TÜRKİYE SOSYAL ARAŞTIRMALAR DERGİSİ

Türkiye Sosyal Araştırmalar Dergisi * 2024 * Cilt: 28 * Sayı: 1 * (113-128)

The Impact of Capital Structures on Firm Performance: Empirical Evidence From BİST Basic Metal Index

Sermaye Yapısının Firma Performansına Etkisi: BİST Ana Metal Endeksi Üzerine Bir Uygulama

Fatih KONAK[*] Diler TÜRKOĞLU[**]

Article Information

Submission: 13.04.2023
Acceptance: 15.07.2023

Doi:
10.20296/tsadergisi.1282720

Key Words:
BIST basic metal index,
Capital structure,
Firm performance

ABSTRACT

To improve a company's financial performance, produce more accurate future forecasts, and support decision-making, it is essential to assess various components both collectively and individually, managing processes accordingly. The research aims to explore how capital structure variables impact firm performance measures, an essential consideration for enhancing a company's financial performance, making accurate future projections, and supporting decision-making processes. To achieve this, panel data analysis was utilized, focusing on data from 17 companies that consistently maintained data over the designated period. This sector was chosen for its dominant role in Türkiye's production activities, significant impact on other industries, and strategic importance to the national economy. The study's findings reveal that the Equity/Total Assets Ratio shows statistically significant values across all three models examined, while the impact of other variables on performance measures appeared to be negligible. Consequently, this suggests a correlation between firms' performance criteria and their capital structure choices. The study proposes that this set of information could be valuable for market participants in their decision-making processes.

Article Information

Geliş: 13.04.2023
Kabul: 15.07.2023

Doi:
10.20296/tsadergisi.1282720

Anahtar Sözcükler:
BIST ana metal endeksi,
Sermaye yapısı,
Firma performansı

ÖZET

Firmaların finansal performanslarının geliştirilmesi, geleceğe yönelik tahminlerin daha gerçekçi yapılabilmesi ve karar süreçlerinin desteklenebilmesi amacıyla birçok farklı faktör bir arada ve ayrı ayrı analiz edilmeli süreçler bu şekilde yönetilmelidir. Bu kapsamda, çalışmanın temel amacı 2011-2021 yılları arasında Borsa İstanbul Ana Metal Endeksi'nde yer alan firmalarda, sermaye yapısı çerçevesinde değerlendirilebilecek değişkenlerin firma performans üzerindeki olası etkisini ortaya koymaktır. Bu doğrultuda, belirlenen dönem içerisinde veri devamlılığı sağlayan 17 şirket analize dâhil edilirken, tahmin yapabilmek için Panel Veri Analizi yöntemi kullanılmıştır. Türkiye'de ana metal sanayi sektörünün üretim faaliyetlerinde ön planda yer alması, diğer sektörler üzerindeki yoğun etkisi ve ülke ekonomisi açısından stratejik bir öneme sahip olması, bu sektörün araştırmaya konu edilmesinin altındaki ana motivasyon kaynaklarıdır. Elde edilen bulgulara göre, Özkaynak/ Toplam varlıklar oranının üç modelde de istatistiksel olarak anlamlı değerler sergilediği tespit edilmiştir. Diğer değişkenlerin ise, performans ölçütleri üzerindeki etkilerinin anlamlı olmadığı görülmüştür. Sonuç olarak, firmaların performans ölçütleri ile sermaye yapısı tercihleri arasında ilişki olduğu gözlemlenirken, piyasa katılımcıları açısından bu bilgi setinin karar süreçlerinde dikkate alınabileceği iddiası sunulmaktadır.

Atıf İçin

Konak, F. & Türkoğlu, D. (2024). The impact of capital structures on firm performance: Empirical evidence from BİST basic metal index. *Türkiye Sosyal Araştırmalar Dergisi, 28*(1), 113-128. doi: 10.20296/tsadergisi.1282720

[*] Prof. Dr., Hitit Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İşletme Bölümü, Çorum, fatihkonak@hitit.edu.tr, ORCID: https://orcid.org/0000-0002-6917-5082
[**] Dr., Bağımsız Araştırmacı, Samsun, diler.turkoglu@samsun.edu.tr, ORCID: https://orcid.org/0000-0001-5247-1590

INTRODUCTION

The capital structure, defining the mix of resources utilized in corporate finance, outlines the strategies a finance manager employs for resource allocation in corporate finance activities (Sayılgan, 2019: 325). The overarching aim for any company and its financial leadership is to enhance the current market value of the firm and the immediate wealth of its shareholders, adhering to predetermined policies. Making optimal decisions within the capital structure framework is a fundamental challenge companies encounter in striving towards this goal. Specifically, a pivotal decision in financial policy involves determining the distribution of long-term liabilities and equity on the liabilities side of the balance sheet (Ercan and Ban, 2018: 227). Financial leverage reflects the extent of debt incorporated into a company's capital structure, indicating that a company's financial leverage escalates as it utilizes more debt to finance its assets (Cornett et al., 2016: 57).

By utilizing the financial leverage factor, the company may, by the traditional capital method, lower its cost of capital and enhance its value; nevertheless, it should be emphasized that in this case, borrowing is not limitless (Sayılgan, 2019: 336). The financing of corporate assets with greater debt contributes to improving the profit per share of the companies, particularly during prosperous times when sales grow or in inflationary circumstances. Since when a company uses debt financing, the number of shares cannot vary, and the profit per share is raised by dividing the increased company profit by the same number of shares (Saylgan, 2019: 329). Companies also find the possibility of paying less tax in the same operational volume since the cost of debt is lower than the cost of equity and interest expenses may be subtracted from the operating profit in the income statement (Kılıç and Alp, 2021: 66) Toto increase shareholder wealth, which is a company's primary goal, reasonable outcomes can thus be attained. Yet, the most crucial need for this is that the debt utilized must provide a company with a profit that is greater than its financial costs (Akgüç, 1998: 139).

The purpose of this study is to investigate any potential effects of the capital structures of the companies listed in the Borsa Istanbul Basic Metal Index between 2011 and 2022 on the performance of the company. To accomplish this, panel data analysis is being used. The main driving force for working with companies in the basic metal industry sector is that, despite production being heavily dependent on finite resources, it has a significant impact on economic growth since it impacts a sizable sector group (Akdoan et al. 2019: 3). The utilization of basic metals in many manufacturing sectors demonstrates the need for this sector to have a high level of resilience to competition. It is common knowledge; a firm must have strong financial standing to be successful. This calls for exceptionally thorough examination and performance evaluation of companies (It et al. 2017: 84). Hence, a finance manager's management strategy, which strives to increase the firm's worth and shareholders' wealth, is successful in assessing the performance of the subject company, managing it, and afterward making decisions regarding its future.

