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Determinants of Capital Structure: Empirical Evidence from Manufacturing Firms Listed on BIST

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Sermaye Yapısının Belirleyicileri: BIST'de İşlem Gören İmalat Sektörü Firmaları Üzerine Ampirik Bir Araştırma	**Determinants of Capital Structure: Empirical Evidence from Manufacturing Firms Listed on BIST**
Öz	**Abstract**
Bu çalışmanın amacı, Borsa İstanbul'da işlem gören imalat sanayi firmalarında, firma düzeyinde faktörlerin sermaye yapısı kararları üzerindeki etkisini araştırmak ve ayrıca bu etkinin firma büyüklüğü ve borçlanma düzeyine göre değişiklik gösterip göstermediğini belirlemektir. Çalışma 2010-2019 dönemini ve 143 firmayı kapsamaktadır. Driscoll-Kraay yaklaşımı kullanılarak yapılan panel regresyon analizi sonuçlarına göre, finansal hiyerarşi ve dengeleme teorisi çerçevesinde seçilen firmaya özgü faktörler, firmaların borçlanma davranışındaki değişimi açıklamada kritik rol oynamaktadır. Ayrıca firma düzeyindeki değişkenlerin sermaye yapısı üzerindeki etkisinin, firma gruplarına göre farklılaşabildiği tespit edilmiştir.	In this study, we analyze the impact of firm-level determinants on the capital structure decisions of Turkish publicly traded firms operating in the manufacturing sector over the period from 2010 to 2019, and we also investigate whether this impact is particularly associated with firm size and level of debt. Panel regression results based on the Driscoll-Kraay procedure imply that firm-specific variables selected within the framework of two dominant theories of capital structure play critical roles in explaining the changes in borrowing behaviors of the firms. Moreover, our empirical results reveal that the impact of the firm-level variables on capital structure varies over different groups of firms.
Anahtar Kelimeler: Sermaye Yapısı, İmalat Sektörü, Dengeleme Teorisi, Finansal Hiyerarşi Teorisi, Kaldıraç	**Keywords:** Capital Structure, Turkish Manufacturing Sector, Trade-off Theory, Pecking Order Theory, Leverage
JEL Kodları: G30, G32, C33	**JEL Codes:** G30, G32, C33

Araştırma ve Yayın Etiği Beyanı	Bu çalışma bilimsel araştırma ve yayın etiği kurallarına uygun olarak hazırlanmıştır.
Yazarların Makaleye Olan Katkıları	Her iki yazarında da makaleye katkı oranı eşit ve %50'dir. 2. Yazar makalenin sorumlu yazarıdır.
Çıkar Beyanı	Yazarlar açısından ya da üçüncü taraflar açısından çalışmadan kaynaklı çıkar çatışması bulunmamaktadır.

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1. Introduction

Capital structure refers to the combination of debt and equity used to finance a firm's assets. Decisions regarding capital structure, which is seen as an important firm policy, are of great importance as they concern all stakeholders of a firm. (Jahanzeb et al., 2015; Sayılgan et al., 2016). One of the most discussed topics in corporate finance literature is whether firms can maximize their market value by changing their capital structure. The problem of the theory of capital structure was first taken up by D. Durand, who made an attempt in 1952 to explain the dependencies between the structure of capital and the cost of its acquisition. On the other side, the Modigliani-Miller model is considered to be the source of the development of the theory of corporate finance (Kruk, 2021).

Under the assumption of perfect and frictionless capital markets, Modigliani et al. (1958) proved that the choice between debt and equity financing has no effects either on the value of the firm or on the cost of capital. Since the seminal work of Modigliani et al. (1958, 1963), the literature has started to expand and several competing theories have emerged (Lee et al., 1988). According to Myers (2001), there exists no valid theoretical perspective for the choice between debt and equity, and no reason to expect one. There are, however, several beneficial conditional theories, especially the trade-off theory (TOT) and the pecking-order theory (POT) (Ozkan, 2001; Huang et al., 2006; Qian et al., 2009).

