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AN INVESTIGATION OF THE VALIDITY OF TRADE-OFF AND PECKING ORDER THEORIES IN CAPITAL STRUCTURE DECISIONS OF SUSTAINABLE FIRMS

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Abstract

The study examines the Pecking Order Theory and Trade-off Theory, which are among the theories on which the capital structure decisions of firms, which are extremely important for firm value, are based. The study aims to test the validity of these theories for sustainable firms in the BIST Sustainability Index. Sustainable firms are preferred because they carry out activities to reduce the cost of capital. The study examines the relationship between total indebtedness ratios, long-term debt ratios and short-term debt ratios and liquidity, asset structure, non-debt tax shield, tax, profitability ratio, change in assets, firm size and firm risk of 40 firms included in the BIST Sustainability Index between 2015-2021. In general, the capital structure preferences of sustainable firms support the Trade-off Theory. In addition, the dummy variable created for the periods when companies are included in the BIST Sustainability Index is statistically significant and positively related to their borrowing behavior. This result is interpreted as an increase in companies' borrowing ratios after their inclusion in the index.
Keywords: Capital Structure, Pecking Order Theory, Trade-off Theory and Sustainability.
JEL codes: G32, Q56, G31.

SÜRDÜRÜLEBİLİR FİRMALARIN SERMAYE YAPISI KARARLARINDA DENGELEME VE FİNANSMAN HİYERARŞİSİ TEORİSİNİN GEÇERLİLİĞİNİN İNCELENMESİ

Öz

Çalışmada firmaların firma değeri açısından son derece önemli olan sermaye yapısı kararlarının dayandığı teorilerden Finansman Hiyerarşisi Teorisi ve Dengeleme Teorisi'nin geçerliliğinin, sermaye maliyetini azaltıcı faaliyetler yürütmelerinden dolayı BIST Sürdürülebilirlik Endeksi'nde yer alan sürdürülebilir firmalar üzerinde test edilmesi amaçlanmıştır. Çalışmada 2015-2021 yılları arasında BIST Sürdürülebilirlik Endeksi'nde yer alan 40 firmanın toplam borçluluk oranları, uzun vadeli borçluluk oranları ve kısa vadeli borçluluk oranları ile likidite, varlık yapısı, borç dışı vergi kalkanı, vergi, karlılık

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oranı, aktiflerdeki değişim, firma büyüklüğü ve firma riski arasındaki ilişki incelenmektedir. Sonuçların geneline bakıldığında sürdürülebilir firmaların sermaye yapısı tercihleri Dengeleme Teorisi'ni destekler niteliktedir. Ayrıca firmaların BIST Sürdürülebilirlik Endeksi'ne girdikleri dönemler için oluşturulan kukla değişkenin borçlanma davranışları ile istatistiksel olarak anlamlı ve pozitif ilişkili olduğu ortaya koyulmuştur. Elde edilen bu sonuç firmaların endekse girdikten sonra borçlanma oranlarının artığı yönünde yorumlanmaktadır.
Anahtar Kelimeler: Sermaye Yapısı, Finansman Hiyerarşisi Teorisi, Dengeleme Teorisi ve Sürdürülebilirlik.
JEL Kodları: G32, Q56, G31.

1. INTRODUCTION

Many theories have been proposed and discussed in the finance literature on capital structure. Modern theories, which started after Modigliani and Miller's (1958) capital structure theory, which states that capital structure does not affect firm value under efficient market conditions, are based on the fact that firms form their capital structure by taking into account the costs and returns on debt and equity. Capital structure is crucial for firms to finance their investments. Firms should decide on the optimal capital structure to maximize firm value. At the micro level, firms' capital structure decisions are based on improving their financial performance, maximizing firm value, growth and sustainability (Fama & French, 2002; Harris & Raviv, 1991; R. G. Rajan & Zingales, 1995). At the macro level, especially during the 2008-2009 financial crisis, firms' capital structure decisions are of great importance in terms of representative cost problems and asymmetric information problems (Miglo, 2010). By considering the capital structure of firms, lenders can understand how much debt they owe and whether there is a risk of non-repayment if a loan is granted. Investors can also form return expectations according to the risk they take by looking at the debt levels of firms (Mumtaz et al., 2013).

