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# THE ROLE OF EXPORTING ON CAPITAL STRUCTURE: A FIRM-LEVEL INVESTIGATION*

## İhracatın Sermaye Yapısı Üzerindeki Rolü: Firma Düzeyinde Bir Araştırma

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**Keywords:**
Capital Structure, Exporting, Panel Data Analysis.

**JEL Codes:**
G32, B27, C23.

**Abstract**

In this study, the effect of exports on capital structure decisions was investigated at the firm level. Annual data of 208 companies exporting in Turkey for the period 2005-2019 were used. Leverage was used as the dependent variable, and export intensity was used as the primary independent variable. In addition, asset structure, cash flow, firm size variables were added as control variables in the study. The current ratio, real effective exchange rate, and real gross domestic product variables are added to test the estimation results of the model. Panel data regression analysis was applied. According to the analysis results, a positive relationship was found between export intensity and leverage, but this relationship is statistically insignificant. A positive and statistically significant association was found between asset structure and firm size and leverage. A negative relationship was found between cash flow and leverage. There is a negative relationship between the current ratio and the leverage and there is a negative relationship between the real effective exchange rate and leverage. Additionally, gross domestic product negatively affects the leverage, but this relationship is statistically insignificant.

**Anahtar Kelimeler:**
Sermaye Yapısı, İhracat, Panel Veri Analizi.

**JEL Kodları**:
G32, B27, C23.

**Öz**

Bu çalışmada ihracatın sermaye yapısı kararlarına etkisi firma düzeyinde araştırılmıştır. Türkiye'de ihracat yapan 208 firmanın 2005-2019 dönemi yıllık verileri kullanılmıştır. Bağımlı değişken olarak kaldıraç ve ana bağımsız değişken olarak ihracat yoğunluğu kullanılmıştır. Ayrıca çalışmada kontrol değişkenleri olarak varlık yapısı, nakit akışı, firma büyüklüğü değişkenleri eklenmiştir. Modelin tahmin sonuçlarının test edilmesi için cari oran, reel efektif döviz kuru ve reel gayrisafi yurt içi hasıla değişkenleri eklenmiştir. Panel veri regresyon analizi uygulanmıştır. Analiz sonuçlarına göre ihracat yoğunluğu ile kaldıraç arasında pozitif yönlü bir ilişki bulunmuştur, fakat bu ilişki istatistiksel olarak anlamsızdır. Varlık yapısı ve firma büyüklüğü ile kaldıraç arasında pozitif yönlü ve istatistiksel olarak anlamlı bir ilişki bulunmuştur. Nakit akışı ile kaldıraç arasında ise negatif yönlü ilişki bulunmuştur. Cari oran ve reel efektif döviz kuru ile kaldıraç arasında negatif yönlü bir ilişki vardır. Ayrıca gayri safi yurt içi hasıla, kaldıracı negatif yönde etkilemektedir, fakat bu ilişki istatistiksel olarak anlamsızdır.

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## 1. Introduction

The capital structure may be vital in the financial management of companies as the capital structure is not only about fundraising but is also associated with supplementary financial decisions. For this reason, it is one of the essential issues that financial managers focus on (Gitman and Zutter, 2015: 575).

Companies use different sources to finance projects to generate cash flow. The two ingredients of the capital structure are debt financing (external source financing), and equity financing (internal source financing). The costs of debt financing and equity financing are different. Therefore, deciding which financing method to use also changes the cost of the company's project financing.

Firms consider three fundamental issues in project finance: 1) the amount of cash flow, 2) the time horizon of the funds, 3) the financial and non-financial liabilities. Only long-term resources are included in the capital structure. Therefore, short-term debts are not considered in capital structure decisions. The level of the firm's need for financial resources also determines the cost of the resources for the firm. When a firm with a high debt ratio needs more debt, it borrows at a higher interest rate. A similar situation is also valid for equity financing. If the firm needs more resources, investors demand higher rates of return (Agarwal, 2013: 11).

Debt financing is generally less costly than other financing methods. There are several reasons for this. One is that lenders may demand a lower rate of return because they are exposed to less risk. An additional reason is that since debts are liabilities for the company, fund providers have the right to confiscate company assets in the case of insolvency. A further reason is the tax shield of debt. Since the interest paid on the debt is an expense, it reduces the amount of tax the company will pay. Therefore, there are two costs of debt, namely pre-tax and post-tax costs. The after-tax cost should be considered the cost of debt in capital structure decisions (Gitman and Zutter, 2015: 575-576).

Another essential component of capital structure is equity capital. There is no 'maturity date in equity financing, unlike debt financing. Thus, equity capital is an indefinite resource. Simply put, there are two types of equity financing, preferred stock equity and common stock equity. Common stock equity can be in the form of issuing new stocks to the market or the portion of the profits earned during a period not distributed to shareholders. Financing provided by retained earnings is also called auto finance. Among these financing methods, the least costly is preferred stock. The most expensive is common stock equity, which is to issue shares.

