



## Determinants of Capital Structure: A Research on Sectors That Contribute to Exports in Turkey

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### ABSTRACT

*Keywords:*

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Panel Data Analysis

This study aimed to determine the factors that affect the capital structure of companies in automotive, food & drink and textile & leather industries, whose shares were traded at the Borsa Istanbul (BIST) covering the period of 2006 and 2014, and at identifying the industry-specific differences with respect to their capital structures. In an attempt to achieve this goal, the data obtained from the financial statements of the related companies were subjected to panel data analysis. At the end of the study, we concluded that while, on one hand, the financial hierarchy theory was valid for the automotive industry for the studied period, on the other hand, both the financial hierarchy and trade-off theories were valid for food & drink and textile & leather industries. Another specific finding of the study was that the factors affecting the capital structure decisions were different across the industries.

### 1. Introduction

The concept of capital in the literature is generally defined as assets that comprise the active side of their balance sheets and used by the companies to achieve economic benefits as well as the difference between the short and long-term liabilities obtained outside the company in order to acquire these assets (Halaç and Surak, 2013). One of the most significant decision areas of the company directors is to determine the asset structure of the company and provide appropriate funding in line with the structure of these assets (Aydm et.al.,2011). In addition to the correct and effective utilization of these funds, the policies adopted for financing these assets may have an impact over the value of the companies as well. Financial policies materialize in the form of borrowing and/or obtaining equity capital. Financial policies representing the choice between domestic funding and outsourcing have an impact over

the company values and their future performance as well as their potential growth (Nunes and Serrasquerio, 2007).

The blend of the assets used for financing the company activities is called the capital structure. Capital structure has turned out to be one of the basic areas of interest in finance literature due to capital cost of the company as well as its possible effects on the company value (Sayılğan and Uysal, 2011).

The purpose of this study is to comparatively identify the factors determining the capital structures of companies in the automotive, food & drink and textile & leather industries whose shares were continuously traded at the Borsa Istanbul (BIST) covering the period between 2006 and 2014. As far as we are concerned, the previous studies conducted in Turkey on capital structure were basically concerned with the major activity areas or economic activity areas; only two studies carried out by Sarioğlu et al. (2013) and Karadeniz et al. (2009) offered

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an analysis aimed at determining the capital structure decision based on sub-sectors.

According to finance theory, the capital structure of a firm affects the cost of capital and the market value of the firm. Generally it is considered that the asset structure, risk level, growth rate and scale of the firm and specifications of the current sector have an effect on the capital structure. Making their sales export-oriented thought to be effective on these factors and the pioneering industries that have significantly contributed to exports in recent years are included in the study.

The automotive industry is interconnected with many other sectors due to its unique structure. The fact that it has such an impact over all these industries makes it inevitable for this sector to significantly affect the economy of the relevant country as well. While the share of the automotive export companies out of the 500 greatest industrial enterprises in Turkey was between 3% and 10% between 1983 and 1999, it started to increase as of 2003, exceeded the level of 30% in 2007, dropped to 25% in 2008 due to the global financial crisis and finally ended up at 24% in 2011. Both the food & drink and textile & leather industries had a share of 6% in 2011 (T.C. Bilim, Teknoloji ve Sanayi Bakanlığı, 2013a).

Turkey has the position of being a regional base for the manufacturing and processing of food products and their export to the great European and Middle Eastern markets. According to the export and import data of TSI (Turkish Statistical Institute), the sector has not had foreign trade deficit since 2011; completed the year 2012 with a surplus of 4,5 billion dollars and had a staggering 186% foreign trade surplus. According to the 2012 data, the share of the food & drink industry within the total exports was 6, 2% and Turkey assumed the title of 15th biggest food & drink exporter in the world by increasing its volume 5-fold in the last decade (T.C. Bilim, Teknoloji ve Sanayi Bakanlığı, 2013b).

The textile & leather products industry with its share within the national GDP, the employment it provides and its high export potential is one of the leading sectors in Turkey. The sector generates more than 10% of the GDP and 16% of the added value created by the manufacturing industry in the country. Turkey was 7th biggest country with its 3.5% share in textile exports in the world. According to the export and import data of TSI, the foreign trade surplus of 0.7 billion dollars in the textile sector in 2011 rose to 2.6 billion dollars in 2012, as opposed to 9.1 billion dollars of imports and 11,7 billion dollars of exports. The leather exports, which were 487 million dollars in the first half of 2012 and 588 million dollars in the second half ended up as 537 million dollars in the first half of 2013 (T.C. Bilim, Teknoloji ve Sanayi Bakanlığı, 2013c).

The basic contribution of our study to the relevant literature is to identify the differences of the capital structures of these sectors in question. In the following part of the study, the theories explicating the factors effective in determining the capital structure were examined and the relevant literature was analyzed. Subsequently, the method and model used in the study was scrutinized; and finally, the findings of the study were presented.

## 2. General Considerations Regarding the Capital Structure

One of the preconditions of the companies in achieving success is to comprise an appropriate capital structure as well as having a sufficient level of capital (Demirhan, 2009). Thus, many studies on capital structure have been conducted in finance literature since 1950s and the debates regarding the capital structure center around four basic approaches today.