Among the modern theories of firms' capital structure decisions, the Trade-off Theory and the Pecking Order Theory are directly related to agency costs, asymmetric information problems, taxation and bankruptcy costs. Agency costs arise when the firm's stakeholders do not act in the interests of shareholders, or when shareholders do not act in the interests of lenders, and form the basis of these theories. Shareholders may engage in risky investments to earn more, but if these risky investments fail, lenders may face financial distress. In the asymmetric information problem, managers have more information than other stakeholders. In other words, it means that people inside the firm have more information than those outside the firm. According to agency theory, managers can provide shareholders with inside information such as the nature of the firm's investments, the firm's growth opportunities, and expected cash flows that will influence investment policies. However, sustainable firms have high performance on environmental, social and governance issues. Therefore, sustainable firms have fewer information asymmetry problems and therefore lower cost of capital (Ferris et al., 2017; Vural-Yavas, 2016). The aim of this study is to reveal which theory is more appropriate for the capital structure decisions of the companies in the BIST Sustainability Index during the period of their inclusion in the index by using data for the period 2015-2021. It

Araştırma Makalesi
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is expected that this study on capital structure decisions, which are extremely important in terms of increasing company value in sustainable companies, will contribute to investors, company owners and the national economy at the macro level.

2. THEORIES ON WHICH THE RESEARCH IS BASED AND LITERATURE REVIEW

2.1. Trade-off Theory

The theory, first proposed by Modigliani and Miller (1963), states that firms should borrow taking into account the tax shield effect of debt and bankruptcy costs, and should balance the tax shield effect of debt with bankruptcy costs and agency costs. Agency theory (Jensen & Meckling, 1976) refers to conflicts of interest between shareholders and lenders or between shareholders and managers. Based on the Barter Theory, large firms are expected to borrow more because of the lower risk of nonpayment. Large firms can borrow more than small firms because they have tangible assets that lose less value in the event of financial distress. Larger firms are more affected by financial difficulties. Therefore, according to Trade-off Theory, there is a negative relationship between growth and borrowing (Barclay et al., 2006; Frank and Goyal, 2003; R. Rajan and Zingales, 1995). Therefore, firms will want to borrow more and benefit more from the tax shield effect. In contrast, firms that have a non-debt tax shield, such as amortization, should have lower borrowing rates than firms that do not. This may vary across countries. Countries that can benefit more from the tax shield effect of debt are expected to have higher borrowing rates than others. Firms with high profitability are expected to borrow more due to lower bankruptcy costs. Therefore, the negative relationship between debt and profitability does not support the theory.

Araştırma Makalesi
DOI:10.47147/ksuiibf.1379933
Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

2.2. Pecking Order Theory

According to Myers (1984), due to the asymmetric information problem and the related adverse selection problem, firms prefer internal financing sources to external financing sources. Myers (1984) states that when a firm needs financing, it first borrows from retained earnings, and when it needs to resort to external sources of financing, it borrows because it is less costly. Stock issuance is the last option. This theory emphasizes that highly profitable firms use internal sources of financing for their investments as much as possible, while firms with low profitability have to use external sources, which is usually borrowing. According to Jensen and Meckling (1976), profitability and debt are negatively related to the agency theory. According to this theory, firms with high profitability want to borrow as little as possible and prefer internal financial resources to external financial resources. At the same time, highly profitable firms will be able to take advantage of investment opportunities in a limited way by borrowing less. As the borrowing rate increases, the probability of investing in high return investment opportunities will also increase.

