm size discrimination of 79 firms used in analysis is made as consistent with the European Union Small and Medium Industrial Enterprises (SMEs) definition. Firms according to this definition are separated as large firms (LS1) and small firms (LS2). When Equation (1) is rearranged to explore the significance of the firm-specific variables for both the small and large firms, it follows as:

$$LEVERAGE_{it} = \sum_{h=1}^{2}\lambda_{1h}GROWTH_{it} + \sum_{h=1}^{2}\lambda_{2h}SIZE_{it} + \sum_{h=1}^{2}\lambda_{3h}PROFIT_{it} + \sum_{h=1}^{2}\lambda_{4h}TANG_{it}$$
$$+ \sum_{h=1}^{2}\lambda_{5h}NDTS_{it} + \sum_{h=1}^{2}LS_{h} + \varphi_{it}$$

$$(3)$$

where h is the firm size; λ_{1h}, λ_{2h}, λ_{3h}, λ_{4h}, ve λ_{5h} are the coefficients of the firm-specific variables for each group; LS_h are the firm size dummies, and φ_{it} is the error term.

5. Empirical Results

The aim of this study is to examine the relationship between the capital structure and the firm-specific variables in Turkey by employing different panel data models. Firstly, two recently developed heterogeneous panel unit root tests are employed to determine the integration degree of the variables in Equation (1). These tests are the Fisher ADF (Choi, 2001) and IPS (Im et al., 2003) that take heterogeneity into account using individual effects and individual linear trends, because the characteristics of each sector may be different. For both tests the null hypothesis is that relevant variable is not stationary. Although all the null hypotheses are rejected for both unit root tests, all variables are stationary and then the static panel data models may be applied easily.

Table 2. Panel Unit Root Test Results

Variables in Levels	ADF – Choi Z-Stat	IPS W-Stat
LEVERAGE1	- 4.5891 (0.0000)*	- 4.6111 (0.0000)*
LEVERAGE1	- 8.2278 (0.0000)*	- 10.6894 (0.0000)*
GROWTH	- 12.6662 (0.0000)*	- 14.6515 (0.0000)*
SIZE	- 9.2880 (0.0000)*	- 8.2060 (0.0000)*
PROFIT	- 9.9690 (0.0000)*	- 10.6705 (0.0000)*
TANG	- 6.3423 (0.0000)*	- 6.8006 (0.0000)*
NDTS	- 3.5696 (0.0002)*	- 9.3434 (0.0000)*

Note: Automatic selection of lags based on Schwarz Information Criterion, 0 to 3. P-values are in parentheses, and *, indicates significance at the at 1% level.

Secondly, the pooled least squares estimator, random effects estimator or fixed effects estimator may be employed as a static panel data estimator. The selection or validity of an efficient estimator may be depended two tests these are the likelihood ratio (LR) test and the Hausman test (See Table 3). Rejecting the null hypothesis for the LR test means that the fixed effects are significant and rejecting the null hypothesis for the Hausman test means that the random effects estimator is not efficient than the fixed effect estimator. These results support that the fixed effect estimator should employ to

explore the relationship between the capital structure and the firm-specific variables in Turkey by using base model, expanded model with sector-specific effects, and expanded model with size effects.

Table 3. The Results of the Likelihood Ratio (LR) Test and the Hausman Test

Models	LR Test	Hausman Test
Leverage 1	150.68 (0.0000)*	64.06 (0.0000)*
Leverage 2	178.03 (0.0000)*	17,14 (0.0042)*
Notes: P-values are in parentheses. * indicate significance at the at 1% level.		

5.1. Results from Base Model

The results from base model can be summarized as follows (See Table 4):