According to the trade-off theory, for a company to reach an optimum capital structure, it is required to trade off various costs (Modigliani and Miller, 1963) such as the tax advantages provided by borrowing (Kraus and Litzengerger, 1973) and the ensuing potential financial hardships caused by excessive borrowing (Frank ve Goyal, 2007); the bankruptcy costs likely to arise as a result of rising financial risks (Frank and Goyal, 2007) and the agency costs between the shareholders and the borrowers (Jensen and Meckling, 1976). The theory in question suggests that the targeted borrowing amounts may vary in accordance with the factors such as company-specific profitability and stock values, and that the companies synchronize their own borrowing amounts in line with their targets in due course (Cotei and Farhat, 2009; Hovakimia et.al., 2001). Accordingly, these companies with high profitability should borrow more in order to be able increase the tax advantages resulting from the deduction of tax assessment caused by borrowing. On the other hand, it should also be kept in mind that excessive borrowing would increase companies' risk of bankruptcy (Nunes and Serrasquerio, 2007). Therefore, trade-off theory urges the companies to seek an optimal capital structure that will enable them to have maximum tax advantages and minimum costs caused by borrowing.

The other approach is the financial hierarchy theory put forward by Myers and Majluf (1984) as an alternative to the trade-off theory. This theory is essentially based on asymmetric information problem stemming from non-exhaustive flow of information between company directors and investors. In their study Myers and Majluf (1984) suggested that company directors knew more about the value of company's assets; therefore, the investors and company directors would issue equity shares during the period in which equity shares were over-priced, and that they would borrow when the share

prices were low. Therefore, investors have acted as such in an attempt to reduce the prices of existing and issued equity shares. Based on this hypothesis, according to the developing financial hierarchy approach, when companies are in need of funding sources, they should first resort to self-financing by initially utilizing the undivided profits in an attempt to take advantage of a profitable investment project. Should this not be sufficient and should external financial sources be needed, companies should resort to borrowing and finally choose to issue equity shares (Halaç and Durak, 2013). Therefore, investors urge the companies to follow the financial hierarchy. However, it is not possible to talk about a predefined target of a borrowing rate. It is because there are two different types of equity capitals; one of them is the internal equity capital that we find at the onset of the financial hierarchy, the other one is the external equity capital that we find at the end of financial hierarchy (Myers, 1984).

The problems regarding the agency costs, one of the approaches of capital structure, stem from the conflicts of interest between the company directors and shareholders, and between the shareholders and company creditors (Ryen et.al., 1997). In order to earn profits from the funds they have placed in the company, the shareholders on one hand need the expertise of the company directors and the directors, on the other hand, need the funding from the shareholders (Shleifer and Vishny, 1997). The conflict of interest between the directors and shareholders is based on two basic reasons. The first one is the reluctance of the directors to put up with the increasing financial risk incurred as a result of additional borrowing and their failure to optimally utilize the financial leverage. The second one is the failure of the company directors to better take advantage of some of the priorities provided by the company and spend excessively and use companies' own funds for their advantage. In this case, the high borrowing rates have the characteristic of a disciplining tool by urging the directors to work harder in order to be able to make high interest debt payments. The conflict of interest between the shareholders and company creditors, on the other hand, stem from the fact that the shareholders transfer assets to themselves from the payees by increasing the profit rates of shareholders, that the shareholders make investments in risky projects in order to make more profits; and that, as opposed to this, the creditors choose to invest in less risky projects in an attempt to secure their assets (Ryen et.al., 1997). Therefore, the company creditors demand higher interest rates in return for high risks that the shareholders take and reduce the value of the company (Halaç and Durak, 2013). According to this approach, an optimal capital structure can be obtained for the companies by striking a balance between agency costs incurred by borrowing and the advantages of borrowing (Jensen and Meckling, 1976).

Another approach that has made an impact over the capital structure in the relevant literature is the signaling theory based on the asymmetrical information problem (Demirhan, 2009). In the study he conducted in 1977, Ross suggested that the company directors claimed to know more about the possible future revenues of the company than the investors. According to Ross, when company's equity shares increase, it would be the company directors that would take advantage of this situation; and when the company face financial hardships, they would be penalized. Therefore, the investors perceive that the increasing borrowing amount is the signal of high quality status for a company (Modigliani and Miller, 1958). Consequently, the high quality companies with high profitability and potential of growth would be able to increase their borrowing in comparison to low quality companies with less profitability and with no tendency of growth, which, thus, are exposed to a higher margin of bankruptcy costs (Haris and Raviv, 1991; Ross, 1977).

### 3. Literature Review

In their joint study that they carried out in 1958, Modigliani and Miller examined the effects of capital structure on company value under the hypothesis of effective market conditions and a tax-free medium, and they suggested that there was no correlation between company value and capital structure (Modigliani and Miller, 1958). Later on, the correlation between company value and capital structure was examined by various other researchers with fewer hypotheses, and factors such as taxes, asymmetrical information problem and agency costs were included in those studies. In a study conducted in 1963, on the other hand, Modigliani and Miller included the effect of corporate tax on capital structure in their model and they reported that the companies, due to the tax advantages resulting from the deduction of interests paid in return for debts, could increase their market values by increasing their debt levels (Modigliani and Miller, 1958). The tax advantage in question has been noted in the relevant literature as the non-debt tax shield. In their study, Stiglitz (1988), Haris and Raviv, (1991) found that as the companies chose to finance themselves through borrowing and increased their debt, the risk of failing to pay the capital and the interest increased as well.