3. LITERATURE REVIEW

There is an ongoing debate in the finance literature on firms' capital structure decisions. No definite judgment has been reached on which capital structure theory is more appropriate for firms. This debate, which started with the view that capital structure decisions have no effect on firm value (Modigliani & Miller, 1958), continues with two different main views in the current literature. The first one is the debt trade-off theory (Modigliani & Miller, 1963) and the second one is the pecking order theory (Myers, 1984). Shaym-Sunder and Myers (1999) showed that larger firms than the 157 firms they analyzed between 1981 and 1989 act in accordance with the pecking order theory during periods of financial distress. Fama and French (2002) support the pecking order theory and find that highly profitable firms make fewer overpayment investments and have less leverage. Huang (2006) finds a positive relationship between debt ratio and firm size and fixed assets, and a negative relationship between profitability, non-debt tax shield and growth opportunities between 1994 and 2003.

Studies examining the relationship between profitability and debt ratio within the framework of trade-off theory and pecking order theory (Baskin, 1989; Biger and Mathur, 2011; Cansız and Sayılgan, 2017; Demirgüç-Kunt et al, 2020; Frank and Goyal, 2003; Nguyen et al, 2020; R. G. Rajan and Zingales, 1995; Sayılgan et al, 2006; Titman and Wessels, 1988) found a negative relationship between profitability and debt, which supports the pecking order theory.

Firm size is also among the factors affecting capital structure decisions. Larger firms can bear the cost of less long-term debt than smaller firms. At the same time, since large firms can find long-term debt more easily than small firms (Vural-Yavaş, 2016), they are expected to borrow more long-term debt than small firms. Large firms are expected to borrow more in order to benefit from the tax effect of debt. However, there are also contrary results in the literature (Abdioğlu, 2019). According to the trade-off theory, there is a positive relationship between firm size and borrowing. However, according to the

Araştırma Makalesi
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Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

pecking order theory, as firm size increases, the problem of asymmetric information will increase, costs will increase, and firms will have difficulty in borrowing. Some of the studies analyzing the relationship between firm size and debt ratio (Eriotis et al., 2007; Frank and Goyal, 2003; Huang and Song, 2006; Nguyen et al., 2020; Sayılgan et al., 2006) support the trade-off theory and show a positive relationship.

The tax advantage of firms' financial resources was first mentioned in the study of Modigliani and Miller (1963). Subsequently, studies examining the relationship between capital structure and tax impact have started to be conducted. Wald (1999) finds a negative relationship between debt level and the non-debt tax shield, but there are also studies that show a positive relationship ((Bradley et al., 1984) and (Titman and Wessels, 1988)). The asset structure of the firm is another factor that has an impact on the debt ratio. According to the pecking order theory, as the ratio of tangible fixed asset structure to total assets increases, borrowing will decrease (Pandey, 2005). According to the trade-off theory, there is a positive relationship between fixed asset ratio and borrowing (Frank and Goyal, 2003; Jong et al., 2008). Alsu and Yarımbaş (2017) examined financial ratios to determine which of the financing pecking order and trade-off theories is applicable for 132 firms operating in the manufacturing sector of the BIST100 Index. According to the findings of the study, the pecking order theory is applied for the firms in the BIST100 Index operating in the manufacturing sector.

Since firm risk increases the cost of borrowing and makes borrowing more difficult (Vural-Yavaş, 2016), firms with low firm risk are expected to borrow more. The same is true for both theories. While Titman and Wessels (2008) do not find any relationship between firm risk and debt, there are also studies that reveal a negative relationship (Bancel and Mittoo, 2005; Pandey, 2005; Wald, 1999).

In this study, taking into account the capital structure determinants used in the literature, the relationship between the long and short-term debt ratios of the firms in the BIST Sustainability Index and profitability, firm size, non-debt tax shield, firm risk and asset structure between the 2015-2021 periods is revealed and it is investigated which theory they support between the trade-off theory and the pecking order theory. In this study, taking into account the capital structure determinants used in the literature, the relationship between long and short-term debt ratios and profitability, firm size, non-debt tax shield, firm risk and asset structure of the firms in the BIST Sustainability Index between the periods 2015-2021 is revealed and it is investigated which theory they support between the trade-off theory and the pecking order theory. The study is differentiated by the focus on sustainable firms that operate to reduce the cost of capital and is expected to contribute to the literature.