Firms should decide which resources to use and how much resources they need. Therefore, capital structure decisions are essential for companies. However, there is still no distinct answer to the question of ‘’How should be the optimal capital structure for companies?". Some studies indicate that firm-specific factors and some macroeconomic factors affect companies' capitalvd.structure decisions. Capital structure decisions are also associated with theories such as agency cost (Jensen and Meckling, 1976), asymmetric information (Ross, 1977). These are the capital structure theories and will be discussed briefly in the second section.

Although there has been a great deal of research on the subject, there is no consensus on optimal capital structure. Since factors such as the industry in which the company is operated, the company's profitability, size, and growth rate are all variable, the optimal capital structure

may differ for each company. In addition, macroeconomic factors such as exchange rates, interest rates, and tax rates may also affect the firms' capital structure by different degrees. For these reasons, although there are many studies on the subject, there is still no consensus.

Although there are many studies in the literature about the factors that affect the capital structure, the firm-level export factor is not included in these studies sufficiently. There are studies on the capital structures of exporting firms. Most studies investigated the factors affecting the capital structure. This study aims to reveal how export intensity affects the capital structure by using firm-level data. In other words, this study is expected to be contribute to the capital structure determinants literature by focusing on the export intensity levels of the firms. The results are expected to be useful for the researchers of this academic area and the owners and managers of exporting firms, financial institutions, and policymakers.

The structure of the paper is as follows. In the second part, capital structure theories are briefly explained. In the third section, a summary of the literature on the subject is given. In section four, the data used in the study and the method of the study are explained. In the fifth section, the results of the analysis are discussed and in the last section, conclusion is included.

## 2. Capital Structure Theories

The capital structure topic has been the focus of attention of researchers working in finance, as well as company managers, for many years. Many researchers have studied what the optimal capital structure should be for the firms, but there is no consensus on optimal capital structure. One of the biggest reasons for this is that company-specific factors that affect capital structure affect each company at different rates. Many studies and research have been carried out in this field have led to the emergence of different theories. It is possible to examine these theories under the two main headings of traditional and modern approaches.

Traditional approaches are the net income approach, the net operating income approach, and the traditional approach. Net income and net operating approaches are studied by David Durand (1952). Traditional approach is studided by Solomon (1955). Modern theories are Modigliani and Miller theorem (Modigliani and Miller, 1958; Modigliani and Miller, 1963), trade-off theory (Kraus and Litzenberger, 1973), agency theory (Jensen and Meckling, 1976), signaling theory (Ross, 1977), and market timing theory (Baker and Wurgler, 2002).

According to the net income approach conducted by David Durand (1952), the cost of debt for the firms is lower than the cost of equity. Firms can decrease the weighted average cost of capital by increasing the debt ratio. As the cost of capital decreases, firm value increases. The optimal capital structure for firms can be created with 100% debt financing. However, the net operating income approach maintains that increasing debt ratio constitutes the bankruptcy risk. Therefore, the cost of capital does not decrease, and firm value does not increase by increasing the debt ratio (Durand, 1952). According to the net income approach, firms have no optimal capital structure. The traditional approach, another classical approach, was presented by Solomon (1955). According to the traditional approach, if the firm uses debt and equity together, it should pay attention to the leverage. Firms prefer debt financing because of the lower cost of the debt. However, the increasing debt ratio (leverage) in the capital structure also increases the risk for the firm and therefore increases the cost of debt and after a point it makes makes equal to the cost of equity. As a result of the increase in the debt ratio, the cost of capital

starts to increase, and firm value decreases. Optimal capital structure for firms may be set at this point (Solomon, 1955).

Modigliani and Miller (M and M) theory is a seminal paper for the capital structure studies, so it is beginning of the modern capital structure theories. In some studies, capital structure theories are grouped as before and after M and M theory. Under perfect market conditions, Modigliani and Miller maintains no relation between firm value and capital structure, so firms have no optimal capital structure (Modigliani and Miller, 1958). M and M revised this study in 1963 and they included the taxes in the model. This study revealed that when taxes are included, using debt financing may increase the company's value due to the decrease in the cost of debt (Modigliani and Miller, 1963).