The TOT has argued that an optimal capital structure can be formed by taking into account the benefits and costs from employing debt (Kraus et al., 1973; Jensen et al., 1976). By the TOT, the optimal debt level of the firms is determined by the tax shield, financial distress, bankruptcy costs, and agency costs (Korkmaz et al. 2021). The use of debt for firms not only provides the tax advantages of debt financing, but also minimizes agency costs caused by the shareholder-manager conflict. However, having a higher leverage (debt-to-equity) ratio results in higher bankruptcy costs and higher agency costs caused by the shareholder-lender conflict. Consequently, there is an optimal debt-to-equity ratio that makes the average cost of capital minimum based on the TOT (Myers, 2001; Wiwattanakantang, 1999; Miglo et al., 2014; Saif-Alyousfi et al., 2020). Conversely, in the presence of information asymmetry, the POT implies that there exists a hierarchy in choosing sources of financing. In other words, by virtue of adverse selection problems, firms prefer primarily to employ internal funds prior to employing debt and equity, and can employ external debt prior to external equity (Myers, 1984; Myers et al., 1984.). Based on this theory, there exists no optimal capital structure for firms (Antoniou et al., 2008).

As a result, capital structure theories not only question whether an optimal capital structure exists, but also provide a framework for explaining the financing behavior of firms. Following Modigliani et al. (1958, 1963) irrelevance theory, alternative capital structure theories have been developed for explaining the existing capital structure decisions of firms. As mentioned above, among these theories regarding the determinants of firm financing, the TOT and the POT are the two most accepted theoretical models. The empirical validity of these theories has been tested in many studies. The firm-level factors such as firm size, profitability, liquidity, non-debt tax shields, asset tangibility, growth opportunities, and earnings volatility are often regarded as important determinants of capital structure and their influence on capital structure still endures a matter of debate (Danso et al., 2020).

The manufacturing sector is one of the leading sectors contributing to national income in developing economies. The capital demanded by the firms operating in this sector is of great importance not only for their production activities to continue without interruption but also for the development and growth of the financial markets in the country. So, this paper aims to test the influence of firm-level factors on the financing behavior of publicly traded firms in the Borsa Istanbul (BIST) manufacturing sector within the framework of the TOT and the POT. In the literature review, generally it has been determined that the factors affecting of the capital structure decisions in the manufacturing sector in Turkey are investigated. It is thought that this study will make an important contribution to the literature by investigating whether the differences in the size and debt level of the firms create a change in the factors affecting the capital structure. In addition, the sample, the selected variables, and the panel estimator distinguish this study from previous studies in the literature.

The rest of the paper is organized as follows: Theoretical background and empirical predictions are given in Section 2. The methodology is introduced in Section 3. The empirical results are given in Section 4. Finally, discussion and conclusion are in the last section.

2. Theoretical Background and Empirical Predictions

In this section, the influences of selected firm-level variables on the financial behavior of manufacturing firms are briefly discussed theoretically within the framework of TOT and POT, and empirical findings of previous studies in the literature are evaluated.

2.1. Influence of Firm Size

According to the TOT, the effect of firm size on leverage can be expected to be positive. Because large-sized firms are less likely to face bankruptcy risk and their cash flows are less volatile thanks to diversification effects. Moreover, these firms are too big to fail. On the other hand, increasing the size of firms may increase their exposure to high information asymmetry costs arising from external financing. Furthermore, large-sized firms may prefer to work with lower leverage, as they have the ability to issue equity at lower costs. Therefore, this variable can be expected to exhibit negative association with leverage based on the POT (Delcoure, 2007; Dakua, 2019). Despite theoretical expectations regarding the association between these two variables, some researchers have estimated a negative association (Marsh, 1982; Titman et al., 1988; Burucu et al., 2016; Sikveland et al., 2020), while others (Danso et al., 2020; Krishnan et al., 1996; Deesomsak et al., 2004; Noulas et al., 2011; D'Amato, 2020) have reported a positive association.