4. METHODOLOGY

In the study, total debt ratios, long-term debt ratios and short-term debt ratios of the firms included in the BIST Sustainability Index (XUSRD) between 2015-2021 are used as dependent variables. Current ratio, asset structure, non-debt tax shield, tax, profitability ratio, change in assets, firm size, and firm risk

Araştırma Makalesi
DOI:10.47147/ksuiibf.1379933
Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

are determined as independent variables. In addition, a dummy variable where firms enter the sustainability index as 1 and other periods as 0 is used. In order to apply structural break tests, time size should be great (Yerdelen Tatoğlu, 2020b). The data set is not suitable for structural break tests. A dummy variable is included in the model for the year 2020, when the effects of the Covid 19 pandemic, which is accepted as a break year worldwide, were seen in Turkey, and for 2018, the beginning of the exchange rate crisis for Turkey. Firm-specific variables are obtained from the official website of the Public Disclosure Platform (KAP). It is determined that 65 firms are included in the Sustainability Index as of 2022. It is determined that 40 of these firms were continuously listed on the BIST during the specified periods. The definitions of the relevant variables are explained below.

Table 1. Variables

Variables	Definitions	Source
TB	Total Debt/Total Assets	KAP
KVB	Short Term Debt/Total Assets	KAP
UVB	Long-Term Debt/Total Assets	KAP
CO	Revolving Asset/Short-Term Debt	KAP
VY	Tangible Assets/Total Assets	KAP
BDVK	Depreciation/Total Assets	KAP
VER	Period Taxes/Period Profit	KAP
KAR	Profit Before Interest and Tax/Total Assets	KAP
AD	$\frac{Total\ asset\ value - Total\ asset\ value\ in\ the\ previous\ year}{Total\ assset\ value\ in\ the\ previous\ year}$	KAP
LAKTIF	Logarithm of Total Assets	KAP
FR	Profit Before Interest and Tax/Financing Expense	KAP
SE	1 if the company is included in the BIST Sustainability Index during the Sample Period, 0 if it is not included in the BIST Sustainability Index	BIST
CRIS	1 for pandemic (2020) and exchange rate crisis (2018), 0 for other years	

Descriptive statistics of the data sets obtained from the financial statements of the firms in the BIST Sustainable Index are presented in Table 2.

Araştırma Makalesi
DOI:10.47147/ksuiibf.1379933
Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

Table 2. Descriptive Statistics

Variables	Observation	Average	Standard deviation	Minimum	Maximum
TB	280	0.65	0.32	0.05	5.01
KVB	280	0.38	0.17	0.03	0.95
UVB	280	0.26	0.31	0.00	4.68
CO	280	1.38	0.63	0.22	4.55
VY	280	0.31	0.20	0.00	0.93
BDVK	280	0.23	0.25	0.00	1.61
VER	280	0.11	0.38	-2.36	2.69
KAR	280	0.10	0.07	-0.05	0.67
AD	280	0.33	0.75	-0.86	9.49
LAKTIF	280	19.69	3.17	10.77	25.20
FR	280	4.47	13.27	-1.76	126.05
SE	280	0.76	0.42	0	1
CRIS	280	0.28	0.45	0	1

Between 2015 and 2021, 40 firms have a total of 280 observations. Among the variables, LAKTIF has the highest mean and firm risk (FR) has the highest standard deviation. The variable with the lowest mean and standard deviation is PROFIT. The data set with the highest difference between minimum and maximum values is FC, while the data set with the lowest difference between minimum and maximum values is short-term liabilities.