In his study he carried out in 88 companies traded in the Chinese Stock Market, Chen (2004) found that the companies, whose directors principally chose to finance the firm with its own equity capital instead of external debt financing, those companies' financial preferences were impacted by institutional differences, financial limitations and company-specific factors, and that the companies acted in accordance with financial hierarchy theory. Furthermore, they also found a negative correlation between long-term borrowing and

profitability, and the size of the company, and a positive correlation between long term borrowing and growth opportunities and fixed assets.

In his study, Bredeea (2013) found that companies had a targeted debt amount and tried to adopt to that particular amount, and had negative correlation between profitability and long term borrowing, and that since more profitable companies had internal finance sources they could resort to, they could borrow less and finally they used the financial hierarchy model. Additionally, he also reported that as the market value of the companies increased, they resorted more to borrowing than equity capital financing.

In their joint study in which they used the data of 26.474 companies operating in 41 different countries, Clark et al. (2008) found that the trade-off theory was operational in developed and developing countries and that the companies analyzed partially accommodated themselves to the targeted capital structures. Furthermore, they also suggested that the legal and institutional factors had various impacts over the capital structures of companies operating in developed and developing countries.

In his study that he carried out with the companies operating in England between 1959 and 1974, Marsh (1982) examined the preferences of companies between equity capital and debt and suggested that the debt rates the companies targeted were functions of company size, bankruptcy risks and capital structure. Moreover, he also stated that the small companies with high risk of bankruptcy and weak fixed asset structure preferred equity asset financing instead of being financed through borrowing and the companies with high amounts of fixed assets, on the other hand, preferred long term borrowing.

In his study in which he examined the effect of company size and the capital structure of the sector that the company is operative in, Gupta (1969) reported that there was a negative correlation between the size of the company and debt rates. Moreover, he also concluded that small companies preferred short term and big companies preferred long-term borrowing.

As a result of the analysis of the data of 37 Ethiopian companies, Umer (2014) found a positive correlation between the companies' borrowing rates and the size, age, asset structure, liquidity and non-debt tax shield; and a negative correlation between companies' profitability and dividend distribution rate. The researcher emphasized that the findings were in line with the theory of agency costs.

In their study, in which Sarioğlu et al. (2013) examined the factors affecting the capital structure decisions of the companies operating in the cement, automotive industry and IT sectors, whose equity securities were traded at the ISE (Istanbul Stock Exchange) in the 2007-2011 period,

they have reached findings supporting the view that there were some differences in terms of the factors determining the capital structures in the sector and the trade-off theory was operative in the cement and IT sectors. Besides, they also found a positive correlation between the company size, asset structure and capital structure supporting the theories of capital structure in the IT sector. They reported that in the cement and IT sectors, on the other hand, there was a positive correlation between the company size and financial leverage ratio.

In their study in which they analyzed the correlation between the capital structures of 104 companies traded at ISE during the 1992-2001 period and their profitability by taking the economic crisis period into account, Kısakürek and Aydın (2013) found that the companies chose to finance themselves with their own equity capital for the period of analysis. Besides, they also found a positive correlation between capital structure, sale profitability and return on asset; and a negative correlation between capital structure and return on equity. They suggested that the findings of the study appeared to support the financial hierarchy theory.

In their study in which they examined the capital structure of 42 IST-registered companies in the Main Metal Industry and Metal Smith, Machinery and Tools Manufacturing industries in the 2003-2007 period, Ata and Ağ (2010) found a positive correlation between borrowing amount and company size; and a negative correlation between borrowing amount and liquidity rate, and between interest coverage ratio and company growth rate. As a result of their analyses, the researchers concluded that big companies utilized more of foreign financial sources in order to take advantage of tax benefits and their findings were in line with the trade-off theory. Moreover, they suggested that since big companies had circulating assets of a higher value and their advantages of generating cash by which they could finance their investments as a result of their activities, they preferred to borrow less and this situation verified the theory of financial hierarchy. Another finding of the researchers was that the companies with high interest coverage ratio and with high growth rate utilized their own financial sources to maintain their commercial activities, therefore borrowing less. Thus, these findings supported the financial hierarchy theory.

In their joint study, in which they explicated the borrowing behavior of the biggest 1000 industrial firms operating in the period of 1993-2007 in Turkey as listed by Istanbul Chamber of Industry, Okuyan and Taşçı's (2010) analyses revealed which capital structure was more successful. The researchers concluded that the companies resorted to utilizing self-funding for their financial needs. This finding was compatible with the financial hierarchy theory.

The study in which Demirhan (2009) analyzed the factors determining the capital structures of service sector companies operating at ISE in 2003 and 2006 concluded that the most important factors affecting the capital structure were profitability, company liquidity and asset structure of the companies. The findings of the study were in compliance with the financial hierarchy theory.

Durukan(1997) reported that the most important factors determining the capital structure of the 68 companies traded at ISE in the 1990-1995 period were profitability and non-debt tax shield. These findings were in compliance with the financial hierarchy theory.

In their study in which they examined the factors decisions of the capital structure of 16 automotive industry companies traded at the ISE in the 2003-2006 period, Korkmaz et al. (2009) concluded that the most important factors were the variables of return on equity and non-debt tax shield, and their finding supported the financial hierarchy theory.