2.2. Influence of Profitability

The TOT stipulates that firms having higher levels of profits may employ higher levels of debt due to both lower bankruptcy risk and the tax shield effect of debt. However, the POT predicts an inverse association between profitability and leverage. More clearly, more profitable firms with higher capacity to generate internal funds may prefer to employ lower debt within their capital structure (Wiwattanakantang, 1999; López-Gracia et al., 2008; Nguyen et al., 2014; Cappa et al., 2020). Nevertheless, empirical studies on this association provide inconclusive results. Some (Dakua, 2019; Nunkoo et al., 2010) have suggested that the connection is positive; some (Huang et al., 2006; Alipour et al., 2015; Serrasqueiro et al., 2014) have stated that the connection is negative; while others (Chakrabarti et al., 2019) display no significant link at all.

2.3. Influence of Liquid Assets

The TOT says that firms with adequate liquid assets can borrow more since they are less risky. So, high liquidity increases the use of debt. Conversely, based on the POT, firms with more liquid assets can, however, use their internal resources to fund profitable investment opportunities, which leads to a decrease in their leverage (Danso et al., 2020; Dakua, 2019; De Jong et al., 2008). There are, however, conflicting conclusions regarding the influence of this variable. For example, some empirical studies (Chakrabarti et al., 2019) on the effect of liquid assets on leverage have found a negative relation. Whereas, the empirical findings of Dakua (2019), Hossain et al. (2015), Mirza et al. (2017), Proença et al. (2014) seem to support for the positive linkage.

2.4. Influence of Non-Debt Tax Shields

Firms that form capital structures by using debt have the opportunity to reduce corporate tax thanks to interest expenses. Similarly, firms can also save on corporate taxes by using depreciation, which contributes to the reduction of their taxable income. Owing to the fact that depreciation provides firms with tax advantages and is accepted as a substitute for the tax shield on debt financing, both the TOT and the POT anticipate a negative relation between non-debt tax shields and leverage (Alnori et al., 2019; Chakrabarti et al., 2019; DeAngelo et al., 1980; Sheikh et al., 2011). This prediction is also supported by many studies (Huang et al., 2006; Serrasqueiro et al., 2014; Hossain et al., 2015; Panda et al., 2020; Touil et al., 2020) in the empirical literature.

2.5. Influence of Tangible Assets

According to the TOT, the tangible assets act as collateral and lower the risk for creditors, which causes firms to operate with higher leverage. In contrast to this, the POT postulates a negative association between tangible assets and level of debt. This could be explained by the fact that tangible assets connected with lower levels of information asymmetry are more likely to fall the cost of issuing equity (D'Amato, 2020; Yildirim et al., 2018). There exists also conflicting results on the association between tangibility and leverage. Empirically, some studies have estimated a negative association (Proença et al., 2014; Hossain et al., 2015; Alipour et al., 2015; Zafar et al., 2019), while others (Sikveland et al., 2020; Nunkoo et al., 2010; Touil et al., 2020; Moradi et al., 2019; Saona et al., 2018) have reported a positive relationship between the two variables.

2.6. Influence of Growth Opportunities

From the TOT perspective, it is assumed that growth opportunities are negatively associated with level of debt. This association is based on the logic that high-growth firms are exposed to greater bankruptcy risk. Within the logic of the POT, however, high-growth firms may prefer to borrow more to finance growth and to capture new business opportunities due to possible problems in issuing new equity in the short term (Krishnan et al., 1996; Deesomsak et al., 2004; Moosa et al., 2012; Vo, 2017). The empirical literature on the link between growth opportunities and leverage does not report consistent evidence. For example, the findings of Deesomsak et al. (2004), Antoniou et al. (2008), Alipour et al. (2015), Dakua (2019), Hossain et al. (2015), Huang et al. (2006), Nunkoo et al. (2010), and Saona et al. (2018) have given strong support for the negative association. On the contrary, Handoo et al. (2014), Krishnan et al. (1996) and Serrasqueiro et al. (2014) provide evidence on the positive connection between growth opportunities and leverage.