Evaluations of the Basic Metal Industrial sector in Türkiye will be made in this context, particularly about the research's focus. Academic studies that are developed within the context of the study's emphasis will be included in the following phase. After describing the dataset and the technique used in the study, analysis, and assessment, cements will be made. The research comes to an end with the conclusion section when the overall assessments are made.

BASIC METAL INDUSTRY IN TÜRKİYE

The basic metal industry is crucial to economic growth since it contributes to a variety of industries and relies heavily on scarce natural resources for manufacturing. In this situation, the sector's dynamics of growth and export have a substantial effect on the overall economy. This is why policymakers that are pursuing balanced and sustainable growth constantly monitor sector trends (Akdoğan et al., 2019: 2). The growth of the basic metal industry, one of the key sectors leading to Türkiye's development, is at the forefront of innovations in the fields of construction, chemical,

energy, automotive, and sectoral investments, particularly in the field of iron and steel (Yıldız, 2019). It is possible to determine the degree of importance of a sector by its contribution to employment, its shares in exports, and production factors (Hirschman, 1958: 124). Furthermore, the manufacture of metal for use in manufacturing facilities is a component of the base metal industry. Metal is commonly utilized in the construction sector, as well as in the fabrication of machinery and various constructions. Equipment used in the armaments industry, medical devices, and automobile parts and equipment are all made of metal. The most often utilized metal components are welding wire, structural steel, pipe stock, castings, and sheet metal. Manufacturing and machinery manufacturing companies are included as part of the basic metal industry (Bozkurt & Nayc, 2021: 180). The following developments can be identified as having both beneficial and negative effects on the basic metal industry (Zden and Haçikolu, 2017):

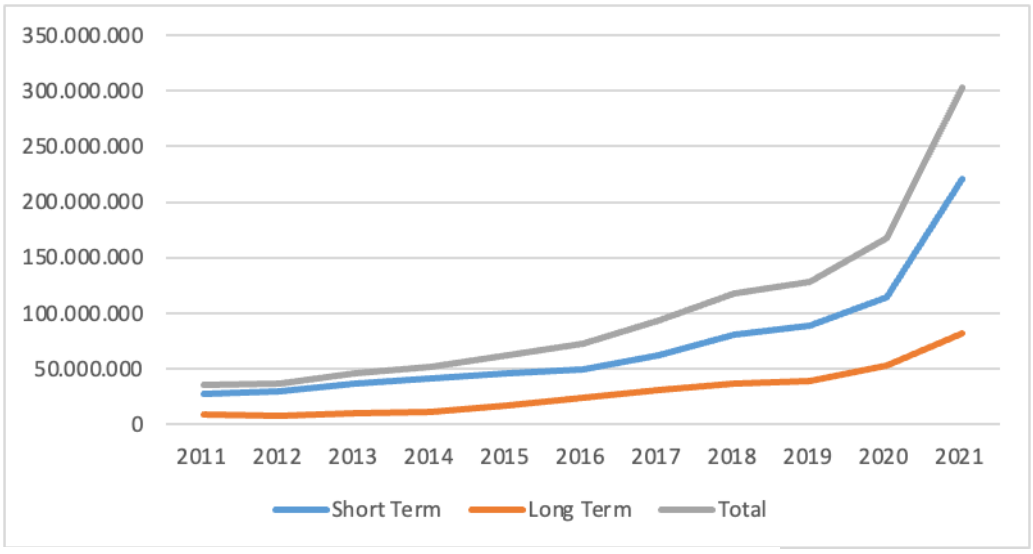
Beneficial Developments:

- The economies of China and the European Union are strengthening,
- In India, Malaysia, and Indonesia, consumer demand has risen,
- Intensification of public investments,
- The sector's competitiveness environment's suitability (away from the monopolistic structure)
- Expansion of the basic metal industry sector's usage area
- It may be categorized as the rate of urbanization and population expansion.

Conditions that have an adverse influence on the sector's development:

- Absence of a system for avoiding price hikes
- Uncertainty in neighboring nations' politics
- Increased lending expenses and high-interest rates
- Making stocks vulnerable to metal price fluctuations
- Currency risk (imports with USD loans while TL depreciates)
- Low capital accumulation and ineffective use of capitalization methods
- Due to the scarcity of substantial industrial facilities.

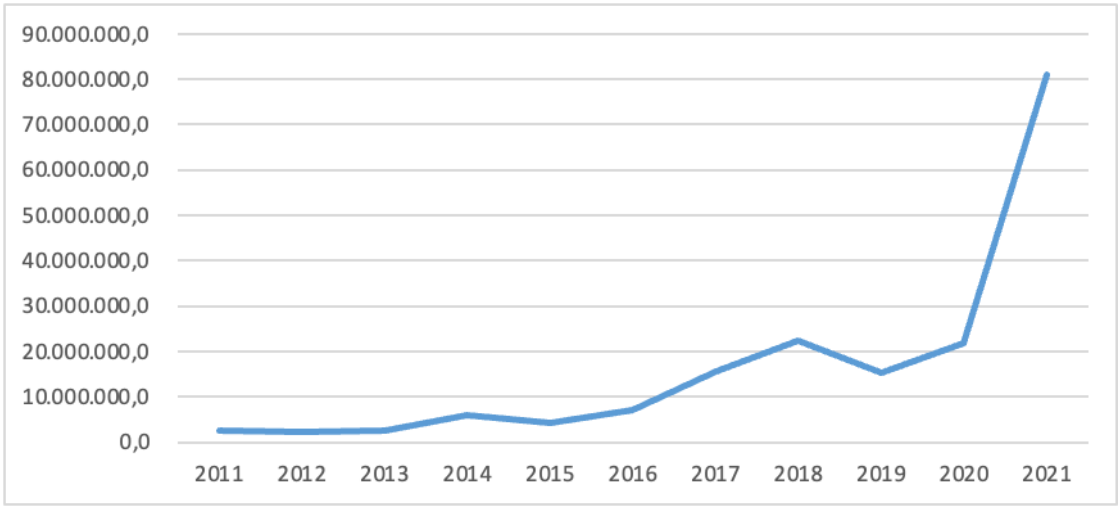
Chart 1. Long and short-term debts of the basic metal industry sector between 2011-2021 (Thousand TL)



Source: Created by the authors with data obtained from the CBRT

The financial sheets of the companies in the basic metal industrial sector from 2011 to 2021 are illustrated in Chart 1 along with their debt levels. Data from the sector balance sheets of the Central Bank of the Republic of Türkiye demonstrate that borrowing amounted to 36.170.186 TL in 2011, of which 27.058.879 TL was for short-term borrowing and 9.111.307 TL was for long-term borrowing. Analysis of the entire loan amount reveals substantial growth, particularly in 2020 and 2022. At this point, the rates of expansion were 30% and 81%, respectively, without discounting the reality of the consequences of inflationary pressure. Overall, it has been shown that during the past ten years, borrowing in the basic metals industry has climbed by 738%.