Three separate independent variables were used in the study. Regression models established with these three variables;

Model T

$$TB_{it} = \beta_0 + \beta_1 CO_{it} + \beta_2 VY_{it} + \beta_3 BDVK_{it} + \beta_4 VER_{it} + \beta_5 KAR_{it} + \beta_6 AD_{it} + \beta_7 LAKTIF_{it} + \beta_8 FR_{it} + \beta_9 SE_{it} + \beta_{10} CRIS_{it} + \varepsilon_{it} \quad (1)$$

Model K

$$KVB = \beta_0 + \beta_1 CO_{it} + \beta_2 VY_{it} + \beta_3 BDVK_{it} + \beta_4 VER_{it} + \beta_5 KAR_{it} + \beta_6 AD_{it} + \beta_7 LAKTIF_{it} + \beta_8 FR_{it} + \beta_9 SE_{it} + \beta_{10} CRIS_{it} + \varepsilon_{it} \quad (2)$$

Model U

$$UVB_{it} = \beta_0 + \beta_1 CO_{it} + \beta_2 VY_{it} + \beta_3 BDVK_{it} + \beta_4 VER_{it} + \beta_5 KAR_{it} + \beta_6 AD_{it} + \beta_7 LAKTIF_{it} + \beta_8 FR_{it} + \beta_9 SE_{it} + \beta_{10} CRIS_{it} + \varepsilon_{it} \quad (3)$$

is established in the form of.

In all three regression models, multicollinearity tests are performed to determine whether there is a relationship between the independent variables, in other words, whether there is a multicollinearity problem. The results of the multicollinearity test are presented in Table 3.

Araştırma Makalesi
DOI:10.47147/ksuiibf.1379933
Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

Table 3. Multiple Linear Connection Test

Variables	VIF	1/VIF
CO	1.20	0.83
VY	1.26	0.79
BDVK	1.34	0.74
VER	1.01	0.99
KAR	1.24	0.80
AD	1.04	0.95
LAKTIF	1.11	0.90
FR	1.19	0.84
SE	1.11	0.89
CRIS	1.02	0.96
Mean VIF	1.16	

As a result of the test conducted to detect the multicollinearity problem, the average VIF value was determined as 1.19<5. VIF value less than 5 indicates that there is no multicollinearity problem among independent variables.

4.1. Empirical Analysis

The study covers 40 sustainable companies between 2015-2021, so the panel data analysis method using horizontal cross section and time dimension together was used in the study. In panel data analysis, the stability is first tested so that the false relationships between the variables do not affect the results of the analysis. Levin, Lin and Chu (LLC) panel unit root analysis is performed for the stability test of the variables. LLC (2002) panel unit root test zero hypothesis is tested as follows (Levin et al., 2002).

H_0: $\delta=0$ (The series is not static).

The results of the LLC panel unit root analysis conducted to test the zero hypothesis are summarized in Table 4.

Table 4. LLC Panel Unit Root Test Results

Variables	Statistical Value
TBO	-16.51***
KVBO	-11.92***
UVBO	-19.91***
CO	-9.84***
VY	-4.37***
BDVK	-5.40***

Araştırma Makalesi
DOI:10.47147/ksuiibf.1379933
Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

VER	-95.06***
KAR	-4.70***
AD	-11.53***
LAKTIF	-11.55***
FR	-24.10***
SE	-2.37***
CRIS	-10.61***

Note: *** p <0.01, ** p <0.05, * p <0.10.

According to the LLC panel unit root results, the H_0 hypothesis is rejected in all of its dependent and independent variables. It is concluded that the series are static at the level, in other words, they are I(0). Three models are analyzed by F test, Breush-Pagan LM test and Hausman test to determine the relationship of series that are stationary at the level and the most appropriate panel regression analysis. The F test is used to determine whether the regression model is a pooled ICC model or a fixed effect model. The F test hypothesis is tested as "H_0: There is no unit and time effect" (Yerdelen Tatoğlu, 2020a). The Breush-Pagan Lagrange Multiplier (LM) test is analyzed to distinguish between pooled OLS and a random effect regression model. The null hypothesis of this test, developed by Breush and Pagan (1980), is "H_0: The variance of the unit effects is equal to zero". The test statistic is broken down by X^2 under the zero hypothesis(Breusch & Pagan, 1980) If the hypothesis is accepted, the pooled OLS model is accepted as the most appropriate model. The Hausman test is performed to distinguish between the random effect and the fixed effect model. The null hypothesis of the test developed by Hausman (1978) is that "the difference between the parameters is not related" (Hausman(Hausman, 1978) When the zero hypothesis is accepted, it is decided that the random effect model is consistent.