2.7. Influence of the Volatility of Firms' Earnings

According to the TOT hypothesis, increasing volatility of firms 'earnings increases the probability of default on firms' payments, which makes external financing costly. As a result, firms with high volatility in earnings need to use less debt to reduce their bankruptcy risk. However, given that investors of firms with higher earnings volatility are more likely to request a higher rate of return, risky firms may prefer to use high levels of debt rather than issue equity. Hence, within the logic of the POT, a positive linkage between risk and level of debt is expected (Deesomsak et al., 2004; Delcoure, 2007; Khémiri et al., 2018; Danso et al., 2020). Empirical research on the link between firms' earnings volatility and their leverage also offers conflicting results. For example, some say that the correlation between earnings volatility and leverage is negative (Dakua, 2019; Serrasqueiro et al., 2014; Zafar et al., 2019), or positive (Mirza et al., 2017; Moradi et al., 2019; Moosa et al., 2012), while others show that earnings volatility has no significant influence on leverage at all (Huang et al., 2006; Delcoure, 2007; Krishnan et al., 1996; Kim et al., 2008).

3. Methodology

3.1. Data Set

Our sample includes 143 firms over the period 2010-2019 representing approximately 85.97% of all listed firms in the BIST manufacturing industry. Financial data for firms is obtained from the Finnet database (a leading financial information service provider in Turkey) and the websites of the firms.

3.2. Regression Model Specification

The endogeneity issue is a serious problem in corporate finance studies and ignoring the endogeneity problem may lead to unreliable estimates. Therefore, to preclude the potential endogeneity problem (e.g. reverse causality) pertaining to dependent and explanatory variables in our analysis, we utilize one-year lagged values of all firm-level explanatory variables. Additionally, two main estimation methods i.e., fixed-effects (FEs) and random-effects (REs) are utilized in our analysis. All model specifications are estimated based on the results of the Hausman specification test. To control for potential autocorrelation, heteroscedasticity, and cross-sectional dependence in the panel data, we apply Driscoll and Kraay (1998) estimation procedure (Hoechle, 2007). We consider the following regression specification to investigate the capital structure determinants of manufacturing firms*:*

$$\mathrm{FL_{it}} = \alpha + \beta_i \mathrm{X_{it-1}} + \xi_t + \mu_i + \epsilon_{it} \quad (1)$$

In the above model: i indexes the firm and t indexes the year; the independent variable is financial leverage denoted by $\mathrm{FL_{it}}$ and this variable is measured by two alternative indicators (i.e., short-term leverage and long-term leverage); α is the intercept term; X_{it-1} is the matrix of one year lagged firm-level variables*;* β is a vector of coefficients on independent variables; ξ_t is time dummies; μ_i is the unobserved firm-specific effect and finally ϵ_{it} is an i.i.d. random error term with $E(\epsilon_{it}) = 0$ and $Var(\epsilon_{it}) = \sigma^2$. We estimate Eq. (1) for the full sample and divide the full data into sub-samples according to both the size of the firms and their leverage levels. While doing this, we take into account the median values of firm size and firm total leverage in the full sample. In this study, the small- (large-) sized firms are identified as firms whose total assets are below (equal or above) the sample median value, and the low- (high-) leveraged firms are identified as firms whose total leverage level are below (equal or higher) the sample median value. Creating these sub-samples allows us to analyze in-depth whether

there are differences in the financing behavior of different groups of firms. Detailed explanations for the definitions of the variables in the financial leverage regression equation are given in Table 1.