Bayrakdaroğlu et al. (2013) reported that 242 companies traded at the ISE in the 2000-2009 period acted in accordance with the financial hierarchy theory in their borrowing behavior and they did not set a target borrowing rate for themselves. Furthermore, they concluded that the large companies in comparison to small ones borrowed more and the companies with opportunities to grow more had higher rates of borrowing. Another finding that the researchers drew attention to, was the fact that while companies preferred to finance with their own equity sources during the periods of high inflation, they chose to borrow more during the high taxation periods.

Yıldırım and Eceyurt (2012) found that the factors determining the capital structure of companies in the Food-drink Industry traded at the IST in the period of 2002-2011 were profitability, operating risks, growth opportunities and liquidity, and reported that their findings were in compliance with the theories of trade-off and financial hierarchy.

Terim and Kayalı (2009) examined the capital structure of companies operating in the manufacturing industry traded at the ISE in the 2000-2007 period, and their findings were inclined to support the trade-off theory for the period of 2003 and 2004, and for the remainder of the period of research, the findings supported the financial hierarchy theory.

In his study in which he analyzed the capital structure of 24 SME (Small and Medium Sized Enterprises) companies traded at the ISE during the 1996-2007 period, Güler (2010) revealed that there was a positive correlation between the variables of non-debt tax shield and company size and companies' financial leverage ratios; and a negative correlation between the variable of

liquidity and companies' leverage ratios. The findings revealed that SMEs acted in accordance with the financial hierarchy theory.

In their study, in which they examined the factors affecting capital structure decisions of Istanbul Stock Exchange (ISE) lodging companies in the 1994-2006 period, Karadeniz et al. (2009) found that effective tax rates, tangibility of assets and return on assets are negatively related to the debt ratio, while free cash flow, non-debt tax shields, growth opportunities, net commercial credit position, and firm size do not appear to be related to the debt ratio. Besides, they also suggested that the findings of the study tended to partially support the pecking order theory.

#### **4. Research Method**

##### *4.1. Aim of the Research and Its scope*

The aim of this research is to determine the factors that affect the capital structure of companies in the automotive, food & drink and textile-leather industries whose shares were traded at the Borsa Istanbul (BIST) covering the period of 2006-2014 and to identify the industry-specific differences with respect to their capital structures. To this end, the study primarily identified the companies in the automotive, food & drink and textile & leather industries that were continuously traded at the BIST in the period of 2006-2014. The number of companies included in the study was 15 in the automotive industry, 17 in the food & drink industry and 16 in the textile & leather industry. The data used in the study were obtained from the financial statements of the companies concerned.

##### *4.2. Developing the Research Method*

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There are many studies available in the relevant literature done in an attempt to identify the factors determining the capital structures of companies. The fact of how capital investments should be financed has an important place within finance theory and the capital structure is defined as the ratio of long term debts in proportion to equity capital. In their studies, researchers used the ratio of the total debts, long term debts and short term debts representing companies' capital structures in proportion to equity capital and the total assets as the dependent variable (2013). Since the companies in Turkey as a developing country have a limited access to finances and long term borrowing in the existing capital markets, it is clearly seen that the cost of short term borrowing within the capital markets is very high. Therefore, in this study, the ratio of long term debts, short term debts and total debts in proportion to the total assets was used as the capital structure ratio. The independent variables in this study, on the other hand, were determined by using the

previous studies that examined capital structures and they were focused on below based on the their effects on their theoretical approaches.

#### 4.2.1.1. Profitability

While the trade-off theory suggests that there is a positive correlation between borrowing levels and profitability of companies with the effect of tax advantages, the hierarchy theory explicates that when they are in need of funding, the companies prefer to resort to internal funds and they only resort to external funds in the case of insufficiency of internal funds (Halaç and Durak, 2013; Nunes and Serrasquerio, 2007). Therefore, in contrast to the trade-off theory, the theory of financial hierarchy suggests that the companies with high profitability would borrow less. In research, return on assets and return on equity data are generally used as profitability indicators. However, in all three sectors due to the high correlation between the two variables, return on assets has been used as a measure of the variable of profitability in this study.

#### 4.2.1.2. Company Size

Literature review demonstrates that it is possible to talk about an uncertainty regarding the connection between capital structure and company size (Chen, 2004). According to the financial hierarchy theory, there is a negative correlation between company size and borrowing ratio (Gupta, 1969). Studies that advocated this theory suggested that internal funds of big companies would be greater than small companies and thus big companies would borrow less. The trade-off theory, in contrast to the financial hierarchy theory, suggests that small companies would borrow less, compared to big companies due to their intrinsic risks (Cotei and Farhat, 2009). In this study, natural logarithm of assets was used as a measure of the variable of company size.

#### 4.2.1.3. Asset Structure

Several studies that examined capital structure suggested that there was a positive correlation between fixed assets of companies and their borrowing levels, since these companies could pledge their fixed assets while borrowing (Chen, 2004). According to the trade-off theory, the companies that have the opportunity to grow in intangibles have a tendency to borrow less in comparison to companies with high value assets; it is due to the fact that their growth opportunities could be pledged while borrowing (Hovakimian et.al.,2001). From this point of view, it is possible to argue that companies with higher value assets could borrow more. In this study, the ratio of fixed tangible assets in proportion to the total assets was used as the measure of the variable of asset structure.