Chart 2. Net profit of the Metal Industry Sector for the period 2011-2021 (Thousand TL)



Source: Created by the authors with data obtained from the CBRT.

The profitability statistics for the companies in the basic metal industry sector from 2011 to 2021 are displayed in Chart 2. It is intriguing to note that the net profit levels differ when the income statements for the aforementioned industry are examined. With the investment incentives put in place in 2016, it can be argued that the profitability level, which fell by 38% in 2015, brought the basic metal sector to its former glory. A total of 24.4 billion TL was invested in the industrial sector over the previous year (TC Ministry of Economy, 2016). Although the Covid-19 pandemic was revealed to have caused a 47 percent decline in 2019, the profitability rates in the industry began to rebound with an increase of 30% in 2020 and 73% in 2021 after this hiatus. According to the Ministry of Industry and Technology's data on investment incentives, 295,388 million TL in investment incentives were provided in 2021, and a total of 277,723 million TL in 2020. As investment incentives grow, employment rises along with them. When profitability dropped off most significantly in 2019, 154.410 million TL was invested, yet only 129.862 people were employed in that industry (T.R. Ministry of Industry and Technology, 2023). The basic metal sector is one of the key elements of a nation's financial growth in terms of its influence on its economy. At times of economic crisis, the sector's contraction has a detrimental impact on employment and the economy (Şengül, 2020: 161).

LITERATURE REVIEW

A rise in financial leverage's impact on firm value in South African-based companies was the focus of Rayan's (2008) research. 113 companies trading on the Johannesburg Stock Exchange were categorized into different categories and then added to the regression analysis model. Therefore, it was discovered that the company value was adversely correlated with an increase in the financial leverage ratio.

Using the TOPSIS technique, Uygurtürk and Korkmaz (2012) examined the firm performance of firms in the basic metal industry from 2006 to 2010. According to the study's findings, the performance scores of the firms varied during the course of the analysis period. Similar to the above, Şengül (2020) used the Data Envelopment Analysis approach to evaluate the performance of basic metal sector businesses traded on the BIST between 2010 and 2018. In the research, output variables such as net income, return on equity, net profit margin, and Tobin's Q were assessed, while input variables such as liquidity ratio, current ratio, total debt/equity, and total assets were also determined. According to the observation and experimentation, there was a declining trend in the efficiency ratings of the companies between 2012 and 2018.

Uluyol et al. (2014) conducted a study on firms listed on Borsa Istanbul across various sectors including information technology, food, mining, textile, and construction, using quarterly data spanning from 1991 to 2012, to assess the impact of the financial leverage ratio on equity profitability. Incorporating variables such as Return on Equity and Financial Leverage Ratio, the research employed co-integration tests and the ARDL method for analysis. The findings indicated that, except for the construction sector, the financial leverage ratio adversely affected equity across industries. Conversely, in the construction sector, a positive and statistically significant influence of financial leverage ratio was observed. Similarly, Omağ (2015) analyzed the effect of financial leverage levels on companies in the manufacturing sector, focusing on industries producing furniture, textiles, paper, and electrical devices. This analysis, covering the years 2009 to 2013, utilized data from firms' income statements, calculating financial leverage based on operational earnings and financing costs of the sector's firms. The study concluded that the textile and paper manufacturing sectors benefit most from financial leverage.

Mule and Mukras (2015) analyzed annual data from 2007 to 2011 to explore the relationship between financial leverage and the financial performance of publicly traded companies in Kenya. Their research demonstrated that financial leverage significantly adversely affects financial performance indicators, specifically Return on Assets (ROA) and Tobin's Q. The study incorporated variables such as financial leverage, ROA, Return on Equity (ROE), Tobin's Q, the ratio of fixed assets to total assets, and the companies' ownership structure. Additionally, Javed et al. (2015) employed the least squares method to evaluate the effectiveness of financial leverage among textile companies listed on the Pakistan Stock Exchange over the period from 2006 to 2011. Their findings corroborate the view that financial leverage negatively influences corporate productivity.

Caba (2017) examined how the financial performance of 136 companies quoted on the BIST Industrial Index was impacted by company size and financial leverage. The debt/equity ratio, total assets, and total sales were used as independent variables in this context's multiple regression model, while net profit margin, ROA, ROE, ROCE, and economic profitability were chosen as the model's dependent variables. Financial leverage and business size are considered to have an impact on the financial performance of the firms when the analysis' conclusions are evaluated.

Onyenwe and Glory (2017) evaluated into how 13 deposit banks listed on the Nigerian Stock Exchange's financial leverage ratios affected bank performance. The data gathered through the yearly reports of the firms were evaluated using the least squares method in the analysis, which considers debt ratio, debt/equity ratio, and interest coverage ratio as the indicators of financial leverage. Financial leverage has a positive impact on profitability and productivity, according to empirical findings. Moreover, to assess the variables impacting the profitability performances of banks, Türkdönmez and Babuşçu (2019) conducted an assessment in two separate frames as internal and external factors between 2010 and 2017. Consequently, a positive and substantial correlation between equity/total assets and ROE was determined.

Dalci (2018) delved into the effects of financial leverage on the profitability of Chinese manufacturing companies using the two-stage Generalized Moments Method for analysis. The study, which examined annual data spanning from 2008 to 2016, revealed an inverted U-shaped

relationship between financial leverage and financial performance. This relationship suggests that financial leverage initially benefits profitability and offers tax shelter advantages, but its negative effects become more pronounced due to factors such as bankruptcy costs, financial crises, agency problems, and information asymmetry. In a similar vein, Rahman et al. (2020) explored the influence of financial leverage on firm profitability within Bangladesh's listed textile industry, using return on equity (ROE) as the profitability metric. The study employed both short-term and long-term debt as indicators of financial leverage. Applying Pooled Ordinary Least Squares (OLS), Fixed Effect (FE), and Generalized Moments Method (GMM) models, the research found that a firm's capital structure negatively impacted its profitability, underscoring the complex dynamics between financial leverage and firm performance.