Trade-off theory states that firms should consider the tax advantage of debt and bankruptcy risk of high debt. In other words, firms should balance the tax advantage of debt and the bankruptcy risk created by debt to reach optimal capital structure (Kraus and Litzenberger, 1973). Pecking order theory, another capital structure theory, considers a firm's capital resources as internal sources and external sources. The theory argues that firms primarily tend to use internal resources in their capital structures and that if those internal resources are insufficient, they tend to turn to external resources. According to the pecking order theory, there is no targeted leverage ratio. Firms decide whether to use internal or external resources in their capital structure decisions (Myers and Majluf, 1984). Stephen Ross proposed the signaling theory in 1977. According to this theory, there is an information asymmetry problem in the market, so managers of the firms have more information than the firm's owners. Managers tend to use debt financing when they think the projects are profitable. In the opposite case, if the managers have poor expectations about the firm's future, equity financing is selected for financing. A firm using debt financing gives a positive signal to investors and makes them think that its future is promising. However, equity financing gives a negative signal to investors and causes them to believe there are substandard expectations for the firm's future (Ross, 1977; Gitman and Zutter, 2015: 586). Market timing theory argues that the firms' capital structures are related to their past share prices. Firms use equity financing through stock issuance when market capitalization is high because the cost of equity decreases in these times. When market values are low, they buy back shares. This situation changes the capital structures of firms (Baker and Wurgler, 2002). In a study conducted by Graham and Harvey (2001) surveys conducted with 392 chief financial officers (CFOs) revealed that managers act according to market conditions in issuing stocks. In the study conducted by Jensen and Meckling (1976) the conflicts of interest between shareholders of the company and their appointed managers, namely agents, are examined. These conflicts of interest create various costs for the company. Costs resulting from the agency problem also increase the cost of capital for companies. Therefore, agency costs are also related to the issue of capital structure. Shareholders may wish to implement more risky projects to generate more profit. Managers tend to accept less risky and, therefore, lower return projects to avoid risk because if the project fails, managers are in danger of being fired from their jobs (Ayyildiz, 2013: 30). Conflicts of interest between the firm managers and shareholders of the firm and the willingness of firm managers to avoid risk prevent optimal utilization of leverage. This reduces the advantage of the debt. Failure to reduce the cost of capital to the optimal level causes the firm value to increase or decrease less (Jensen and Meckling, 1976). There may be conflict of interests between the shareholders and the managers of the firm. Additionally, conflicts of interest may arise between lenders and company owners (Ozturk, 2014). Lenders

may also increase the rate of interest to be paid on debt, as shareholders accept more risky projects to generate more returns. Cost of debt for the firm may increase because of the increased risk. As a result, the possibility of increasing the firm's value by decreasing the capital cost decreases.

## 3. Literature Review

There are various studies on the factors that affect the capital structure in the international literature. Some of the studies focus on a particular variable to reveal its effect on the capital structure. Due to the main aim of this study, the former studies focus on the relationship between exporting and capital structure are given in this section.

Greenaway et al. (2007) examined the export decisions and financial factors relationship. They used data from 9,292 British firms for the 1993-2003 period. The study results showed that exporting firms performed better financially and had a better financial situation than non-exporting firms. In addition, it was observed that companies that have just started to export borrowed more due to high costs and therefore had higher leverage.

Gundogdu (2009) investigated the financing methods of exporting firms in Turkey. In the study, the data belonging to 86 firms for the 1997-2008 period were used. In the study, a Pedroni panel cointegration analysis was employed. The analysis results showed that firms primarily use debt while increasing their exports. Analysis results show that export positively affects the leverage of the firms.

Berman and Hericourt (2010) investigated the impact of financial factors on exports with the data of 5,000 companies from 9 developing countries. Countries included in the study were: India, China, Vietnam, South Africa, Thailand, Bangladesh, Morocco, Indonesia, and the Philippines. Although the period of data used in the study varies according to country, all data covered the 2000-2005 period. The results obtained in the study showed that firms' access to financing resources significantly affected their exports. If the firms have access external finance, they export more. However, the financial health of firms did not have any effect on exports. A further result of the study was that the countries' financial development increased the number of exporters in that country and increased exports.

Okuyan and Tasci (2010) studied for the capital structure determinants of the 1,000 largest industrial firms operating in Turkey. They employed a panel data analysis by using the 1993-2007 period data of firms. They used debt ratio, profitability, added value created by the firm, export, ownership structure, and size as variables. The debt ratio was used as the firm's leverage and was the dependent variable. According to the analysis results, firms size and profitability negatively affects the leverage of the firms. This result supported the pecking order theory. A positive relationship was found between the leverage of firms and the added value it creates. In other words, it was seen that companies using debt create more added value. In the study it was seen that exporting firms use more debt than those who do not. There was a positive relationship between exports and the leverage ratio.

Elci (2011) examined the export and the capital structure of Turkish firms. She used the data of the 1993-2009 period. Companies were divided into three groups as fully foreign capital companies, companies with foreign partners, and companies without foreign capital. Analysis results showed that foreign partnerships increased 'firms' opportunities of entering new markets

and therefore they could export more. It was observed that companies without foreign partnerships made fewer exports than those with existing partnerships.

Chen and Yu (2011) researched the relationship between foreign direct investments (FDI), exports, and capital structure by using the data of 566 Taiwan firms. They used the debt ratio as dependent variable. Foreign direct investment positively affects the debt ratio of the firms, but export negatively affect the debt ratio. According to this result, it was observed that exports with FDI carried different risks and therefore changed the financing behavior of the companies. In their research within the agency theory framework, the authors also revealed that as companies' international operations increased, monitoring costs for creditors increased, so it might be more difficult for companies to borrow money.

Goldman and Viswanath (2011) analyzed the relationship between export and capital structure for Indian firms. Leverage was the dependent variable, and export, market capitalization, book value, research and development expenses, operating cash flow, and asset structure were independent variables. They used data of over 2100 firms for the 2000-2009 period. According to the study results, exporter firms use more leverage than non-exporter firms.