#### 4.2.1.4. Liquidity

According to the financial hierarchy theory, there is a negative correlation between liquidity ratio and the ratio of borrowing. It is due to the fact that the strength of liquidity of a company signifies that the company itself could self-finance its own investments and borrow less (Ata and Ağ, 2010). On the other hand, company directors increase the agency costs of borrowing by paying out the assets of the company as dividends, which is in favor of shareholders, but disfavor of creditors. This particular situation is a sign of a negative correlation between liquidity and the level of borrowing (Sarioğlu et al., 2013). In this study, acid-test ratio was used as an index of the variable of liquidity.

#### 4.2.1.5. Non-Debt Tax Shield

In several studies on capital structure, a negative correlation was found between non-debt tax shield and the level of borrowing. As tax shield advantage allowing the companies to deduct the amount of interest incurred by borrowing from accrued tax could be accounted as expenditure, the depreciation that allow tax advantages to the companies are defined as non-debt tax shield (Durukan, 1997). However, there are some studies in the relevant field indicating a positive correlation between non-debt tax shield and level of borrowing (Okuyan and Taşçı, 2010; Karadeniz et.al., 2009). In this study, the ratio of depreciation costs in proportion to total assets was used as a representative of non-debt tax shield variable.

#### 4.2.1.6. Growth

It is suggested that there is a positive correlation between the growth rate and level of company debt. Since the companies with a high rate of growth may be insufficient in meeting self-funded investments, they would borrow more (Gupta, 1969). However, there are also some studies that reported a negative correlation between the level of borrowing and the level of growth (Ata and Ağ, 2010). In this study, the annual increase percentage in sales was used as the rate of growth.

#### 4.2.1.7. Company Risks

The volatility observed in the company revenues increases the likelihood of companies to face financial hardships and cause them to fail to take on the ensuing responsibilities of debt. Therefore, it is possible to talk about a negative correlation between company risk caused by the volatility observed in corporate revenues and level of borrowing (Demirhan, 2009). In this study, the percentage change in the operating profits of the company was used as an index for company risks.

Explanations on the dependent and independent variables abbreviated in the models are presented in Table 1.

**Table 1: Dependent and Independent Variables Used in the Study**

Variables	Notations	Explanations
Dependent Variables	TD/TA	Total Debts/Total Assests
	LTD/TA	Long Term Debts/Total Assests
	STD/TA	Short Term Debts/Total Assests
Independent Variables	ROA	Return on Assets
	CS	Company Size
	AS	Asset Structure
	ATR	Acid-Test Rate
	NDTS	Non-Debt Tax Shield
	GRW	Growth
	CR	Company Risk

#### 4.2.2. Model

In this study, in an attempt to indentify the factors determining capital structure, the method of panel data analysis, allowing the joint analysis of the section series and time, was used. The models used in the study were designed in reference to the relevant literature review (Nunes and Serrasquerio, 2007; Saroğlu et.al., 2013, Chen, 2004; Kısakürek and Aydın, 2013; Okuyan and Taşcı, 2010; Karadeniz et.al., 2009) and they were individually tested for each and every industry. The analyses were conducted using the Stata 10.0 program. The models are described below:

Model 1:  $TD/TA_{it} = \alpha_{it} + \beta_1 ROA_{it} + \beta_2 CS_{it} + \beta_3 AS_{it} + \beta_4 ATR_{it} + \beta_5 NDTS_{it} + \beta_6 GRW_{it} + \beta_7 CR_{it} + \varepsilon_{it}$  (1)

Model 2:  $LTD/TA_{it} = \alpha_{it} + \beta_1 ROA_{it} + \beta_2 CS_{it} + \beta_3 AS_{it} + \beta_4 ATR_{it} + \beta_5 NDTS_{it} + \beta_6 GRW_{it} + \beta_7 CR_{it} + \varepsilon_{it}$  (2)

Model 3:  $STD/TA_{it} = \alpha_{it} + \beta_1 ROA_{it} + \beta_2 CS_{it} + \beta_3 AS_{it} + \beta_4 ATR_{it} + \beta_5 NDTS_{it} + \beta_6 GRW_{it} + \beta_7 CR_{it} + \varepsilon_{it}$  (3)

## 5. Empirical Results

The results of the Breusch-Pagan Lagrange Multiplier Test applied to determine whether pooled or fixed effects model is more appropriate in estimating the models established in the study are separately given for each sector and model in Table 2.

The  $H_0$  hypothesis of the Breusch-Pagan Lagrange Multiplier Test suggests the pool model. We can observe on Table 2 that the  $H_0$  hypothesis was rejected for all models for each sector. In other words, the random effect regression was more appropriate for the data.

**Table 2: Breusch-Pagan Lagrange Multiplier Test**

Automotive			
	Model 1	Model 2	Model 3
<b>chi2(1)</b>	108.01	92.36	109.93
<b>Prob&gt;chi2</b>	0,0000	0,0000	0,0000
Food&Drink			
	Model 1	Model 2	Model 3
<b>chi2(1)</b>	236.90	166.69	80.32
<b>Prob&gt;chi2</b>	0,0000	0,0000	0,0000
Textile&Leather			
	Model 1	Model 2	Model 3
<b>chi2(1)</b>	148.27	111.34	137.08
<b>Prob&gt;chi2</b>	0,0000	0,0000	0,0000

In estimating the model, the results of the Hausman Test applied in order to make a choice between random effects and fixed effects models are separately given for each sector and model in Table 3.