Evgeny (2020) investigated how the financial leverage and company performance of companies quoted on the Russian Stock Exchange were linked. Although return on assets, return on equity, and operating margin are considered as firm performance indicators, the ratio of a firm's debt to total assets is used to gauge financial leverage. Analyzing the data from 2004 to 2013 reveals that financial debt has a severe impact on the performance of Russian companies. From a different angle, Das (1995) reached the opinion that the effect of firm age on company performance in developing economies is positive in his research of the Indian computer hardware industry. In a similar vein, Shanmugam and Bhaduri (2002) examined the correlation between company performance and firm size of 392 manufacturing firms. Therefore, it has been discovered that a company's age positively affects its performance.

DATASET AND METHODOLOGY

By employing panel data analysis, this study aims to shed light on any potential impact of the financial structure of the firms listed in the Borsa Istanbul Basic Metal Index between 2011 and 2022 on the performance of the company. In this context, Return on Assets, Return on Equity, and Tobins' Q metrics are selected as the independent variables, while Financial Leverage, Long Term Liabilities/ Total Assets, Short Term Liabilities/ Total Assets, Equity/ Total Assets, Total Sales, and Firm Age are chosen as the dependent variables. The calculating method and acronyms for the variables listed in Table 1 are presented.

Table 1. *Dependent, Independent, and Control Variables*

Variables	**Variables Abbreviations**
Dependent Variables	
Return on Assets (Net Profit/Total Assets)	ROA
Return on Equity (Net Profit/Equity)	ROE
Tobins'Q (Market Cap+Total Debt)/Total Assets	TQ
Independent variables	
Financial leverage (Total Liabilities/Total Assets)	FLEV
Long-Term Liabilities /Total Assets	LTLTA
Short-Term Liabilities /Total Assets	STLTA
Equity/Total Assets	EQTA
Control Variables	
Sales (ln(Sales))	SALE
Firm Age	AGE

Net profit is generated by proportioning the nominal, paid, effective, and equity capital that the company has when determining the link between a firm's profit and capital structure, or its financial profitability (Aydın et al. 2017: 110). Return on Assets is a statistic that assesses the profit a company makes from its assets while accounting for financial leverage and tax liabilities (Cornett et al, 2016: 57). The ratio of the change in return on equity or profits per share to the relative change in EBIT can be used to describe the level of financial leverage (Akgüç, 1998: 139). Returns on assets and equity are inversely correlated with financial leverage. Even if this suggests that companies borrow less, a positive association between enterprises and the market-book value ratio could be observed. As just a consequence, companies typically take on additional debt and make contractual payments on schedule (Javed et al., 2015). In addition to these, sales and firm age are included in the analysis as control variables even though the ratios of Longe Term Liabilities /Total Assets, Short Term Liabilities /Total Assets, and Equity/Total Assets (equity density) are thought of as independent variables.

The potential effects of the factors under consideration on the chosen performance indicators were investigated using panel data analysis. With the models shown below, it has been attempted to determine the link between company performance and independent variables.

(Model 1)

$$ROA_{it}= \alpha_{0it}+ \beta 1FLEV_{it}+ \beta 2LTLTA_{it}+ \beta 2STLTA_{it}+ \beta 3EQTA_{it} + \beta 4SALE_{it} + \beta 5AGE_{it} + \varepsilon_{it}$$

(Model 2)

$$ROE_{it}= \alpha_{0it} + \beta 1FLEV_{it}+ \beta 2LTLTA_{it}+ \beta 2STLTA_{it}+ \beta 3EQTA_{it} + \beta 4SALE_{it} + \beta 5AGE_{it} + \varepsilon_{it}$$

(Model 3)

$$TQ_{it}= \alpha_{0it} + \beta 1FLEV_{it}+ \beta 2LTLTA_{it}+ \beta 2STLTA_{it}+ \beta 3EQTA_{it} + \beta 4SALE_{it} + \beta 5AGE_{it} + \varepsilon_{it}$$

In the aforementioned Model 1-3, α_0 represents the constant term in the regression, β_1- β_5 refers to the coefficient expressing the effect of independent variables on financial performance, and ε_{it} denotes the error term. Information on the abbreviations of the variables between Models 1- 3 is shown in Table 1.
The research's hypothesis construct is established considering the models developed as follows:

H_0: There is no correlation between the performance of the company and the indicators of its capital structures.

H_1: There is a link between the indicators of a company's capital structure and its performance.

The H_0 hypothesis will be rejected and the H_1 hypothesis accepted if the independent variables demonstrate a statistically significant outcome.

FINDINGS AND ANALYZES

The panel data analysis method was utilized to investigate the influence of capital structures on the performance of companies listed in the BIST Basic Metal Index from 2011 to 2021. The initial phase of the research involves presenting descriptive statistics and correlation results for the variables considered in this segment. Subsequently, after assessing the available data, a suitable model from the range of panel data models is selected based on its efficiency. Following the verification of the essential model assumptions, a robust estimator is applied for the analysis. Descriptive statistics pertaining to the variables of this study are provided in Table 2.

Table 2. *Descriptive Statistics Data of Variables*

	ROA	ROE	TQ	FLEV	LTLTA	STLTA	EQTA	SALE	AGE
Mean	6.658	13.59	0.226	32.00	0.130	0.189	0.436	13.378	21
Median	5.835	7.15	0.195	31.92	0.126	0.147	0.421	13.516	22
Maximum	43.54	1235.5	0.82	77.71	0.577	0.729	0.915	18.034	35
Minimum	-12.630	-173.14	0.000	0.000	0.000	0.000	0.000	8.307	1
Std. Dev.	8.126	97.16	0.159	18.10	0.108	0.150	0.187	2.024	7.89
Skewness	0.955	11.322	1.124	0.361	0.996	1.024	0.280	-0.282	-0.279
Kurtosis	5.649	143.91	4.651	2.760	4.811	3.648	3.123	2.541	2.47
Jarque-Bera	78.26	1495.3	57.072	4.256	53.188	33.843	2.427	3.874	4.307
Probability	0.000	0.000	0.000	0.119	0.000	0.000	0.297	0.144	0.116
Observations	176	176	176	176	176	176	176	176	176

Table 2 presents descriptive statistics for 176 observations, including an examination of the significance levels for the normal distribution. The analysis identifies the mean, median, maximum, and minimum values of the variables under consideration, alongside the skewness and kurtosis levels of the series employed in the study. Descriptive statistical data for both dependent and independent variables relevant to the research scope were also established.