Table 5. Regression Estimator Tests

Model	**F Test**	**Breush-Pagan LM Test**	**Hausman Test**
Model T	2.06***	7.97***	15.57
Model K	20.27***	360.90***	15.13
Model U	1.81***	4.12**	13.29

Note: *** p <0.01, ** p <0.05, * p <0.10.

According to the F test results of the regression models established with total indebtedness ratio, short-term indebtedness ratio and long-term indebtedness ratio, the null hypothesis is rejected. It is concluded that there are unit and time effects in the models. This result indicates that the fixed effect model should be preferred in the models. According to the results of Breush-Pagan LM test, the variance of unit effects is not equal to zero in all three

Araştırma Makalesi
DOI:10.47147/ksuiibf.1379933
Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

regression models. It is concluded that the pooled OLS model is not a valid method for T, K and U regression models. As a result of the Hausman estimator used to decide between fixed effect and random effect models, the null hypothesis is accepted and it is determined that the random effect model estimator should be used in T, K and U regression models.

Before the random effect regression estimator, some assumption tests are performed to test the presence of heteroskedasticity, autocorrelation and inter-unit correlation in the T, U and K models. The heteroskedasticity test is performed by Levene, Brown and Forsythe tests. Levene (1960) proposed a robust estimation test for equality of variances in the heteroskedasticity test when alternative formulations of the test statistic are not normally distributed. This test was proposed by more robust estimators instead of the mean (Brown and Forsythe, 1974). Levene Brown and Forsythe heteroskedasticity hypothesis test is established as "H0: There is no heteroskedasticity in the model" (Yerdelen Tatoğlu, 2020a).

Bhargava, Franzini and Narendranathan's Durbin-Watson test is used to determine whether there is an autocorrelation problem in regression models. Bhargava et al. (1982) also generalize Durbin-Watson-type statistics to test for residuals in a regression model. The null hypothesis of the test is "H0: ρ=0 (no autocorrelation)" ((Bhargava et al., 1982) Bhargava et al. A Durbin-Watson test statistic less than 2 is interpreted as an autocorrelation problem in the model (Yerdelen Tatoğlu, 2020a). For the random effect model, Pesaran, Friedman and Frees tests were used for the inter-unit correlation test. In the study, the results of the inter-unit correlation test statistic developed by Frees (1995-2006) are interpreted. Frees proposes a test based on the mean square of Spearman's rank correlation coefficient (Frees, 2006). The test hypothesis is H0: ρij=0 There is no correlation between units (Frees, 1995). The results of the three hypothetical tests analyzed for the random impact model are described in Table 6.

Table 6. Results of Assumption Tests

		Model T	**Model K**	**Model U**
Heteroskedacity Testing	The Test of Levene, Brown and Forsythe	4.87***	3.20***	4.89***
Autocorrelation Test	Bhargava, Franzini and Narendranathan's Durbin-Watson Test	1.10	1.38	1.14
Inter-Unit Correlation Test	Frees Test	0.89***	1.21***	0.85***

Note: *** describes the %1 significance level. **, inter-unit correlation alpha critical values: alpha 0.10:0.35; Alpha 0.05:0.49; Alpha 0.01:0.76)

Levene, Brown and Forsythe's heteroskedasticity test rejected the null hypothesis. In all three models, heteroskedasticity, that is, the problem of variable variance, was detected. The Durbin-Watson autocorrelation result

Araştırma Makalesi
DOI:10.47147/ksuiibf.1379933
Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

shows that the values are less than 2 and the null hypothesis is rejected. Autocorrelation problem is detected in T, K and U regression models. The null hypothesis is rejected since the results of the Frees test to test the existence of correlation between the units are greater than the alpha critical values. This result indicates that there is a correlation problem between the units in the model.