Table 4. Results of General The Fixed Effects Model Analysis

	LEVERAGE 1	LEVERAGE 2
Variables	Coefficients	Coefficients
GROWTH	0.0008 (0.0950)	0.0816 (0.0000)***
SIZE	-0.0161 (0.0015)***	-0.0744 (0.0870)*
PROFIT	-0.4796 (0.0000)***	-6.6033 (0.0000)***
TANG	-0.0923 (0.0000)***	-0.8711 (0.0112)***
NDTS	-0.0243 (0.1220)	-0.0988 (0.7272)
ρ	0.6689 (0.0000)***	0.2960 (0.0000)***
R-squared	0.8216	0.4634
Adjusted R-squared	0.8097	0.4276
S.E. of regression	0.0874	1.6094
F-statistic	68.9783 (0.0000)	12.9357 (0.0000)
Durbin-Watson stat.	1.8966	2.0339
Notes: Models were estimated by using Eviews5 software and autocorrelation problem is solved by applying a Marquardt nonlinear least squares algorithm. ρ is the first order autocorrelation coefficient. White cross-section standard errors & covariance are used. ***, ** and * are statistical significant at 1 % level, 5 % level and 10 % level, respectively. P-values are in parentheses.		

i) There are significant relationships between leverage 1 and growth opportunities, size, profitability and tangibility. But non-debt tax shields explanatory variable has insignificant effects on leverage 1. Growth opportunity has statistically positive effect at 10 % level. This result supports the trade-off theory. Size, profitability and tangibility have negative effects at 1 % level on leverage 1. These results support the pecking order theory.

ii) There are significant relationships between leverage 2 and growth opportunities, size, profitability and tangibility. But non-debt tax shield explanatory variable has also insignificant effects on leverage 2. Growth opportunity has statistically positive effect at 1 % level. This result supports the trade-off theory. Size, profitability and tangibility have negative effects at 1 % level and 10 % on leverage 2. These results support the pecking order theory.

5.2. Expanded Model with Sector-Specific Effects

The results expanded model with sector-specific effects follows as (See Appendix I):

i) Generally, profitability (profit) and growth opportunity variables have more significant effect than other variables on debt/equity (Leverage 1 and Leverage 2) for all sectors.

ii) In leverage 1 model, the signs of growth, profitability, tangibility and non-debt tax shields variables are consistent with the pecking order theory while size variable is consistent with the trade-off theory for significant sectors. Debt/equity rate increases while growth opportunity and size of firms increase. However, debt/equity rate decreases while profitability, tangibility and non-debt tax shields rates of firms increase in significant sectors.

iii) In leverage 2 model, the signs of size, profitability and tangibility variables are only consistent with the pecking order theory while growth and non-debt tax shields variables are consistent with the trade-off theory and the pecking order theory for significant sectors. Debt/equity rate increases while growth opportunity increases for sector 1, sector 2 and sector 7. However, debt/equity

rate increases while growth opportunity increases for sector 5 and sector 6. Furthermore, debt/equity rate decreases while size, profitability, tangibility and non-debt tax shields rates of firms increase for significant sectors.

The comparisons with results expected in capital structure theory of analysis results of panel data analysis models expanded with sector-specific effects are presented in Table 5.

Table 5. Comparison with Theory of Panel Data Analysis Results Expanded with Sector Specific Effects

	The Trade-Off Theory	The Pecking Order Theory	LEVERAGE 1	LEVERAGE 2
GROWTH	-	+ / -	1. Textile, wearing app. (+) 2. Paper, printing and publishing sector (+) 3. Chemical, petroleum(+) 4. Non-metallic products (+) 5. Fab.metal products, machinery, equipment (+)	1. Food, beverage, tob. (+) 2. Paper, printing and publishing sector (+) 3. Non-metallic products (-) 4. Basic metal (-) 5. Fab.metal products, machinery, equipment (+)
SIZE	+	-	1. Fab. metal products, machinery, equipment (+)	1. Non-metallic products, (-) 2. Basic metal (-)
PROFIT	+ /-	-	1. Food, beverage, tob. (-) 2. Textile, wearing app. (-) 3. Paper, printing and publishing sector (-) 4. Chemical, petroleum (-) 5. Non-metallic products, (-) 6. Basic metal (-) 7. Fab. metal products, machinery, equipment (-)	1. Food, beverage, tob. (-) 2. Textile, wearing app.(-) 3. Paper, printing and publishing sector (-) 4. Chemical, petroleum (-) 5. Non-metallic products, (-) 6. Basic metal (-) 7. Fab. metal products, machinery, equipment (-)
TANG	+	-	1. Textile, wearing app.(-) 2. Basic metal (-)	1. Food, beverage, tob. (-) 2. Textile, wearing app.(-) 3. Chemical, petroleum (-) 4. Non-metallic products, (-) 5. Basic metal (-) 6. Fab. metal products, machinery, equipment (-)
NDTS	-	-	1. Chemical, petroleum (-)	5. Basic metal (-)

Notes : (+) is positive relationship between debt/equity and explanatory variables related to sector. (–) is negative relationship between debt/equity and explanatory variables related to sector. Empty box is insignificant relationship between debt/equity and explanatory variables related to sector.