**Table 3: Hausman Test**

Automotive			
	Model 1	Model 2	Model 3
<b>chi2(1)</b>	36.02	29.29	14.64
<b>Prob&gt;chi2</b>	0,0000	0,0001	0.0410
Food&Drink			
	Model 1	Model 2	Model 3
<b>chi2(1)</b>	34.09	8.29	2.24
<b>Prob&gt;chi2</b>	0.0000	0.3078	0.9450
Textile&Leather			
	Model 1	Model 2	Model 3
<b>chi2(1)</b>	41.18	14.17	24.46
<b>Prob&gt;chi2</b>	0.0000	0.0483	0.0009

The  $H_0$  hypothesis of the Hausman Test suggests the random effects model. We can observe in table 3 that the  $H_0$  hypothesis was rejected for all models in the automotive and textile & leather industries; for Model 1 in the food & drink industry. In other words, the fixed effect regression was appropriate for these models. Furthermore, the  $H_0$  hypothesis was not rejected for the Model 2 and Model 3 for the food & drink industry. In other words, the models in question should be estimated by the use of the random effects model.

In order for the results to be reliable, it should be examined whether there is a problem of autocorrelation and heteroscedasticity in the models. Whether there was autocorrelation for every model in the sector was measured by the Durbin-Watson test. When the statistical findings of the test were analyzed, it was observed that there was autocorrelation in all the models. The results are illustrated in Table 4.

**Table 4: Durbin-Watson Test**

<b>Automotive</b>			
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
<b>Durbin-Watson</b>	0.75439287	1.4181047	0.98677828
<b>Food&amp;Drink</b>			
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
<b>Durbin-Watson</b>	1.2290657	1.4939081	1.4483373
<b>Textile&amp;Leather</b>			
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
<b>Durbin-Watson</b>	1.1530677	1.5350217	1.2432246

Wald Test was used to observe whether there was heteroscedasticity problem in all models for the automotive and textile & leather industries and in Model 1 for the food & drink industry. Based on the findings, the H0 hypothesis was rejected. Therefore, there exists the problem of heteroscedasticity in the models in question. The results are presented in Table 5.

**Table 5: Wald Test**

<b>Automotive</b>			
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
<b>chi2(1)</b>	875.19	1618.99	2617.78
<b>Prob&gt;chi2</b>	0,0000	0,0000	0,0000
<b>Food&amp;Drink</b>			
	<b>Model 1</b>		
<b>chi2(1)</b>	3635.92		
<b>Prob&gt;chi2</b>	0.0000		
<b>Textile&amp;Leather</b>			
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
<b>chi2(1)</b>	2042.46	2039.71	3038.46
<b>Prob&gt;chi2</b>	0.0000	0.0000	0.0000

Levene, Brown and Forsythe Test was utilized to observe whether there was heteroscedasticity problem in Model 2 and in Model 3 for the food & drink industry. The Levene, Brown and Forsythe Test statistics (w0, w50, w10) with the degree of freedom of (16, 136) for the food & drink industry were compared with the Snedecor F table and the H0 suggesting that “the variations of the

sections were equal” was rejected. Therefore, there exists the problem of heteroscedasticity in all the models in question. The results are illustrated in Table 6.

**Table 6: Levene, Brown ve Forsythe'nin Test**

<b>Food&amp;Drink</b>		
W0 = 5.9167485	df(16, 136)	Pr > F = 0.00000000
W50 = 4.1191453	df(16, 136)	Pr > F = 0.00000210
W10 = 5.9167485	df(16, 136)	Pr > F = 0.00000000

In order to correctly estimate the models by overcoming the problems of autocorrelation and heteroscedasticity, all the models were corrected by the PCSE approach (Panel Corrected Standard Errors) and were estimated again.

Findings of this study for each sector scrutinized are individually given in Appendix 1: Table 7.

For automotive companies, the explanatory power of Model 1 was 40.85% and the validity of the regression equation was also very powerful. The findings of our study revealed that the return on assets, asset structure and liquidity factors were effective over the total debt levels of the companies. The coefficient of the factors in the estimated regression equation in question was negative. According to the financial hierarchy theory, when companies are in need of funding, they principally choose to use internal funding, and in case the internal funds are insufficient, they would choose to resort to borrowing (Halaç and Durak, 2013; Nunes and Serrasquerio,2007). Therefore, this theory suggests that the companies with high profitability borrow less and the correlation between return on assets and level of borrowing is also in line with this hypothesis. According to the financial hierarchy theory, there is a negative correlation between liquidity ratio and the ratio of borrowing. It is because, the strength of liquidity of a company signifies that the company itself could self-finance its own investments and borrow less (Ata and Ağ, 2010). In the model, the negative relationship between liquidity and total debt ratio also supports the financial hierarchy theory. However, there is, contrary to expectations, a negative correlation between the asset structure and the level of borrowing. The negative correlation in question in the literature is explained by the financial hierarchy theory. Accordingly, when some investors invest in companies with high value tangible fixed assets, they are faced with less of a problem of asymmetrical information, and therefore, they choose to go into a partnership rather than lending to the company. Therefore, the companies with high value tangible fixed assets emphasize self-finance through their equity capital and borrow less (Sayılğan and Uysal, 2011).