In the three regression models established to determine the capital structure development with TBO, CVBO and UVBO dependent variables, it is found that there are problems of variance, autocorrelation and inter-unit correlation. In order to eliminate these three problems, regression models were constructed and analyzed with the Driscoll-Kraay Robust estimator test. The Driscoll-Kraay estimator proposes a simple modification of the standard parametric time series covariance matrix estimator that overcomes the shortcomings of techniques based on time dimension (T) asymptotic. It allows the construction of a covariance matrix estimator that is robust to very general forms of spatial and periodic dependence, especially when the time dimension grows.

$Y_{it} = \beta X_{it} + \varepsilon_{it}$ panel data regression model *(i=1,... N; t=1,... T*) is an estimator used in cases where there is heteroscedastic, cross-sectional, and periodic correlation of the data set (Driscoll & Kraay, 1998).

Table 7. Driscoll-Kraay Resistive Panel Regression Estimator

	Model T	**Model K**	**Model U**
CO	-0.14***	-0.12***	0.01
VY	0.19	-0.12***	0.54**
BDVK	-0.08	-0.03	-0.09
VER	-0.08***	0.00	-0.08**
KAR	0.57*	0.40***	0.03
AD	-0.06***	-0.04***	-0.01**
LAKTIF	0.00	0.00	0.00
FR	-0.00	0.00***	-0.00**
SE	0.10**	0.02*	0.08**
CRIS	-0.00	-0.00	-0.01
Constant	0.51***	0.4620**	-0.05
Wald Probability	286.17***	6184.97***	1013.65***
R^2	0.20	0.42	0.18

Note: *** p <0.01, ** p <0.05, * p <0.10.

According to the results presented in Table 7, the T, K and U regression models tested with the robust estimator are statistically significant. When the R^2 values of the models are analyzed, it is determined that the explanatory power of the T model is 20%, the explanatory power of the K model is 42% and the explanatory power of the U model is 18%.

Araştırma Makalesi
DOI:10.47147/ksuiibf.1379933
Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

According to the results of Model T, current ratio, tax, asset turnover ratio and firm risk have a statistically significant and negative effect on total debt ratio. A 1-unit increase in CO, VER, AD and FR decreases the total borrowing ratio. Profitability ratio has a positive and statistically significant effect on total debt ratio. A 1-unit increase in the profit ratio increases the TB ratio. The dummy variable created for the period in which companies are included in the sustainability index has a statistically significant and positive effect on the total debt ratio. The inclusion of companies in the sustainability index increases the TB. The CRIS variable, in which Covid 19 pandemic and exchange rate crisis periods are set as dummy variable to avoid deviations in the analysis estimation results, is not statistically significant for all three models.

CO, VY and AD ratios have a statistically significant and negative effect on short-term debt ratio. The dummy variables KAR, FR and SE positively affect the short-term borrowing ratio and are statistically significant. While a 1-unit increase in CO, VY and AD decreases STLRs, a 1-unit increase in CAR, FR and SE increases STLRs.

Asset structure and Sustainability dummy variable have a statistically significant and positive effect on long-term debt ratio. A 1-unit increase in VY and SE increases UVBOs. Tax, change in assets and firm risk ratios affect long-term debt ratio negatively and are statistically significant. A 1-unit decrease in VER, AD and FR decreases UVBOs.