5.3. Expanded Model with Firm Size Effects

The results for expanded model with firm size effects can be summarized as follows (see Appendix II):

i) In leverage 1 and leverage 2 models, profitability variable of small and large firm groups has negative effect on debt/equity ratio. There is no a significant difference between two groups.

ii) In leverage 1 model, growth variable of two groups is positive and significant. But, in leverage 2 model, growth variable of large firm group are only positive and significant.

iii) Size has also a positive effect on debt/equity ratio both of firm groups for only leverage 1 model.

iv) Tangibility has a negative effect on debt/equity ratio of small firm group in leverage 1 model and large firm group in leverage 2 model.

v) Non-debt tax shield has a negative effect for only large firm group in leverage 1 model.

vi) For both of models, the signs of size variable are consistent with the trade-off theory while growth and tangibility variables are consistent with the pecking order theory for significant groups. Profitability and non-debt tax shields variables are consistent with both of the pecking order theory and the trade-off theory.

The comparisons with results expected in capital structure theory of analysis results of panel data analysis models expanded with firm size effects are presented in Table 6.

Table 6. Comparison with Theory of Panel Data Analysis Results Expanded with Firm Size Effects

	The Trade-Off Theory	The Pecking Order Theory	LEVERAGE 1 (Turkish Firms)	LEVERAGE 2 (Turkish Firms)
GROWTH	-	+ / -	1. Large firm group (+) 2. Small firm group (+)	1. Large firm group (+)
SIZE	+	-	1. Large firm group (+) 2. Small firm group (+)	
PROFIT	+ /-	-	1. Large firm group (-) 2. Small firm group (-)	1. Large firm group (-) 2. Small firm group (-)
TANG	+	-	1. Small firm group (-)	1. Large firm group (-)
NDTS	-	-	1. Large firm group (-)	

Notes: (+) is positive relationship between debt/equity and explanatory variables related to firm group. (−) is negative relationship between debt/equity and explanatory variables related to firm group. Empty box is insignificant relationship between debt/equity and explanatory variables related to firm group.

6. Conclusion

This paper attempts to explore the determinants of the capital structure of a sample of 79 listed firms on the Istanbul Stock Exchange in Turkey. Sample period spans from 1993 to 2010. In the study, there is the base model. This model is expanded with firm size and sector-specific effects. Based on data availability, five potential determinants of capital structure were analyzed. These determinants are growth opportunities, size, profitability, tangibility and non-debt tax shields.

We followed the trade-off theory and pecking order theory. These theories possess different traits to explain the corporate capital structure. The trade-off theory suggests that optimal capital structure is a trade off between net tax benefit of debt financing and bankruptcy costs. The pecking order theory states that firms prefer internal financing to external financing.

Empirical findings suggest that the growth opportunities generally appear to have positive influence on debt levels except for non-metallic products and basic metal products sectors. This result is inconsistent with the theoretical prediction. But, it is consistent with some studies on the pecking order theory. This result shows that in Turkey, firms with high future growth opportunities use more debt financing.

Firm size is negatively correlated with leverage except for fabricated metal products, machinery, equipment sector, and large and small firm groups in Leverage 1 (book value of total debt / total assets). Negative results are consistent with the pecking order theory while positive results consistent with the trade-off order theory. The trade-off theory predicts that larger firms tend to be more diversified, less risky and less prone to bankruptcy. Firms may prefer debt rather than equity financing for control. Control considerations support positive correlation between size and leverage. Thus, large firms should be more highly leveraged. But in the base model, firm size is negatively correlated with leverage for Turkish firms. Thus, firms prefer equity rather than debt financing.