For automotive companies, the explanatory power of Model 2 is 12.17%, and the validity of the regression equation was also very high. The findings clearly demonstrated that the single factor impacting long-term debt level of automotive companies was liquidity. The coefficient of liquidity in the regression equation was negative and this finding supported the financial hierarchy theory.

For the period of analysis, the explanatory power of Model 3 was 36% and the validity of the regression equation was also very high. The findings clearly demonstrated that the factors impacting the short-term debt level of automotive companies were asset structure and non-debt tax shield. The negative correlation between liquidity and asset structure and short term borrowing was in parallel to the financial hierarchy theory. A positive correlation between non-debt tax shield and short term was found. In other words, as the automotive companies' non-debt tax shields increase, they choose to borrow on short-term basis in order to finance their assets.

For food & drink companies, the explanatory power of Model 1 was 40.64%, and the validity of the regression equation was also very powerful. The findings clearly demonstrated that the factors such as the return on assets, asset structure and liquidity of the companies in the food & drink industry were effective on the total debt level of companies. The coefficient of these factors in the estimated regression equation in question was negative. The negative correlation between these factors and short-term borrowing was compatible with the financial hierarchy theory.

For food & drink companies, the explanatory power of Model 2 was 14.23%, and the validity of the regression equation was also very high. The findings clearly demonstrated that the factors impacting the long-term debt level of food & drink companies were company size, asset structure and liquidity. For the period of analysis, it was observed that the coefficient of these factors impacting the long-term debt were negative and this negative correlation was in parallel to the financial hierarchy theory.

For food & drink companies, the explanatory power of Model 3 was 46.78%, and the validity of the regression equation was also very high. The findings demonstrated that the factors impacting the short term debt level of food & drink companies were return on assets, company size, asset structure and liquidity. The coefficients for the variables in the estimated regression equation were return on assets, asset structure and liquidity and negative, and the negative correlation between these variables and the short-term debt supported the financial hierarchy theory. For the period of analysis, it was observed that there was a positive correlation between company size and short-

term borrowing. This finding could be explained by the trade-off theory, which suggests that big companies will borrow more due to their intrinsically lower risks.

For textile & leather companies, the explanatory power of Model 1 was 49.92%, and the validity of the regression equation was also very powerful. The findings clearly demonstrated that company size, asset structure, liquidity and non-debt tax shield were effective for the total debt levels of the companies operating in the textile & leather industry. The coefficients of company size, asset structure and liquidity factors in the estimated regression equation were negative and the negative correlation for each variable was in parallel to the financial hierarchy theory. A positive correlation between non-debt tax shield and total debt ratio was found. In other words, as the textile & leather companies' non-debt tax shield increased, they choose to borrow more in order to finance their assets.

For textile & leather companies, the explanatory power of Model 2 was 31.71%, and the validity of the regression equation was also very high. The findings demonstrated that the factors impacting the long-term debt level of textile & leather companies were asset structure, liquidity, non-debt tax shield, and company risks. For the period of analysis, a positive correlation was found between the asset structure and long-term borrowing. According to the trade-off theory, while the companies with high value tangible fixed assets resort to borrowing, for they are able to pledge their fixed assets while borrowing, they would be able to borrow more. Therefore, this particular finding seems to support the trade-off theory. The findings demonstrated that there was a negative correlation between non-debt tax shield and long-term borrowing. According to the trade-off theory, out of debt tax shields provide companies with opportunities that would substitute the characteristics of the tax shield of their taxes and companies would be able to protect their revenues against taxation by using their non-debt tax shields instead of utilizing the tax shield through borrowing. Therefore, the companies with a high level of non-debt tax shield might not need the tax shield obtained through borrowing (Sayılğan and Uysal, 2011). Thus, our findings were compatible with the trade-off theory. The negative correlation between liquidity and long term borrowing was in parallel to the financial hierarchy theory. Another finding in the study was, in contrast to general expectation that there was a positive correlation between company risks and long term borrowing. This particular situation might have stemmed from the fact that borrowing has become attractive due to the recent decrease in the interest rates in Turkey.

For textile & leather companies for the period of analysis, the explanatory power of Model 3 was 58.08%, and the validity of the regression equation was also very high. The findings demonstrated that the factors impacting the

short-term debt level of textile & leather companies were company size, asset structure, liquidity and non-debt tax shield. The coefficients for the company size, asset structure and liquidity variables in the estimated regression equation were negative and the negative correlation between these variables and short-term borrowing supported the financial hierarchy theory. A positive correlation between non-debt tax shield and short term was observed. In other words, as the automotive companies' non-debt tax shield increased, they chose to borrow on short term in order to finance their assets.

Factors affecting the capital structure are separately given for each sector and model in Appendix 2: Table 10.

## 6. Empirical Results

Capital structure always attracted a special interest in the finance literature due to its possible effects on the company value and various hypotheses were theorized in an attempt to identify the factors determining the capital structure, and the validity of these hypotheses were tested on various cross-sectional units. Similarly in this study, the capital structures of automotive, food & drink, and textile & leather industries in Turkey, known as the pioneering industries, which significantly contribute to the country's exports, were examined for the period between 2006 and 2014. The aim of this study was to find out whether the factors determining the capital structures across sectors were different.