5. RESULTS

Within the scope of the study, it has been determined which finance theory is compatible with the borrowing behavior and capital structure decisions of 40 companies operating continuously in the BIST Sustainability Index between 2005-2021. In the literature, borrowing behaviors are generally tested within the scope of pecking order theory and trade-off theory. In this study, the appropriateness of these two theories for the companies in the BIST Sustainable Index is examined. The dependent variable of borrowing behavior is used in three different models: total debt ratio, short-term debt ratio and long-term debt ratio. Profitability, liquidity, non-debt tax shield, tax, firm risk, growth rate, growth and asset structure are used as independent variables. In addition, a dummy variable was added to the model by assigning a value of 1 to the period when the firms were included in the BIST Sustainable Index and 0 to the other periods. Panel data regression analysis was conducted in the study. F test, Breush-Pagan LM test and Hausman test were conducted to determine the most appropriate panel regression model for the models established with total debt ratio, short-term debt ratio and long-term debt ratio. As a result of these three tests, it is decided that the random effect regression model is appropriate. The random effect model was analyzed for heteroskedasticity, autocorrelation and inter-unit correlation problems. Heteroskedasticity, autocorrelation and inter-unit correlation problems were detected in all three models and the models were estimated with the Driscoll-Kraay Resistive estimator to eliminate the problem.

As a result of the Driscoll-Kraay regression estimator, it is found that the liquidity ratio has a negative effect on total debt and short-term debt ratio and

Araştırma Makalesi
DOI:10.47147/ksuiibf.1379933
Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

the effect is consistent with the pecking order theory. With this result, it is revealed that firms in the sustainability index prefer to borrow less as their liquidity strength increases. This implies that the company can meet its operations and investments with its own cash and cash equivalents. The increase in total debt and short-term debt ratios as the profitability of the firm increases is consistent with the trade-off theory.

The effect of profitability ratio on total debt ratio and short-term borrowing ratio is positive and consistent with the trade-off theory. Firms that want to increase their profitability are expected to borrow more in order to benefit from the tax shield. Moreover, firms with higher profitability will have lower financing costs when their debt coverage ratio is higher. While the effect of firm risk ratio on short-term debt is positive, its effect on long-term debt ratio is negative. While the short-term debt ratio of high-risk firms increases, the long-term debt ratio decreases. This result suggests that risky firms prefer short-term borrowing or have difficulty in finding long-term debt.

Firms' asset structure has a negative effect on short-term debt and a positive effect on long-term debt ratio. Firms with more tangible assets are found to prefer more long-term debt, which is consistent with the trade-off theory. In addition, contrary to the trade-off theory, firms with more tangible assets prefer less short-term debt. The effect of firms' growth rate on borrowing rates is negative and consistent with the trade-off theory. It is concluded that firms with higher growth rates borrow less to avoid bankruptcy risk.

A positive and statistically significant relationship is found on the borrowing behavior of the dummy variable created for the periods when the companies are included in the sustainability index. This result is interpreted as an increase in firms' debt ratios after their inclusion in the index. The table below summarizes the results of the pecking order theory and trade-off theory literature on capital structure decisions and the results obtained from the study.

Table 8. Theoretical Predictions and Results of Models

	Theoretical Predictions		Direction of the Relationship		
	Trade-off theory	Pecking order theory	Total debt ratio	Short-term debt ratio	Long-term debt ratio
Profitability	-	+	+	+	Meaningless
Size	+	-	Meaningless	Meaningless	Meaningless
Growth Rate	-	+	-	-	-
Liquidity	+	-	-	-	Meaningless
Firm Risk	-	-	Meaningless	+	-
Asset Structure of Firms	+	-	Meaningless	-	+
Non-Debt Tax Shield	-	+	Meaningless	Meaningless	Meaningless

Araştırma Makalesi
DOI:10.47147/ksuiibf.1379933
Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

As a result, while the effect of liquidity ratios of firms in the sustainability index on debt is consistent with the pecking order theory, variables such as profitability and growth rate are generally consistent with the trade-off theory. In other words, the capital structure preferences of firms in the sustainability index were found to support the trade-off theory (Abdioğlu, 2019; Lindkvist and Saric, n.d.; Tunçel and Yılmaz, 2020). Sustainable firms that act in accordance with the trade-off theory form their borrowing ratios by taking into account the costs of financial distress while financing sustainable activities that require additional resources.

Araştırma Makalesi
DOI:10.47147/ksuiibf.1379933
Makale Geliş- Kabul Tarihi: 23.10.2023- 29.12.2023

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