Table 3. *Correlation Matrix of Variables*

	ROA	ROE	TQ	FLEV	LTLTA	STLTA	EQTA	SALE	AGE
ROA	1								
ROE	0,2606	1							
TQ	-0,1844	-0,0978	1						
FLEV	-0,3408	0,1071	0,0797	1					
LTLTA	-0,2293	0,2918	0,1372	0,5597	1				
STLTA	-0,2459	-0,0808	-0,0026	0,5829	-0,0446	1			
EQTA	0,4661	-0,0602	-0,1680	-0,7812	-0,4595	-0,6112	1		
SALE	0,2394	0,0628	-0,2125	-0,0729	0,1026	-0,1617	0,0331	1	
AGE	0,0997	0,1031	-0,1733	0,2096	-0,0435	0,2840	-0,2904	0,5440	1

Table 3 displays the direction and strength of the relationship between the dependent and independent variables through a correlation matrix. This matrix was constructed with consideration for the possibility that significant correlations among variables could affect the model's explanatory capability and the integrity of the data set. The values indicate that the connections between the variables are not overly strong in either positive or negative directions. Specifically, because the correlation coefficients are below the recommended critical threshold of 0.80, they do not pose an issue for concern (Gujarati & Porter, 2009).

Table 4. *Panel Data Model Selection Criteria*

Models	Basic Assumption Tests	Test Statistics (Probability)	Hypothesis	Outcome
Model 1 (ROA Dependent Variable)	F (Chow) Testi	6,13 (0.000)	H0: Pooled Model Valid H1: Fixed Effects Model Valid	Fixed Effects Applicable
	Breusch-Pagan Testi	17,65 (0.000)	H0: Pooled Model Valid H1: The Random Effects Model Is Valid	Random Effects Applicable
	Hausman Testi	12,6 (0,0056)	H0: The Random Effects Model Valid H1: Fixed Effects Model Valid	Fixed Effects Applicable
Model 2 (ROE Dependent Variable)	F (Chow) Testi	1,87 (0,0303)	H0: Pooled Model Valid H1: Fixed Effects Model Valid	Fixed Effects Applicable
	Breusch-Pagan Testi	0,8 (0,1851)	H0: Pooled Model Valid H1: The Random Effects Model Is Valid	Pooled Model Valid
	Hausman Testi	6,73 (0,1509)	H0: The Random Effects Model Valid H1: Fixed Effects Model Valid	Random Effects Applicable
Model 3 (Tobins' q Dependent Variable)	F (Chow) Testi	0,97 (0,0486)	H0: Pooled Model Valid H1: Fixed Effects Model Valid	Fixed Effects Applicable
	Breusch-Pagan Testi	12,46 (0,035)	H0: Pooled Model Valid H1: The Random Effects Model Is Valid	Random Effects Applicable
	Hausman Testi	5,42 (0,24)	H0: The Random Effects Model Valid H1: Fixed Effects Model Valid	Fixed Effects Applicable

The panel data model selection criteria are listed in Table 4. The F (Chow) Test, Breusch-Pagan Test, and Hausman Test, respectively, were used to test each of the three dependent variables to choose the appropriate model to use with the variables, the F (Chow) test is run. Table 4 demonstrates that the fixed effects model is appropriate for all three variables. The Breusch-Pagan Test is another method for determining if dependent variables in a regression model are appropriate considering random effects or the pooled model. The findings for the pooled model in the ROE variable and the results for the random effects model in the ROA and Tobin's Q variables are shown in the table. According to the final Hausman test results, when Model 1 is reviewed, it becomes clear that ROA should be modeled using the fixed effects model, ROE should be modeled by using the random effects model in Model 2, and Model 3 should be modeled through using fixed effects model as Tobin's Q performance criteria are implemented in that model.

Table 5. *Fixed and Random Effects Test Results for Models*

Variables		Fixed Effects ROA	Random Effects ROE	Fixed Effects Tobins'q
FLEV		-25.855	-10.655	-2.151
		(117.2)	(211.3)	(-3.515
LTLTA		25.95	14.113	215.1
		(142.21)	(18.415)	(351.5)
STLTA		-5,763	10.152	214.9
		(-28,29)	(19.746)	(351.5)
EQTA		17.63***	60.687**	-0.267***
		(-8.317)	(71.194)	(0.0989)
SALES		0.643	-4.687	-0.0128*
		(0.528)	(6.339)	(0.00730)
AGE		0.128*	2.889*	-0.00249
		(0.142)	(1.641)	(0.00196)
Constant		-14.38***	-47.236	0.607***
		(-5.734)	(35.114)	(0.105)
Observations		176	176	176
R-squared		0.292	0.3034	0.181
Key Assumption Tests for Panel Data Models				
Variance Variation	Levene, Brown, and ForsytheTest	7.663***	4.448***	2.356***
Autocorrelation	Bhargava etc.DW	1.285	1.759	1.647
	Baltagi-Whu LBI	1.588	0.855	1.824
Cross-Section Dependence	Frees	0.558	1.175	0.648

Frees 0.01 and 0.05 critical values respectively 0.464 and 0.310

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The findings of the fixed and random effects determined for the models are summarized in Table 5, which was developed from the data collected from Table 4. The equity/total assets ratio is shown to be statistically significant at the 1% level and positive based on the findings of the fixed effects test applied to the ROA variable. Similarly, it was demonstrated that the equity/total asset ratio was once again positively significant at the 5% level on the dependent variable of ROE in Model 2, where the random effects model is dominating. It was observed that the equity/total asset ratio on Tobin's'Q was negative and at a 1% significant level in Model 3, where the fixed effects model is dominating. Apart from these, it should be emphasized that no other independent factors had statistically significant outcomes. On the other hand, it was found that Models 1 and 2 had positive and statistically significant age variables, which is one of the control variables.