In all empirical findings, leverage is negatively correlated with profitability. This finding is consistent with the pecking order theory rather than with the trade-off theory. That is, higher profitable firms use less debt. High profit firms use internal financing, while low profit firms use more debt because their internal funds are not adequate.

Tangibility is also negatively correlated with leverage in all empirical findings. This finding is consistent with the pecking order theory. This finding contradicts the proposition that serving as collateral for loans, the greater the proportion of tangible assets, the more willing lenders should be to supply loans, and leverage should be higher.

A non-significant relationship between non-debt tax shield and leverage was found except for chemical, petroleum sector and large firm group in leverage 1 and basic metal sector in leverage 2 (book value of total debt / book value of equity). This result shows that tax rate is not the determinant of capital structure in Turkish manufacturing sector.

Generally, in the models, firm specific variables have significant influences on capital structure of firms. This study is limited to the sample of firms in Turkish manufacturing sector. This paper extends the empirical literature on capital structure in the context of an emerging economy like Turkey. This study may be helpful to academicians and policy makers who vouch for the recognition of the importance of firm specific factors in the determination of financial policy of firms in an economy. In addition, future research can investigate to determine other factors that influence capital structure in other sectors.

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Appendix I. The General Models Expanded with Sector Effects

	LEVERAGE 1			LEVERAGE 2		
	Coefficient	T-Value	P-Value	Coefficient	T-Value	P-Value
S1	0.0046	0.0070	0.9944	5.9142	4.0730	0.0000
S2	-0.1703	-0.2468	0.8051	3.2064	2.7582	0.0059
S3	-0.7601	-0.6864	0.4926	0.3503	0.1377	0.8905
S4	-0.8300	-0.9078	0.3641	3.2313	2.3047	0.0213
S5	-0.5756	-0.9727	0.3309	2.7725	5.5357	0.0000
S6	-0.0859	-0.0906	0.9279	4.3322	4.3286	0.0000
S7	-0.5320	-0.8959	0.3705	1.4200	1.3127	0.1895
δ1GROWTH	0.0004	0.5456	0.5854	0.2303	2.2957	0.0218
δ2GROWTH	0.0091	2.3778	0.0176	0.0441	0.8815	0.3782
δ3GROWTH	0.0077	1.6768	0.0938	1.3827	6.6172	0.0000
δ4GROWTH	0.0005	1.6730	0.0946	0.0891	1.4421	0.1495
δ5GROWTH	0.0052	1.7770	0.0758	-0.1784	-5.4802	0.0000
δ6GROWTH	0.0001	0.1095	0.9128	-0.0074	-1.6831	0.0926
δ7GROWTH	0.0040	1.9463	0.0518	0.1234	1.7886	0.0739
δ1SIZE	0.0333	1.1011	0.2711	-0.1626	-1.5448	0.1226
δ2SIZE	0.0346	0.9780	0.3282	-0.0597	-0.9904	0.3222
δ3SIZE	0.0565	1.0303	0.3031	-0.0988	-0.8020	0.4227
δ4SIZE	0.0580	1.2895	0.1974	-0.0645	-1.0389	0.2991
δ5SIZE	0.0418	1.3398	0.1806	-0.0677	-2.7055	0.0069
δ6SIZE	0.0298	0.6787	0.4975	-0.1161	-2.2312	0.0258
δ7SIZE	0.0511	1.8292	0.0676	0.0662	1.2038	0.2289
δ1PROFIT	-0.6852	-9.5163	0.0000	-12.2470	-4.6813	0.0000
δ2PROFIT	-0.4900	-5.5726	0.0000	-4.0405	-3.8332	0.0001
δ3PROFIT	-0.4380	-3.6265	0.0003	-10.1207	-2.3933	0.0168
δ4PROFIT	-0.4545	-5.0306	0.0000	-6.9597	-3.6726	0.0002
δ5PROFIT	-0.3653	-4.0922	0.0000	-3.2986	-3.4153	0.0007
δ6PROFIT	-0.4306	-6.3359	0.0000	-3.8346	-3.5979	0.0003
δ7PROFIT	-0.5627	-5.5595	0.0000	-6.3785	-5.2285	0.0000
δ1TANG	-0.2867	-1.3530	0.1763	-2.5831	-1.6748	0.0942
δ2TANG	-0.3233	-3.5163	0.0005	-2.1522	-5.6512	0.0000
δ3TANG	-0.0671	-0.5130	0.6080	1.9503	1.4427	0.1493
δ4TANG	-0.0308	-0.3888	0.6975	-0.9342	-1.7843	0.0746
δ5TANG	-0.0077	-0.2297	0.8183	-0.4145	-2.1703	0.0302
δ6TANG	-0.2508	-1.6773	0.0937	-1.7643	-1.9038	0.0572
δ7TANG	-0.0531	-0.3785	0.7052	-2.6022	-4.4024	0.0000
δ1NDTS	-0.0196	-0.1830	0.8548	-0.6389	-0.4656	0.6416
δ2NDTS	0.0327	0.8763	0.3810	-0.3600	-0.7240	0.4692
δ3NDTS	-0.0246	-1.3748	0.1694	-0.0901	-0.3009	0.7636
δ4NDTS	-0.1029	-1.9839	0.0475	-0.5110	-0.6480	0.5171
δ5NDTS	-0.0742	-1.3317	0.1832	-0.3854	-1.6243	0.1046
δ6NDTS	-0.0681	-1.1779	0.2391	-0.6929	-2.3954	0.0167
δ7NDTS	0.0420	0.9815	0.3265	0.1009	0.2595	0.7953
ρ	0.8938	43.7912	0.0000	0.3480	5.7280	0.0000
R-squared	0.8134			0.5691		
Adjusted R-squared	0.8074			0.5552		
S.E. of regression	0.0879			1.4187		
Durbin-Watson stat	2.0982			2.1268		