He et al. (2013) in their study, explored the export capacities and the capital structure relations of the firms. They used the data of 1,901 Chinese manufacturing firms for the 1999-2007 period. They grouped the firms according to their size as small, medium, and large firms. They employed the Generalized Method of Moments (GMM) as analyzing method in the study. In this study, export was the dependent variable, debt ratio, and firm age were the independent variables. According to the results of the study, financing decisions and capital structure affected the export capacity of all companies, but the degree of influence varied. Therefore, policies regarding government regulations and supports should be regulated by considering the size and structure of the companies. It was thought that the capital supports given to small companies would also protect medium-large scale companies. Capital supports provided to firms increased the export capacities of firms.

Bartoli et al. (2014) researched the relationship between access opportunities to bank financing and export performance for Italian firms. They used research data from UniCredit in their study in 2010. The study results showed that bank subsidies affect firms' export capacity. The ability of small businesses to obtain financing from banks enabled them to export by meeting the costs required for export. In this case, it could be said that exporting small firms had a higher debt ratio in their capital structure.

Celik (2014) examined the capital structure of exporter SMEs in Turkey. He researched export performance and the capital structure of these firms. He used the 2009-2011 period data of 882 companies in his study. Of the companies examined, it was observed that those which export use more foreign resources. It was concluded that exporter companies could access foreign resources more efficiently and therefore had higher leverage.

Kara and Erdur (2015) studied about the factors that affect the capital structure of exporter firms in Turkey. They used the data for firms from different sectors such as automotive, food and beverage, and the textile and leather industry. They used the data for the 2006-2014 period. They used the variables of the debt ratio, profitability, company size, liquidity, non-debt tax shield, asset structure, growth, company risk in their study. Debt ratio

was used as leverage and it was the study's dependent variable. The study results revealed that capital structures differed according to the sectors. Profitability, liquidity, and asset structure were the factors that affected the capital structure decisions of companies operating in the food and beverage, and automotive sectors. In the textile and leather sector, liquidity, non-debt tax shield, firm size, and asset structure factors were the determinants of the capital structure. The results showed that the sector was also important for capital structure decisions.

Ayob et al. (2015) examined that how the financial factors affect the export behavior of the firms. Their study conducted a survey with 356 Malaysian small and medium-sized enterprises (SME) and analyzed the survey results. According to the study results, exporting companies encountered more costs than non-exporting companies. Therefore, these companies needed more resources. It was difficult for SMEs to obtain external financing. Consequently, these companies should be supported. The export performances of financially supported firms were also increasing.

Maes et al. (2016) examined the effect of exports on the decisions for capital structure of the firms by using the 1998-2013 data of SMEs operating in Belgium. Leverage was the dependent variable; export, size, growth, profitability, volatility, and asset structure were independent variables. According to the results obtained in the study, leverage of the exporting firms is higher than the leverage of the non-exporting firms. The reason for this was thought to be the short-term debt of exporting companies being higher.

Liu and Zhang (2017) studied about the relationship between exports and the capital structures of companies operating in 16 different sectors in China for the 2007-2015 period. They considered the capital structures of the sectors in their work. Variables such as export dependency, profitability, tangible assets, sector size, and risk were also used in the study. Leverage was included as the dependent variable, and the others were included as independent variables. Results showed that there is a positive relationship between capital structure and export. International operations reduced the cost of debt by increasing the cash flows of businesses. For this reason, exporting firms used more debt and in this case, leverage ratios also increased.

Silva (2017) examined the financial structures of the exporter and non-exporter firms in Portugal. In the study, the author used data from 32,912 Portuguese companies for the 2011-2015 period. Taxes, tangible assets, profitability, size, industry, business risk, inflation rate, and leverage were variables used in the study. Dependent variable was leverage of the firms. The analysis results showed that the debt utilization decisions of exporting firms were different from those of non-exporting firms. Exporter firms tended to use less debt than non-exporting firms. However, a meaningful result could not be found regarding the effect of export intensity on leverage, and therefore, it was concluded that its impact was insignificant.

Miravitlles et al. (2018) investigated the effects of the financial structures of companies on export decisions with the data of 8,019 Spanish companies. In their study, the companies were divided into groups according to their size. They used data of the 2002-2005 period. Export, ownership structure, financial rates, and FDI were variables. Export was the dependent variable, and the remainder were independent variables. In the study it was observed that there was an export trend for large companies. It was observed that export decisions in small and medium-sized enterprises were not related to financial structure. Another result of the study was that the relationship between the financial structures of different sized firms and their export

decisions differed. The reason for this difference was thought to be effective in the export incentives provided to businesses.

Pinto and Silva (2021) investigated the effect of exports on capital structure decisions of the firms. They used the data of 7,676 Portuguese SMEs. They used the leverage, export intensity, taxes, the tangible fixed assets proportion on total assets, profitability, firm size, growth opportunities, operating risk, and industry conditions (average leverage ratio in the firm's industry) as variables. Leverage was the dependent variable, and those remaining were independent variables. They employed the Generalized Method of Moments (GMM) analysis method. The analysis was made with data of the 2011-2016 period. According to the results, export incentives could encourage companies to use debt. In particular, the fact that governments provided guarantees for the loans used by companies facilitated the use of debt. For this reason, companies that benefit from export incentives could borrow money.