Basic Assumption Testing for Panel Data Models is also contained in Table 5. Applying these tests is done to determine whether the series has issues with cross-section dependency, autocorrelation, or variable variance. The existence of the variance variation problem in the series shines out, according to the outcomes of the Levene, Brown, and ForsytheTest changing variation variance test. It is noteworthy that there is an autocorrelation problem in the series based on the findings of Bhargava etc. DW and Baltagi-Whu LBI were used to determine the issue. A problem with

autocorrelation may be inferred from the fact that the results of these tests are less than 2 (Yardelen Tatoğlu, 2018: 226). The existence of cross-section dependence was finally discovered when the Fress test findings used to determine cross-section dependency were compared with the critical values of 0.01 and 0.05, 0.464 and 0.310, respectively. This was because the test statistic was greater than the critical values.

Table 6. *Huber, Eicker, and White Estimator Test Outcomes*

VARIABLES	ROA	ROE	TQ
FLEV	74.39	147.0	-2.192
	(152.3)	(-1,217)	(-3.788)
LTLTA	-7,437	-14,355	219.2
	-15,229	(-121,73)	(378.8)
STLTV	-7,435	-14,74	219.0
	-15,229	(-121,72)	(378.8)
EQTA	24.94***	82.43**	-0.268***
	-5.206	(36.46)	(0.0977)
SALES	0.537	-6.251	-0.0127
	(0.368)	(-6.107)	(0.00835)
AGE	0.178*	3.126	-0.00253
	(0.100)	(-2.242)	(0.00242)
Constant	-16.40***	(-43.70)	0.606***
	-4.236	(29.19)	(0.134)
Observations	176	176	176
R-squared	0.292	0.326	0.211

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

In the research, the detection of variable variance, autocorrelation, and cross-section dependency issues led to the application of the Huber, Eicker, and White test, which is resistant to the heteroscedasticity problem and was proposed by Huber (1976), Eicher (1976), and White (1980). The analysis demonstrates that all three of the dependent variables are similarly affected by the equity/total assets ratio in a statistically significant manner. If we examine the specifics, it is apparent that the equity/total assets ratio is statistically significant and is 1% on ROA, 5% on ROE, and 1% on Tobins'Q. Moreover, the age of the company has a 10% positive significance on ROA. In this circumstance, it is reasonable to conclude that the firm's age positively affects the return on assets. In addition, it can be claimed that the H_0 hypothesis can be rejected for all three models when we examine the impact of the companies' capital structures on firm performance. In other words, it is reasonable to accept the H_1 hypothesis, which argues that the statistically significant equity/total assets ratio is linked to capital structure as well as company performance.

CONCLUSION

The assessment of a company's performance is a crucial topic for business managers, industry representatives, and all other market players. To maximize the company's current value and the wealth of the shareholders as the primary goal, the study of corporate data is once again of paramount importance. It is crucial for Türkiye's economy that the country's basic metal manufacturing sector is at the forefront of production operations. As a result, using some criteria, it is feasible to assess the competitive potential of businesses working in the field. The linkage between a company's financial statistics and profitability as well as the assessment of sector balance sheets are some of the research fields. The relevance of the analyses and projections to be

produced rises because of changes in the profitability, liquidity, or capital structures of the firms, all of which have an impact on their performance. The goal of this research is to provide insight into any possible links between the performance of the firms listed in the BIST base metal Index from 2011 to 2021 and their capital structure choices.

The graphs produced by glancing at the sector's balance sheets illustrate the debt and profitability levels of the specified sector between the pertinent years. Examining the graphs reveals that profitability levels have risen dramatically, particularly during the times when investment incentives are offered. The linear relationship between borrowing and profitability is another noteworthy aspect. The indication that companies in the basic metal sector might have benefited from the leverage effect of borrowing is underscored by the observed increase in profitability during periods of heightened borrowing.

The panel data analysis conducted as part of this study determined the adoption of the fixed effects model for the ROA and Tobin's Q variables, and the random effects model for the ROE variable, across all three models. For each model, the equity/total assets ratio was found to be statistically significant. To ensure the accuracy of the models, tests were conducted to check for issues of heteroscedasticity, autocorrelation, and cross-sectional dependence. The results confirmed the presence of each issue within the models. To mitigate these concerns, the robust estimator developed by Huber, Eicher, and White (1976, 1980), known for yielding more precise outcomes, was employed. It is both reasonable and precise to report that this test yielded results consistent with previous findings.

The empirical evidence presented in this study indicates that the equity density, or equity/total assets ratio, significantly impacts the dependent variables ROA, ROE, and Tobin's q. These findings are in agreement with the research of Türkdönmez and Babuşçu (2019) and Hacevliyagil et al. (2020) regarding the significance level. Moreover, the influence of firm age on ROA aligns with the research findings of Das (1995) and Shanmugam (2002). Consequently, the H0 hypothesis is rejected, affirming that capital structure decisions significantly influence company performance. The study suggests that further research into the manufacturing sector and its subsectors, vital for the nation's economy, would contribute to a deeper understanding of crucial policy content. On the flip side, company-specific evaluations are anticipated to offer additional insights for market participants.

REFERENCES

Akdoğan, K., Chadwick, M., Saygili, H., & Saygili, S. (2019). Ana metal sanayi ihracatındaki eğilimler. CBT Research Notes in Economics 1914 (1914). https://ideas.repec.org/p/tcb/econot/1914.html

Akgüç, Ö. (1998). *Finansal Yönetim*. Muhasebe Enstitüsü Yayın No: 65.

Aydın, N., Başar, M., & Coşkun, M. (2017). *Finansal Yönetim*. Detay Yayıncılık.

Bozkurt, Y., & Naycı, G. (2021). Metal sektöründe meydana gelen iş kazalarında cinsiyet faktörü. *Akademik Yaklaşımlar Dergisi, 12*(1), 174-191.

Cornett, M. M., Adair, T. A., & Nofsinger, J. (2016). *Finans.* (V. Sarıkovanlık, Çev.) Nobel.

Dalci, İ. (2018). Impact of financial leverage on the profitability of listed manufacturing firms in China. *Pacific Accounting Review, 30*(4), 410-432. doi:10.1108/PAR-01-2018-0008

Das, S. (1995). Size, age and firm growth in an infant industry: The computer hardware industry in India. *International Journal of Industrial Organization, 13*(1), 111-126.

Ercan, M., & Ban, Ü. (2018). *Değere dayalı işletme finansı finansal yönetim*. Gazi Kitabevi.

Evgeny, I. (2015). The impact of financial leverage on firm performance: Evidence from Russia. *Корпоративные финансы, 9*(2), 24-36.

Gujarati, D. N., & Porter, D. C. (2018). *Temel ekonometri.* (Ü. Şenesen, & G. Şenesen Günlük, Çev.) Literatür.