Notes : Growth, size, profit, tang and ndts is firm specific variables, Sector1 (S1) is food, beverage and tobacco sector; Sector2 (S2) is textile, wearing apparel and leather sector; Sector3 (S3) is paper, printing and publishing sector; Sector4 (S4) is chemical and petroleum, rubber and plastic product sector; Sector5 (S5) is non-metallic mineral products sector; Sector6 (S6) is basic metal sector; Sector7 (S7) is fabricated metal products, machinery and equipment sector; δ1, δ2, δ3, δ4, δ5, δ6, and δ7 are dummies relating to sectors; coefficient of explanatory variable multiplied by sector dummy is coefficient of explanatory variable related to sector.

Appendix II. The General Models Expanded with Firm Size Effects

	LEVERAGE 1			LEVERAGE 2		
	Coefficient	T-Value	P-Value	Coefficient	T-Value	P-Value
LS1	-0.6087	-1.2725	0.2034	2.0712	2.0246	0.0431
LS2	-0.8920	-2.2116	0.0272	1.5027	0.5318	0.5950
λ1GROWTH	0.0008	1.9607	0.0501	0.1000	2.5084	0.0122
λ1SIZE	0.0454	1.8134	0.0700	-0.0062	-0.1161	0.9076
λ1PROFIT	-0.4630	-7.8479	0.0000	-6.4135	-5.7290	0.0000
λ1TANG	-0.0637	-1.2093	0.2268	-1.2621	-2.6850	0.0073
λ1NDTS	-0.0399	-2.4598	0.0140	0.0023	0.0055	0.9956
λ2GROWTH	0.0018	1.8988	0.0578	0.0740	0.9751	0.3297
λ2SIZE	0.0624	3.0485	0.0023	0.0262	0.1504	0.8804
λ2PROFIT	-0.4978	-9.0810	0.0000	-7.1344	-4.4452	0.0000
λ2TANG	-0.1015	-2.1673	0.0304	-0.3959	-0.7799	0.4356
λ2NDTS	-0.0191	-0.6425	0.5206	-0.3440	-1.0105	0.3125
ρ	0.9155	53.3167	0.0000	0.4639	3.8282	0.0001
R-squared	0.8002			0.3902		
Adjusted R-squared	0.7984			0.3847		
S.E. of regression	0.0899			1.6686		
Durbin-Watson stat	2.0888			2.1311		

Notes: LS1 is coefficient relating to the large firm group; LS2 is coefficient relating to the small firm group; coefficient of explanatory variable multiplied by size dummy is coefficient of explanatory variable relating to the relevant to group.