Pinto (2019) examined the financing decisions of exporters and non-exporters in Spain. He investigated that how the export affects the capital structure decisions of the firms with the 2012-2017 data of 45,147 Spanish firms. In addition to leverage and export variables, he also used tax rates, tangible fixed assets, profitability, inflation rate, business risk, industry conditions, variables in his study. Leverage was the dependent variable, and the rest were independent variables. According to the results conducted with panel data analysis, the capital structures of exporters and non-exporters might differ. Three different models were established in the study. In the first model, a negative relationship was observed between exports and leverage when all firms were included. In the second model, where only exporting firms were included, a negative relationship was observed between profitability and inflation and leverage. In the third model, there were companies that did not export. For the non-exporting companies, tax and profitability positively affect the leverage.

Abora et al. (2014) investigated the effect of SMEs' access to bank financing on their export performance. The study used data of the manufacturing companies operating in Ghana for the 1991-2002 period. Data on exports, bank debts, firm age, profitability, firm size, and panel data analysis were used. Export was the dependent variable. The analysis results showed that SMEs that could access bank financing made higher exports. From this point of view, it might be said that according to this study, the debt ratios of exporting firms were higher in their capital structures.

Chalmers et al. (2020) examined the export and leverage relations of small and medium-sized enterprises operating in Spain and the factors that affect the financial decisions of these firms. Their study investigated how the ratio of foreign sales of companies to their total sales affects leverage. Leverage was the dependent variable, and export intensity, profitability, tangibility, size, growth, and business risk were independent variables. They used the data of 2,000 companies for the period 2010-2016 in their study. According to the GMM analysis results, the leverage ratio decreased as exports increased for the examined companies. Companies that export more used less debt, so a negative relationship between firms' leverage and exports was found. In addition, profitability negatively affects the leverage. However, tangible fixed assets, and growth of the firms positively affects the leverage.

Erkol and Coskun (2020) searched the influence of the financial structure on the export performance for firms operating in manufacturing sector firms in Turkey. In their study, they used data from 24 different manufacturing sectors for the 2008-2016 period. The ratio of

exports to total sales was used for export intensity and this was the dependent variable. Profitability, debt ratios, size, current rate, exchange rate, and interest expenses were used as financial factors and were the independent variables. Analysis results showed that financial structure affected export intensity. It was observed that firms with easy access to debt had higher exports. In addition, firm size was a factor affecting exports. The easier access of large companies to resources increased the exports of these companies.

## 4. Methodology

The annual data of 208 exporting firms whose stocks are traded on the Istanbul Stock Exchange for the period 2005-2019 are used in the study. Exporting firms are determined as the firms that regularly make foreign sales in the period. The reason for choosing 2005 as the starting year in the data used in the study is the amendment made in the tax procedure law in 2005. Firms are obliged to make inflation adjustments in their financial statements with this law. Since the effect of exports on the capital structure is investigated in the study, firms operating in the financial sector and firms that are not exporter are not included in the analysis. As a result, only the data of exporting real sector companies are used in this study. The data of the firms are obtained from the Finnet database.

In addition to firm-level data, the real effective exchange rate (REER), and real gross domestic product (GDP) macroeconomic variables are also used in the analysis. The real effective exchange rate data is obtained from the Central Bank of the Republic of Turkey (2022) Electronic Data Delivery System. Real GDP data are taken from the World Development Indicators of World Bank (2022). Variables are explained in Table 1.

**Table 1. Variables**

| Notation | Variable | Description |
|---|---|---|
| lev | Leverage | Dependent variable. It is calculated by dividing the long-term liabilities by total assets. |
| exp | Export Intensity | Main independent variable. It is calculated by dividing the foreign sales by total sales. |
| astan | Asset Tangibility | Tangible Assets / Total Assets |
| cf | Cash Flow | (Net profit + Amortization) / Total Assets |
| size | Size | The logarithm of total assets |
| cr | Current Ratio | Current Assets / Current Liabilities |
| reer | REER | Real Effective Exchange Rate. |
| gdp | Real GDP | The logarithm of real GDP |

Before starting the econometric analysis, extreme values of the leverage, export intensity, asset tangibility, and cash flow variables are removed from the data used in the study. In other words, the values below 1% and above 99% are eliminated with the trimming method. Table 2 shows that the descriptive statistics.