Table 1: Variables, Measurements and Expected Effects of Independent Variables on Leverage

Variable	Measure	Notation	Theoretical Expectation	
Dependent Variables				
Short-Term Leverage	Ratio between short term debt and total assets	STL		
Long-Term Leverage	Ratio between long term debt and total assets	LTL		
Determinants			**Positive**	**Negative**
Firm Size	Logarithm of total assets	SIZE	TOT	POT
Profitability	Ratio between earnings before interest, taxes, depreciation, and amortization and total assets	EBIT	TOT	POT
Liquidity	Ratio between total current assets and short term debt	LIQ	TOT	POT
Non-Debt Tax Shields	Ratio between total depreciation expenses and total assets	NDTS	-	TOT/POT
Asset Tangibility	Ratio between tangible assets and total assets	TANG	TOT	POT
Growth Opportunities	Ratio between the market value of equity plus short- and long-term liabilities to total assets.	TQ	POT	TOT
Earnings Volatility	Absolute value of percentage variations of earnings before interest and tax	RISK	POT	TOT

4. Results

4.1. Summary Statistics

The summary statistics for all the variables used in our empirical estimation are given in Table 2. The average value of total leverage ratio (TL) is about 51%. This ratio varies between a minimum of 1.7% and a maximum of 145%. The mean of short-term leverage ratio (STL) is approximately 36%, with a range between 1.1% and 106%. Table 3 depicts that, on average, long term leverage ratio (LTL) of all sampled firms is about 15%. Table 3 also indicates that the minimum value for this variable is 0% while the maximum value is 125.3%. The findings of the summary statistics reveal that firms listed in the manufacturing industry tend to finance roughly half of their assets by using debt. Moreover, considering the maturity of the debt, firms in this sector mostly prefer using short-term debt to long-term debt in financing their investments. This result may be explained by the fact that the lack of a sufficiently developed capital market and the volatile economic environment make it difficult for these firms to access long-term finance.

Table 2: Summary Statistics

	Mean	Median	Std. Dev.	Min	Max	N
TL	0.506	0.519	0.223	0.017	1.45	1430
STL	0.357	0.348	0.178	0.011	1.06	1430
LTL	0.149	0.112	0.124	0	1.253	1430
Ln(Assets)	19.474	19.428	1.757	13.852	24.74	1430
EBITDA	0.083	0.081	0.081	-0.204	0.765	1430
LIQ	2.04	1.48	2.142	0.032	43.864	1430
NDTS	0.03	0.026	0.032	-0.103	0.647	1430
TANG	0.471	0.461	0.194	0.009	0.978	1430
TQ	1.361	1.126	0.99	0.141	13.012	1430
RISK	0.018	0.009	0.035	0	0.445	1430

Note: TL is the ratio of total debt to total assets.

4.2. Correlation Matrix

Table 3 indicates *the findings of* the *Spearman* pairwise correlation matrix. The fact that the estimated correlation coefficients are below 0.8 demonstrates that the absence of multi-collinearity between the independent variables used for the analysis.

Table 3: Correlation Matrix

	TL	STL	LTL	SIZE	EBIT	LIQ	NDTS	TANG	TQ	RISK
TL	1.000									
STL	0.840*	1.000								
LTL	0.599*	0.138*	1.000							
SIZE	0.139*	0.021	0.263*	1.000						
EBIT	-0.070	-0.043	-0.048	0.339*	1.000					
LIQ	-0.719*	-0.708*	-0.337*	-0.149*	0.201*	1.000				
NDTS	0.014	-0.018	0.055	0.127*	0.291*	-0.073	1.000			
TANG	-0.102*	-0.311*	0.284*	0.168*	-0.239*	-0.383*	0.144*	1.000		
TQ	0.061	0.048	0.019	0.122*	0.289*	0.050	0.200*	-0.143*	1.000	
RISK	0.027	0.019	0.019	-0.175*	-0.212*	-0.022	-0.014	0.022	-0.113*	1.000

Note: * indicates the level of significance at 1%.