Hacıevliyagil, N., Şit, A., & Tuna, İ. (2020). Finansal krizleri de içeren dönemlerde sermaye yapısının finansal performans üzerine etkisi: Türk bankacılık sektörü üzerine bir uygulama. *Tokat Gaziosmanpaşa Üniversitesi Sosyal Bilimler Araştırmaları Dergisi, Sonbahar Özel Sayı*, 139-148. .

Hirschman, A. (1958). *The strategy of economic development.* New Haven: Yale University Press. doi:https://doi.org/10.2307/1235188

Javed, Z., Rao, H., Akram, B., & Nazir, M. (2015). Effect of financial leverage on performance of the firms: empirical evidence from Pakistan. *SPOUDAI Journal of Economics and Business, 65*(1-2), 87-95.

Kılıç, S., & Alp, A. (2021). *Finansal yönetim/financial management*. Beta.

Mule, R., & Mukras, M. (2015). Financial leverage and performance of listed firms in a frontier market: Panel evidence from Kenya. *European Scientific Journal, 11*(7), 534-550.

Nihan, C. (2017). Finansal kaldiraç ve firma büyüklüğünün finansal performans üzerine etkisi: bist sinai endeksinde işlem gören işletmeler üzerine bir uygulama. *Uluslararası Yönetim İktisat ve İşletme Dergisi, ICMEB17*(Özel Sayı), 796-811.

Omağ, A. (2015). Finansal kaldiraç derecesi ve seçilmiş sektörlere yönelik bir uygulama. *Maliye Finans Yazıları, 103*, 205-218.

Onyenwe, N., & Glory, I. (2017). Effect of financial leverage on firm's performance: a study of Nigerian Banks (2006 -2015). *International Journal of Recent Scientific Research, 8*(7), 18554-18564. doi:10.24327/IJRSR

Özden, A., & Haçikoğlu, M. (2017). *Ana metal sanayi sektörü.* A&T Bank Ekonomik Araştırmalar Departmanı.

Rahman, M., Saima, F., & Jahan, K. (2020). The impact of financial leverage on firm's profitability: an empirical evidence from listed textile firms of Bangladesh. *Journal of Business, Economics and Environmental Studies, 10*(2), 23-31. doi:10.13106/jbees.2020.vol10.no2.23

Rayan, K. (2008). *Financial leverage and firm value.* The University of Pretoria.

Sayılgan, G. (2019). *Soru ve yanıtlarıyla işletme finansmanı*. Siyasal Kitabevi.

Shanmugam, K., & Bhaduri, S. (2002). Size, age, and firm growth in the Indian manufacturing sector. *Applied Economics Letters, 9*(9), 607-613.

Şengül, Ü. (2020). BIST 100 de yer alan ana metal sanayi firmalarinin veri zarflama analizi ile performans ölçümü. *Journal of Life Economics, 7*(2), 161-176. doi:https://doi.org/10.15637/jlecon.7.011

Şit, A., Ekşi, H., & Hacıevliyagil, N. (2017). BİST'te ana metal sanayi endeksinde faaliyet gösteren işletmelerin finansal performans ölçümü: 2011-2015 Dönemi. *Süleyman Demirel Üniversitesi Vizyoner Dergisi, 8*(17), 83-91. doi:10.21076/vizyoner.284906

T.C. Ekonomi Bakanlığı (2016). *Yatırım Teşvik Bülteni* -Aralık 2016 verileri.

T.C. Sanayi ve Teknoloji Bakanlığı. (2023). 2023 tarihinde yatırım teşvik istatistikleri. https://www.sanayi.gov.tr/istatistikler/yatirim-istatistikleri/mi1304021615

Türkdönmez, C., & Babuşcu, Ş. (2019). Bankaların kârlılık performansını etkileyen faktörler. *Başkent Üniversitesi Ticari Bilimler Fakültesi Dergis, 3*(1), 37-54.

Uluyol, O., Lebe, F., & Akbaş, Y. (2014). Firmaların finansal kaldıraç oranları ile öz sermaye karlılığı arasındaki ilişki: Hisseleri Borsa İstanbul (BİST)'da işlem gören şirketler üzerinde sektörler bazinda bir araştırma. *İşletme Araştırmaları Dergisi, 6*(1), 70-89.

Uygurtürk, H., & Korkmaz, T. (2012). Finansal performansın TOPSIS çok kriterli karar verme yöntemi ile belirlenmesi: Ana Metal Sanayi işletmeleri üzerine bir uygulama. *Eskişehir Osmangazi Üniversitesi İİbf Dergisi, 7*(2), 95-115.

Yardelen Tatoğlu, F. (2018b). *Panel veri ekonometrisi*. Beta.

Yıldız, O. (2019). *Metal sektörü durum analizi.* Karabük Üniversitesi-T.C. Çevre ve Şehircilik Bakanlığı.

Uzun Öz

İşletmelerde optimal sermaye yapısının oluşturulması işletme finansmanında kullanılan uzun vadeli yabancı kaynak ve özsermayenin dengelenerek finans politikası açısından önemli bir