**Table 2. Descriptive Statistics**

| Variable | Observations | Mean | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| lev | 2909 | 0.14933 | 0.14026 | 0.00207 | 0.6352 |
| exp | 2905 | 0.24895 | 0.24730 | 0 | 0.94 |
| astan | 2912 | 0.32316 | 0.18844 | 0.00163 | 0.7733 |
| cf | 2909 | 0.06183 | 0.09459 | -0.26581 | 0.3345 |
| size | 2912 | 8.52818 | 0.84975 | 6.01567 | 11.6089 |
| cr | 2912 | 2.03904 | 1.79314 | 0.18974 | 10.8337 |
| reer | 2912 | 102.712 | 14.75055 | 76.25 | 127.72 |
| gdp | 2912 | 12.1180 | 0.09306 | 11.97016 | 12.2485 |

The correlation test results are given in Table 3. Finding high levels of correlation among the dependent variables is undesirable in econometric analysis. According to the results, there is a high negative correlation between the real GDP and real effective exchange rate.

**Table 3. Correlation Test Results**

| | lev | exp | astan | cf | size | cr | reer | gdp |
|---|---|---|---|---|---|---|---|---|
| lev | 1 | | | | | | | |
| exp | 0.0649 | 1 | | | | | | |
| astan | 0.2536 | 0.0633 | 1 | | | | | |
| cf | -0.2191 | 0.1011 | -0.0867 | 1 | | | | |
| size | 0.2492 | 0.0664 | 0.0323 | 0.2026 | 1 | | | |
| cr | -0.2911 | -0.0587 | -0.1975 | 0.2928 | -0.1506 | 1 | | |
| reer | -0.0947 | -0.0116 | 0.1124 | 0.0393 | -0.1972 | 0.0639 | 1 | |
| gdp | 0.0953 | 0.0081 | -0.1312 | -0.0242 | 0.1996 | -0.0278 | -0.8992 | 1 |

The main model is as follows:

$$lev_{it} = \alpha + \beta_1 exp_{it} + \beta_2 astan_{it} + \beta_3 cf_{it} + \beta_4 size_{it} + \varepsilon_{it} \quad (1)$$

Here *lev* denotes the leverage, and it is the dependent variable. α denotes the constant parameter. The main independent variable is export intensity, and it is expressed with *exp*. Other variables are *astan* for asset tangibility, *cf* for cash flow, and *size* denotes the logarithm of total assets of the firm. These are the control variables.

According to some studies in the literature, exporting level affects the leverage positively (Greenaway et al., 2007; Goldman and Viswanath, 2011; Maes et al., 2016; Pinto and Silva, 2021). These studies argue that companies with high exports use more debt. However, studies also find that export negatively affects leverage (Silva, 2017; Chalmers et al., 2020). In these studies, it was revealed that companies use less debt as their exports increase.

It is expected that a positive relation between the asset tangibility and the leverage of the firms. If firms own more tangible assets, they may borrow more by using them as collateral. (Myers and Majluf, 1984). Also, according to the agency theory, tangible assets reduce the agency cost for lenders. In this case, debt usage may be higher for companies with high tangible assets (Jensen and Meckling, 1976).

Trade-off theory argues that the large companies may create more cash flow because they operate in different sectors. Therefore, it may be easier for large firms with high cash flow to access capital resources. As a result, these firms are expected to have higher leverage (Fama and

French, 2002). According to the pecking order theory, companies primarily use internal resources. Firms with high cash flow may have low leverage, as they provide financing with internal resources. In this case, it is expected that a negative relationship between leverage and firm size (Myers and Majluf, 1984). However, there are also studies that find positive relationship between size and leverage (Terim and Kayali, 2009; Ozturk, 2014; Cevheroglu-Acar, 2018).

In this study, a classical panel data regression analysis was applied. Even though we were directly able to employ the fixed-effects model in terms of our data set characteristics (Falls and Natke, 2007) nevertheless, we performed diagnostic tests. Firstly, Hausman test was applied to see which model is appropriate. In addition, Pesaran cross-sectional dependence test, modified Wald heteroskedasticity test, and Baltagi-Wu auto-correlation tests are used before the main model estimation to observe the diagnostics of the model.

## 5. Results

Table 4 shows that the Hausman test results, Pesaran cross-sectional dependence test results, modified Wald heteroskedasticity test results, and Baltagi-Wu auto-correlation test results.

The Hausman test results show that the probability value is less than 0.05. According to this result, $H_0$ null hypothesis is rejected, and the alternative hypothesis ($H_a$) is accepted, so that the fixed-effects model is more appropriate to use.

According to the results of the Pesaran test, the test statistic is calculated as 4.576 and the probability value is less than 0.05. This result shows that the $H_0$ null hypothesis is rejected, so there is a correlation between units. According to this result, there is cross-sectional dependence in the model used.

According to the modified Wald Test results, the probability value is found to be less than 0.05. In this case, the null hypothesis is rejected, and the alternative hypothesis is accepted. It is revealed that there is a heteroskedasticity problem in the model.

According to the Baltagi-Wu test results, test statistics are less than 2, and the probability value is less than 0.05. In this case, the null hypothesis is rejected, and it is considered to be an auto-correlation problem.

Test results show cross-sectional dependence, heteroskedasticity, and auto-correlation problems in the predicted model. In the case of these problems in fixed-effect models, it is appropriate to use the Driscoll and Kraay standard errors estimator. The Driscoll and Kraay standard errors estimator results are explained in the next section.