4.3. Estimation Results

Tables 4-6 indicate the results of the estimation of different specifications of the model (1). We first perform our regression on the full sample. We then estimate our regression model for the sub-samples of small (large) firms and low (high) leveraged firms. The estimation results for the full-sample are presented in Table 4. Table 5 indicates the results of the sub-samples of small- and large-sized firms, whereas Table 6 gives the results of the sub-samples of low- and high-leveraged firms.

Table 4: Regression Results for Full Sample

	Full Sample			
	STL (1)		LTL (2)	
	Coefficients	Robust SEs	Coefficients	Robust SEs
SIZE	0.031***	0.009	0.023***	0.006
EBIT	-0.190**	0.080	-0.070	0.086
LIQ	-0.012**	0.004	-0.002	0.001
NDTS	-0.059	0.185	0.033	0.137
TANG	-0.084*	0.045	0.085***	0.007
TQ	0.006	0.006	-0.001	0.004
RISK	-0.063	0.052	0.225**	0.071
Intercept	-0.155	0.169	-0.312**	0.120
Hausman Test-FE vs. RE	62.20***		18.79***	
R-squared	0.1339		0.1127	
F-statistic	71.42***		355.85***	
Panel Estimator	Driscoll-Kraay FE		Driscoll-Kraay FE	
Number of Obs.	1287		1287	
Number of Firms	143		143	

Notes: Robust SEs are reported in parentheses. DK-FE(RE) is the Driscoll-Kraay standard errors estimator using FEs (REs) regression. *, **, and *** indicate the level of significance at 1%, 5% and 10%, respectively.

Table 5: Regression Results for Small vs. Large Firms

	Small Firms		Large Firms	
	STL	LTL	STL	LTL
	(3)	(4)	(5)	(6)
SIZE	0.012*	0.004	0.023	0.017
	(0.006)	(0.007)	(0.016)	(0.023)
EBIT	-0.047	-0.128**	-0.282**	-0.028
	(0.087)	(0.052)	(0.114)	(0.089)
LIQ	-0.009**	-0.003***	-0.039***	-0.006
	(0.003)	(0.001)	(0.005)	(0.006)
NDTS	-0.169	0.102	-0.510	-0.231
	(0.164)	(0.147)	(0.348)	(0.416)
TANG	-0.081	0.046	-0.169***	0.164**
	(0.056)	(0.029)	(0.041)	(0.063)
TQ	0.020***	-0.004	0.003	0.0102***
	(0.006)	(0.003)	(0.006)	(0.003)
RISK	-0.092	0.254*	-0.030	0.169**
	(0.092)	(0.122)	(0.073)	(0.060)
Intercept	0.206*	0.108	0.073	-0.246
	(0.110)	(0.142)	(0.343)	(0.516)
Hausman Test-FE vs. RE	59.19***	22.46	28.04**	36.35***
R-squared	0.1106	0.1350	0.2071	0.1510
F-statistic	509.03***	21304.26***	807.00***	2529.86***
Panel Estimator	DK-FE	DK-RE	DK-FE	DK-FE
Number of Obs.	623	623	664	664

Notes: Robust SEs are reported in parentheses. DK-FE(RE) is the Driscoll-Kraay standard errors estimator using FEs (REs) regression. *, **, and *** indicate the level of significance at 1%, 5% and 10%, respectively.