karardır. Bu karar firmanın değerini etkilemekte ve dolayısıyla yatırımcılara yol gösterici nitelikte olmaktadır. Bu doğrultuda çalışmada Borsa İstanbul Ana Metal Endeksi'nde yer alan firmaların sermaye yapısının firma performansına etkisinin tahmini amaçlanmaktadır. Bu firmaların incelenmesindeki ana motivasyon ana metal sanayi sektörünün farklı üretim alanlarında kullanılıyor olmasının yanı sıra sektörün rekabet gücünün yüksek dirence sahip olmasıdır. Ayrıca sektörün kısıtlı kaynaklarla geniş sektör grubuna etki ediyor olması sektörün ekonomik gelişmelerdeki önemini de ön plana çıkarmaktadır. Bunun yanı sıra ana metal sanayi sektöründe yer alan firmaların yatırım teşviklerinden yararlanıyor olmasının firma karına ve istihdama olumlu etkisi kaçınılmazdır. Örneğin 2016 yılında imalat sektörüne yapılan 24.4 milyar TL değerindeki yatırımın ana metal sanayin ekonomisini canlandırdığı söylenebilmektedir. Zira sektör bilançoları incelendiğinde 2016 yılında ana metal sanayi sektörünün dönem net karı %40 oranında bir artış söz konusudur. Sektör bilançoları incelendiğinde dikkat çekici bir başka husus ise borçlanma ile karlılık arasındaki doğrusal bağlantıdır. Borçlanmanın arttığı dönemlerde karlılığında artış gösteriyor olması ana metal sektöründe faaliyet gösteren firmaların borçlanmanın kaldıraç etkisinden faydalanmış olabileceği düşünülmektedir. Tüm bu hususlar dikkate alınarak çalışmada 2011-2021 yılları arası Borsa İstanbul Ana Metal Endeksi'nde yer alan ve süreklilik gösteren 17 firmanın sermaye yapılarının firma performansına etkisi test edilmektedir. Firmalara ilişkin veriler Datastream veri tabanından sağlanmıştır. Çalışmada sermaye yapısını temsilen Finansal Kaldıraç, Uzun Vadeli Yabancı Kaynak/ Toplam Varlıklar, Kısa Vadeli Yabancı Kaynak/ Toplam Varlıklar ve Öz kaynaklar/ Toplam Varlıklar bağımsız değişkeleri, firma performansını temsilen ise Aktif Karlılığı, Özkaynak Karlılığı ve Tobins'q bağımlı değişkenleri kullanılmıştır. Satışlar ve firma yaşı ise kontrol değişkeler olarak analize dâhil edilmiştir. Söz konusu testlerin yapılabilmesi için Panel Veri Analizi yöntemi uygulanmıştır. Çalışmada oluşturulan modeller perspektifinde hipotez kurgusu şu şekildedir:

H_0: Firma performansı ile sermaye yapısına ilişkin göstergeler arasında herhangi bir ilişki bulunmamaktadır.

H_1: Firma performansı ile sermaye yapısına ilişkin göstergeler arasında ilişki bulunmaktadır.

Bağımsız değişkenlerde istatistiksel olarak anlamlı bir sonuç ortaya çıkması halinde H_0 hipotezi reddedilip, H_1 hipotezi kabul edilecektir. Çalışmanın amacı doğrultusunda öncelikle kullanılan değişkenlere ilişkin tanımlayıcı istatistik ve korelasyon matrisi verilmiştir. Modelin açıklama gücünü etkileme olasılığı ile oluşturulan korelasyon matrisine yer verilmiştir. Çalışma kapsamında kullanılan bağımlı ve bağımsız değişkenlere ait betimleyici istatistiksel verileri ele alınan değişkenler için ortalama, medyan, maksimum, minimum, standart sapma değerleri ile araştırmada kullanılan serilerin çarpıklık ve basıklık dereceleri tespit edilmiştir. Ayrıca oluşturulan korelasyon matirisinde değişkenler arasında hem pozitif hem de negatif yönde aşırı yüksek korelasyonun var olmadığı görülmüştür. Analizin devamında Panel Veri Modelleri arasında seçim kriterleri verilerek sırasıyla F (Chow) Testi, Breusch-Pagan Testi ve Hausman testi uygulanmıştır. Bu testleer neticesinde ROE değişkeni için tesadüfi etkiler modeli ve Tobins'q değeri için ise yine sabit etkiler modelinin uygulanması gerekliliği ortaya çıkmıştır. ROA değişkeni için uygulanan sabit etkiler test sonuçlarına göre özkaynak/toplam varlıklar oranının %1 düzeyde ve pozitif yönde istatistiksel olarak anlamlı olduğu görülmektedir. İkinci olarak tesadüfi etkiler modeli uygulamasında ROE bağımlı değişkeni üzerinde yine özkaynak/toplam varlık oranının %5 düzeyinde pozitif yönde anlamlı olduğu ve son olarak Tobins'Q değişkeni için sabit etkiler modeli uygulanmış ve aynı doğrultuda özkaynak/toplam varlık oranının negatif yönde ve %1 anlamlılık düzeyinde olduğu bulgularına ulaşılmıştır. Çalışmanın devamında Panel Veri Modellerine İlişkin Temel Varsayım Testleri yapılmıştır. Bu testlerin uygulanmasındaki amaç serilerde değişen varyans, otokorelasyon ve yatay bağımlılık sorunlarının olup olmadığının tespit edilmesidir. Levene, Brown ve ForsytheTesti değişen varyans testi sonuçlarına göre serilerde değişen varyans sorunu tespit edilmiştir. Otokorelasyon sorununun tespiti için ise uygulanan Bhargava etc. DW ve Baltagi-Whu LBI sonuçlarına göre serilerde otokorelasyon sorununun olduğu dikkat çekmektedir. Son olarak yatay kesit bağımlılığı tespiti için uygulanan Fress testi sonuçları ise birimler arası korelasyonun varlığına işaret etmektedir. Çalışmada son olarak değişen varyans, otokorelasyon ve birimler arası korelasyon sorunlarının tespit edilmesi nedeniyle heteroskedasite problemine karşı dirençli olan ve

Huber (1976), Eicher (1976) ve White (1980) tarafından öne sürülen Huber Eicker White testi uygulanmıştır. Yapılan analiz neticesinde Özkaynak/Toplam varlıklar oranı yine üç bağımlı değişken için istatistiksel olarak anlamlı sonuçlar vermiştir. Özkaynak/Toplam varlıklar oranının ROA değişkeni üzerinde %1 düzeyinde, ROE değişkeni üzerinde %5 ve Tobins'Q değişkeni üzerinde %1 düzey seviyesinde ve istatistiksel olarak anlamlı sonuçlar elde edilmiştir. Firma yaşı bağımsız değişkeninin ROA değişkeni üzerinde ise %10 düzeyde ve pozitif yönde anlamlılığı söz konusudur. Dolayısıyla firmanın yaşının aktif karlılık üzerinde olumlu etkisinin olduğu söylenebilmektedir. Tüm sonuçlar göz önüne alındığında firmaların finansal kararlarının firma performansı üzerinde etkisinin olduğu söylenebilmektedir. Dolayısıyla H_0 hipotezi reddedilerek "Firma performansı ile sermaye yapısına ilişkin göstergeler arasında herhangi bir ilişki bulunmaktadır." H_1 hipotezi kabul edilmiştir. Bundan sonra yapılacak çalışmalarda ülke ekonomisini açısından öneminin büyük olması sebebiyle imalat sektörünün ve alt sektörlerin makro açıdan incelenmesinin ulusal yazına katkı sağlayacağı düşünülmektedir. Öte yandan, firma bazlı değerlendirmelerin piyasa katılımcılarına ilave katkılar sağlayabileceği öngörülmektedir.