Driscoll and Kraay (1998), state that there is mostly a cross-sectional dependence problem in the analysis made with panel data. According to Driscoll and Kraay, standard techniques that do not take into account spatial and cross-sectional correlations can give erroneous results. In these cases, the Driscoll and Kraay estimator can produce resistant standard errors (Tatoglu, 2018: 276). In cases of cross-sectional dependence, heteroskedasticity, and autocorrelation problems in fixed-effect models, accurate predictions can be made using the Driscoll and Kraay standard error estimator.

**Table 4. Hausman Test Results and Diagnostics of the Model**

| Tests | Hypothesis | Test Statistics | Probabilities |
|---|---|---|---|
| Hausman Test | $H_0$: There is no correlation between explanatory variables and unit effect.<br>$H_a$: There is a correlation between explanatory variables and unit effect. | 35.22 | 0.0000 |
| Pesaran Cross-Sectional Dependence Test | $H_0$: There is no correlation between units<br>$H_a$: There is a correlation between units | 4.576 | 0.0000 |
| Modified Wald Heteroskedasticity Test | $H_0$: The variance of each unit is equal to the panel mean<br>$H_a$: At least the variance of one unit is not equal the panel mean | 190,000 | 0.0000 |
| Baltagi-Wu Auto-Correlation Test | $H_0$: There is no autocorrelation between units<br>$H_a$: There is auto-correlation between units | 1.1202717 | 0.0000 |

The analysis results performed on the main model using the Driscoll and Kraay standard errors estimator are shown in Table 5. Results show that the export positively affects the leverage of the firms. It can be said that firms use more debt as their export intensity increases. However, the fact that the probability value is 0.457 and this indicates that the positive relationship between export intensity and leverage is statistically insignificant. There are further studies in the literature that find a positive relationship between export and leverage (Greenaway et al., 2007; Gundogdu, 2009; Okuyan and Tasci, 2010; Goldman and Viswanath, 2011; Bartoli et al., 2014; Celik, 2014; Maes et al., 2016; Liu and Zhang, 2017; Pinto and Silva, 2021; Abora et al., 2014). However, Silva (2017) found a negative relationship between exports and leverage in his study; but this relationship is also statistically insignificant.

**Table 5. Main Model Estimation Results - Driscoll and Kraay Standard Errors Estimator**

| | **(1)**<br>***lev*** |
|---|---|
| *exp* | 0.00862<br>(0.457) |
| *astan* | 0.0768*<br>(0.019) |
| *cf* | -0.226***<br>(0.000) |
| *size* | 0.0656***<br>(0.000) |
| *α* | -0.424***<br>(0.000) |
| *N* | 2902 |
| *Within* $R^2$ | 0.0833 |
| *F stat.* | 240.39 |
| *F stat., p val.* | 0.0000 |

*p-values in parentheses.* $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$, $^{+}p < 0.10$

The positive relationship between export and leverage is a result that is compatible with many studies in the literature. However, the statistical insignificance of this relationship is different from the studies in the literature.

Asset tangibility, one of the control variables, refers to the asset structures of companies. Firms can borrow their tangible fixed assets by providing collateral. Therefore, firms that have high tangible fixed assets may use more debt. According to the analysis results, leverage and asset tangibility have a positive relationship. The probability value was calculated as 0.019. This result proved that the relationship is statistically significant at the 5% significance level, and it is consistent with the studies of Myers and Majluf (1984) and Jensen and Meckling (1976). The positive relationship between asset tangibility and leverage is also compatible with the trade-off theory and the agency theory, but this result is incompatible with the pecking order theory. From this point of view, it can be interpreted that the asset tangibility and leverage relationship of exporting real sector firms supports the trade-off theory.

The cash flow variable, which expresses the cash flow generation power of firms, was used as another control variable. According to the analysis results, cash flow and leverage have a negative relationship. Firms that have the strong ability to generate cash flow use less debt. In this case, it can be interpreted that firms with high cash flow meet their financing needs with their internal resources. This result is consistent with the pecking order theory. However, this relationship may be explained with the firms facing high costs of debt so that the firms may avoid the debt usage (Almeida and Campello, 2008).

There was a positive relationship between leverage and firm size. Analysis results showed that large firms use more debt. This relationship is also statistically significant. This result is again in line with the trade-off theory, but it is incompatible with the pecking order theory and the agency theory. The pecking order theory states that large firms have more internal fundraising power and therefore use less debt. On the other hand, the agency theory states that as firms grow, the difficulty for lenders to use debt increases because their agency cost also increases, so this relationship is negative.