Table 6: Regression Results for Low vs. High Levered Firms

	Low Leveraged Firms		High Leveraged Firms	
	STL	LTL	STL	LTL
	(7)	(8)	(9)	(10)
SIZE	0.006	0.0208	-0.012	0.010*
	(0.011)	(0.011)	(0.021)	(0.004)
EBIT	-0.161**	-0.003	-0.115	-0.078
	(0.053)	(0.047)	(0.133)	(0.119)
LIQ	-0.006**	-0.002	-0.060**	0.0303**
	(0.002)	(0.001)	(0.024)	(0.012)
NDTS	0.031	-0.014	-1.319***	0.681
	(0.073)	(0.083)	(0.383)	(0.535)
TANG	-0.080**	0.0321	-0.169***	0.210***
	(0.026)	(0.031)	(0.039)	(0.033)
TQ	-0.000	-0.002	-0.014	-0.004
	(0.003)	(0.003)	(0.011)	(0.007)
RISK	0.129**	0.062	-0.148**	0.218***
	(0.039)	(0.068)	(0.054)	(0.051)
Intercept	0.180	-0.316	0.964**	-0.106
	(0.220)	(0.223)	(0.434)	(0.107)
Hausman Test-FE vs. RE	76.89***	28.76**	73.03***	15.88
R-squared	0.1015	0.0849	0.1319	0.2014
F-statistic	572.47***	1478.91***	957.67***	3893.42***
Panel Estimator	DK-FE	DK-FE	DK-FE	DK-RE
Number of Obs.	631	631	656	656

Notes: Robust SEs are reported in parentheses. DK-FE(RE) is the Driscoll-Kraay standard errors estimator using FEs (REs) regression. *, **, and *** indicate the level of significance at 1%, 5% and 10%, respectively.

The coefficient of SIZE is statistically significant and positive in both STL and LTL models (in columns 1, 2, 3, and 10). This finding supports the TOT, which explains that the firm size increases the debt capacity of the firm. A possible reason for the positive impact of the SIZE variable is that larger Turkish manufacturing firms are less likely to face bankruptcy risk and can find cheaper external financing from the debt market by paying less risk premium. These findings are also similar to the results of previous empirical studies (Yildiz et al., 2009; Saona et al., 2018; Chakrabarti et al., 2019; Bilgin, 2019).

The estimated coefficients of EBIT are negative and significant in both STL and LTL models (in columns 1, 4, 5, and 7). This finding indicates that the leverage ratios decrease as firm profitability increases. One possible explanation is that firms with high profit tend to prefer to use less debt because of their abilities to generate funds internally. This inverse relationship is consistent with other studies (Delcoure, 2007; Yildiz et al., 2009; Handoo et al., 2014; Alipour et al., 2015; Sikveland et al., 2020; Khoa et al. 2021; Ngaa, 2021) and supports the logic of the POT.

As shown in Tables 4-6, the estimated coefficients of the LIQ are negative and significant in all models, except for model 10 (in columns 1, 3, 4, 5, 7, and 9). This result, which supports the POT, demonstrates that firms with more liquid assets tend to employ these assets rather than use debt in financing their investments. This finding is also supported by other studies (Hossain et al., 2015; Mirza et al., 2017; Bilgin, 2019; Danso et al., 2020, Khoa et al. 2021). However, the positive relation between LIQ and LTL in model 10 supports the TOT and might indicate that high-levered firms having more liquid assets borrow more in the long term. Similar result can be found in Alipour et al. (2015) and D'Amato (2020).

The estimated results demonstrate that the influence of NDTS is negative and significant only STL model for sub-sample of high levered firms (in column 9). The negative impact, parallel with both the TOT and the POT, supports the hypothesis that NDTS can be substitutes for the tax deductibility of debt financing so that an increase in NDTS decreases the sort-term leverage. This finding is supported by some previous studies in the empirical literature (Delcoure, 2007; Bilgin, 2019).

For the TANG variable, we find that this variable has a significant negative influence on STL (in columns 1, 5, 7, and 9), while a significant positive impact on LTL (in columns 2, 6, and 10). The significant negative conclusion confirms the hypothesis of the POT and indicates that firms with more tangible assets could choose to operate with lower leverage ratios because of the lower cost of issuing equity. Our finding is consistent with previous empirical studies (Vo, 2017; D'Amato, 2020; Ngaa, 2021). Whereas, the significant positive association of TANG and LTL confirms the hypothesis of the TOT and shows that firms with high levels of tangible assets obtain external finance easily owing to the collateral characteristic of tangibility. This finding confirms previous empirical findings (Nunkoo et al., 2010; Yildirim et al., 2018; Ngaa, 2021).