Based on the findings of our analyses, the factors determining the capital structures differed across the sectors. While return on assets, asset structure and liquidity were effective on the total debt ratio in the automotive and food & drink industries; company size, asset structure, liquidity and non-debt tax shield were effective in textile & leather industry. The analysis of the long-term debt findings demonstrated that liquidity in the automotive industry; company size, asset structure and liquidity in the food & drink industry; asset structure, liquidity, non-debt tax shield and company risk in the textile & leather industry were the factors that impacted the capital structure. In our study we also examined the factors that were effective on short-term borrowing since the short-term borrowing constituted a significant portion within the capital structures of companies in Turkey. Based on our analyses, the factors such as asset structure, liquidity and non-debt tax shield in automotive industry; return on assets, company size, asset structure and liquidity in food & drink industry; company size, asset structure, liquidity and non-debt tax shield in textile & leather industry were effective on short term borrowing.

While the findings obtained from the debt level models established for the automotive industry concluded that the financial hierarchy model was effective on the companies operating in the period of analysis; for the

food & drink, and textile & leather industries, it was observed that both financial hierarchy theory and the trade-off theory were effective.

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## Appendix 1

Table 7: PCSE Model for the Industries

Automotive						
	Model 1: TD/TA		Model 2: LTD/TA		Model 3: STD/TA	
	Coefficient	p-Value	Coefficient	p-Value	Coefficient	p-Value
ROA	-0.0895341	0.023	-0.0355488	0.107	-0.0539853	0.078
CS	-0.0063192	0.731	-0.0009559	0.938	-0.0053633	0.550
AS	-0.3502782	0.027	-0.0204912	0.673	-0.329787	0.035
ATR	-0.0425501	0.000	-0.008647	0.000	-0.0339031	0.000
NDTS	1.85373	0.073	-0.4064383	0.313	2.260168	0.020
GRW	-0.0002722	0.997	0.014541	0.627	-0.0148132	0.784
CR	0.0055563	0.085	0.0023183	0.330	0.003238	0.271
(_CONS)	0.6216428	0.000	0.1493361	0.103	0.4723066	0.000
R <sup>2</sup>	0.4085		0.1217		0.3600	
F Statistic	70.32		35.24		73.24	
Prob.(F Statistic)	0.0000		0.0000		0.0000	
Food&Drink						
	Model 1: TD/TA		Model 2: LTD/TA		Model 3: STD/TA	
	Coefficient	p-Value	Coefficient	p-Value	Coefficient	p-Value
ROA	-0.7000671	0.000	0.0999048	0.329	-0.799972	0.000
CS	-0.0018358	0.888	-0.0357978	0.001	0.0339619	0.015
AS	-0.4604071	0.000	-0.1161272	0.030	-0.3442799	0.000
ATR	-0.1047496	0.000	-0.0219964	0.000	-0.0827532	0.000
NDTS	-0.0413996	0.408	-0.0504061	0.410	0.0090065	0.871
GRW	0.0530557	0.307	0.0064387	0.816	0.046617	0.394
CR	0.0033067	0.191	0.0029111	0.174	0.0003955	0.666
(_CONS)	0.9180708	0.000	0.5156877	0.000	0.4023831	0.001
R <sup>2</sup>	0.4064		0.1423		0.4678	
F Statistic	146.42		25.53		151.63	
Prob.(F Statistic)	0.0000		0.0006		0.0000	
Textile&Leather						
	Model 1: TD/TA		Model 2: LTD/TA		Model 3: STD/TA	
	Coefficient	p-Value	Coefficient	p-Value	Coefficient	p-Value
ROA	-0.1612704	0.518	-0.0723414	0.526	-0.088929	0.640
CS	-0.0766339	0.011	-0.0159017	0.398	-0.0607322	0.024
AS	-0.3306441	0.000	0.3467474	0.000	-0.6773915	0.000
ATR	-0.0811473	0.000	-0.0074502	0.001	-0.0736971	0.000
NDTS	1.815416	0.001	-1.378295	0.000	3.193711	0.000
GRW	0.0167513	0.241	0.0133717	0.152	.0033796	0.760
CR	0.0005169	0.529	0.0009315	0.023	-0.0004146	0.443
(_CONS)	1.307109	0.000	0.2062815	0.168	1.100828	0.000
R <sup>2</sup>	0.4992		0.3171		0.5808	
F Statistic	254.89		107.54		239.75	
Prob.(F Statistic)	0.0000		0.0000		0.0000	

## Appendix 2

Table 10: Factors Affecting the Capital Structure

	Automotive			Food&Drink			Textile&Leather		
	Model 1 TD/TA	Model 2 LTD/TA	Model 3 STD/TA	Model 1 TD/TA	Model 2 LTD/TA	Model 3 STD/TA	Model 1 TD/TA	Model 2 LTD/TA	Model 3 STD/TA
ROA	-	NA	NA	-	NA	-	NA	NA	NA
CS	NA	NA	NA	NA	-	+	-	NA	-
AS	-	NA	-	-	-	-	-	+	-
ATR	-	-	-	-	-	-	-	-	-
NDTS	NA	NA	+	NA	NA	NA	+	-	+
GRW	NA	NA	NA	NA	NA	NA	NA	NA	NA
CR	NA	NA	NA	NA	NA	NA	NA	+	NA