**Table 6. Robustness Checks**

| | **(2)** ***lev*** | **(3)** ***lev*** | **(4)** ***lev*** |
|---|---|---|---|
| *exp* | 0.00844 | 0.0108 | 0.0123 |
| | (0.473) | (0.365) | (0.316) |
| *astan* | 0.0744* | 0.0815* | 0.0849* |
| | (0.016) | (0.016) | (0.013) |
| *cf* | -0.222*** | -0.223*** | -0.224*** |
| | (0.000) | (0.000) | (0.000) |
| *size* | 0.0652*** | 0.0519*** | 0.0455*** |
| | (0.000) | (0.000) | (0.001) |
| *cr* | -0.00177 | | |
| | (0.266) | | |
| *reer* | | -0.000354+ | |
| | | (0.078) | |
| *gdp* | | | 0.0776 |
| | | | (0.105) |
| *α* | -0.416*** | -0.272*** | -1.196* |
| | (0.000) | (0.001) | (0.022) |
| *N* | 2902 | 2902 | 2902 |
| $R^2$ | 0.0837 | 0.0848 | 0.0856 |
| *F stat.* | 209.26 | 279.88 | 202.11 |
| *F stat., p val.* | 0.0000 | 0.0000 | 0.0000 |

*p*-values in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, + $p < 0.10$

Robustness checks were made to test the robustness of the model after the main model predictions were made. Table 6 shows the robustness checks results. Here, first, the firm level variable current ratio was included in the model and an estimation was made. It was observed that current ratio negatively affects the leverage of the firms. The negative relationship between current ratio, which is a ratio expressing the liquidity of companies, and leverage shows that companies use less debt as their liquidity increases. This result is consistent with many studies in the literature. However, this relationship turned out to be statistically insignificant.

Estimates were made by adding macroeconomic variables to the model for Robustness checks. Real effective exchange rate and real GDP were added the analysis as macroeconomic variables. A statistically significant negative correlation was found between the real effective exchange rate and leverage at a 10% significance level. An increase in REER means that the Turkish lira appreciated. When Turkish lira appreciates, firms may meet their financial needs with their internal sources, and they may demand less debt. All companies included in the analysis are exporter companies. Exporter firms use less debt as the real effective exchange rate increases. If there is an increase in real effective exchange rate, this means Turkish lira appreciated. For this reason, exporting companies can meet their financing needs with their internal resources when the real effective exchange rate increases. This situation also supports the pecking-order theory.

The analysis was repeated by including real GDP as another macroeconomic variable in the model. Here GDP was used by taking the natural logarithm of the real GDP, and GDP expresses the aggregate demand for goods and services in a country. If there is an increase in the aggregate demand, firms may need more capital sources to make investments to meet this demand. Analysis results show a positive relationship between real GDP and leverage, but this relationship is statistically insignificant. According to this result, an increase in the aggregate demand in Turkey increases the debt usage of the firms. But this relationship is statistically insignificant.

## 6. Conclusion

Capital structure decisions are important for firms. The cost of capital may differ depending on the sources of funding. For this reason, it is important to choose which source is to be used and to what extent. Capital structure decisions are complex because they are related to other units of the firm and require many factors to be considered (Gitman and Zutter, 2015: 576). The cost of capital of the firms is used as discount factor to evaluate the investment projects. For this reason, firms strive to reach an optimal capital structure. The importance of capital structure has also attracted the attention of researchers in the field of finance and many studies have been done on the subject. Various theories of capital structure have emerged as a result of the studies.

A great deal of literature exists on the capital structure determinants of the firms. It was observed that in the studies the factors affecting the capital structure vary according to the firms and countries examined. Since the effect of exports on capital structure is focused in this study, leverage was used as the dependent variable and export intensity as the main independent variable. In addition to the dependent and main independent variables, a set of control variables were also used. They are asset tangibility, cash flow ratio, and firm size. Moreover, to check the

robustness of the main model, we also employed current ratio, real effective exchange rate, and real GDP. According to the results obtained from the analyses, a positive relationship was found between export intensity and leverage, but this relationship is statistically insignificant. The positive relationship between export and leverage is consistent with the previous studies in the literature (Greenaway et al., 2007; Gundogdu, 2009; Okuyan and Tasci, 2010; Goldman and Viswanath, 2011; Bartoli et al., 2014; Celik, 2014; Maes et al., 2016; Liu and Zhang, 2017; Abora et al., 2014). Besides, our findings are similar to the studies (such as, Berman and Héricourt, 2010; Silva, 2017; Miravitlles, et al., 2018) that reveal positive but insignificant relationship between export and leverage. Additionally, asset tangibility and size affected the main variable positively, while the cash flow variable affected it negatively, in the main model. The relationships were also robust with a set of additional variables.

In this study, only exporter firms in terms of capital structure decisions in Turkey were examined. The results obtained in the study showed that the capital structures of the real sector firms exporting in Turkey predominantly support the trade-off theory. It is possible to compare the capital structure of exporter and non-exporter firms by including the non-exporter firms for future studies especially with more advanced methods, such as GMM. The findings are expected to be helpful for the scholars and the owners and managers of exporting firms, financial institutions, and policymakers. The results may reveal that the exporter firms may access debt financing easier than the others.

**Declaration of Research and Publication Ethics**
This study which does not require ethics committee approval and/or legal/specific permission complies with the research and publication ethics.

**Researchers' Contribution Rate Statement**
The authors declare that they have contributed equally to the article.

**Declaration of Researcher's Conflict of Interest**
There are no potential conflicts of interest in this study.

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