A positive and significant correlation between the TQ variable (as a proxy for the future growth opportunity of firms) and the leverage measures is observed in both STL and LTL models (in columns 3 and 6). The positive linkage can be explained within the logic of the POT. Based on this theory, high-growth firms tend to prefer to borrow more to finance growth and to capture new business opportunities due to possible problems in issuing new equity. Krishnan et al. (1996), Handoo et al. (2014), and Serrasqueiro et al. (2014) provide evidence on the positive connection between growth opportunities and leverage.

As predicted by the POT, RISK has a positive and significant influence on STL and LTL models (in columns 2, 4, 6, 7, and 10). This conclusion, consistent with the result of Mirza et al. (2017), demonstrates that firms operating in the manufacturing sector increase their debt level due to the higher cost of issuing equity. In contrast to this result, we also observe a negative and significant relationship between RISK and STL (column 9) as predicted by the TOT. This finding may indicate that high-levered firms with high business risk tend to use less debt to diminish the risk of bankruptcy. The negative impact of RISK can be found in Yildirim et al. (2018).

5. Conclusion

In recent years, dynamics such as globalization, increasing competition and technological developments have increased the importance of developing economies. Although the theory of capital structure has been studied extensively in the corporate finance literature, the number of studies that take into account the size and debt structure of firms in the context of developing economies is relatively limited.

This paper aims to test if financing decisions of firms is consistent with theories of capital structure (i.e., the trade-off and pecking order theories) for firms. For this purpose, we employ a yearly data set of a balanced panel of Turkish manufacturing firms traded in the Borsa Istanbul for the period 2010-2019. In line with the aim of our study, the empirical validity of these theories has been questioned employing some selected variables such as firm size, profitability, liquidity, non-debt tax shields, asset tangibility, growth opportunities, and earnings volatility.

Our empirical findings obtained from this study allow us to conclude that: (i) based on the summary statistics, manufacturing firms employ debt to finance approximately 51% of their investments. Moreover, the findings reveal that short-term debt dominates debt selection of Turkish manufacturing sector; (ii) for all firms, it has been observed that the POT is valid in the short-term leverage regression, whereas the TOT is valid in the long-term leverage regression; (iii) for small and large firms, the financing decisions of these firms seem to further confirm the POT in both short and long term leverage equations; (iv) given the debt structure of firms, the results are quite interesting. In the short-term leverage model, low levered firms have been seriously followed POT. However, both capital structure theories are insufficient to explain the financing behavior of these firms in the long term regression. Moreover, although the findings from the short-run regression model for highly leveraged firms partially support the POT, the TOT seems to largely explain the capital structure decisions of these firms in the long-run regression model.

The findings obtained from the main and sub-samples reveal that the determinants of firm financing are different for short and long term leverage. All of the short-term leverage models mainly support POT. On the other hand, the results from long-term leverage models are mixed. Therefore, financial managers in firms operating in the manufacturing sector need to consider these differences when deciding on the most appropriate capital structure, which may contribute to the increase in the value of their firms. Why the findings obtained from the study differ according to the basic characteristics of the firms is an important research question that arises.

This study has some limitations. First of all, in this study, it has been tested whether both the TOT and the POT are valid for Turkish manufacturing firms. The use of static panel estimators in this study can be considered as another limitation of the study. However, our models are less likely to suffer from endogeneity problems. In future studies, the validity of other capital structure theories such as signaling theory, agency theory, and free cash flow theory can be tested in different sectors. It may also be suggested to use dynamic panel data estimators that take into account the endogeneity problem in future studies on capital structure determinants.

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