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Ownership structure in BIST - Capital structure relation Granger causality test a comparative application between BIST industrial index and service index

By Gökhan ÖZER [a†] & Ali Korhan ÖZEN [b]

Abstract. In this study, it was aimed to determine whether there is a bidirectional relationship between the ownership and capital structures through the variables representing the ownership and capital structures of 142 businesses, which are included in the Service and Industrial Indexes of Borsa Istanbul (BIST) between the years of 2006-2014. The capital structure in the research is represented by the leverage ratio (TBTV), which determines the extent to which a business is dependent on debt and to determine how much of the assets owned by the business are financed with debt, while the ownership structure is represented by the largest shareholder's equity (EBOP), the foreign share (YAP), the corporate investor ratio (KURY) and the number of the shareholders with more than 10% share of the business (ORTAK). The factors influencing the bi-directional causality between the ownership and the capital structures were researched with the Panel Vector Autoregressive Model (VAR). In the scope of the VAR analysis, Granger causality test and the impulse response analyzes were also performed. It was found in the result of the analysis that in the model where the capital structure (TBTV) is a dependent variable in the service index, none of the independent variables belonging to the ownership structure has a causality relation through the TBTV. In the model where the variables belonging to the ownership structure were dependent variables, it was found that the independent variable belonging to the capital structure (TBTV) is the reason of the change in the ownership variables of EBOP, HAO and KURY variables. According to the results obtained, 1 period delay in the capital structure causes decrease in EBOP and HAO; increase in KURY. As to the businesses in the industrial index, a causality relationship was not seen between the ownership structures and the capital structures in the context of these variables and the two structures do not effect each other.
Keywords. Ownership structure, Capital structure, Granger casuality, BIST.
JEL. C33,G10, G32.

1. Introduction

In this article, the casual relationship between the ownership and capital structure indicators belonging to the industrial index and service index businesses in the BİST was tested using the Granger causality test and the relationship between the ownership and the capital structures was examined. The conflicts of interest between business owners, managers and the other stakeholders and the conflicts of interest between the control holders of the business and the stakeholders, who follow from the outside, constitute the center of corporate governance literature. The similarities can be observed in corporate ownership and the capitalstructures in the enterprises as well as serious differences. These differences can affect the financial performance of the business as well as these

[a†] Gebze Technical University, Kocaeli, Turkey.
. +90 (262) 605 14 12
. gokozerhan@gmail.com
[b] Gebze Technical University, Kocaeli, Turkey.
. 0262 605 10 00
. akorhanozen@gmail.com

impacts arising from these differences affect both the formation decisions of the ownership and capital structures. The existing capital structure of a business refers to the association of the debt and stockholders' equity used in the financing requirement of the business. The construction of the capital structure of the business and the formation of a structure according to this is one of the most important financial issues for which a business is obliged to make a decision. These decisions have an undeniable importance on the financial structure, ownership structure of the business and the profitability, which is one of the main reasons for the establishment of the business. The founding partners, shareholders and managers responsible for the financing of the business are trying to create a capital composition that will increase the value of the business or increase the satisfaction of the business partners.

Until 1958, the management directors have focused on the capital composition that was unaltered for any situation and had the aim of reaching the most appropriate capital structure. However, a s, carried out by Modigliani and Miller (M&M) has revealed that there is no correlation between the capital composition and capital cost, in other words, business value and the business risk is more remarkable in this respect. In other words, it can be said that the first model of business finance theory in the modern sense began with the study of M&M's study on the capital composition. Also, numerous studies have been carried out on the variables that affect the construction of the capital structures of the companies in the period following the M&M model, which is revealed in the modern sense.

Very different results were obtained according to the factors used in the studies aiming to show what the capital structure is. In these studies, briefly the subject of the theory of the trade-off tax, the subject of the finance hierarchy information asymmetry, the effective markets for M&M model and finally the importance of the representative costs as representative theory are mentioned.

The concept of the ownership means to have the right to be able to make savings and to transact related to the existing entity due to having right of usage of this entity. The notion of the ownership concentration refers to the control of a large amount of the existing shares belonging to the business by a certain person or persons. In parallel with the gradually growing business structures, the increase of the shareholders has led to some changes in the existing ownership structures of the businesses and this change also continues today.

2. Theory and literature

2.1. The ownership structure

The opinion of expanding of the capital owners to a wide basis in the businesses, (in other words having a low intensity partnership structure) and the business is being controlled by the managers has been possessed in the corporate financing for a long time. The starting point for this view by many authors is Adolph Berle and Gardiner Means' "Modern Institutions and Private Property", 1933. Berle & Means (1933) noted in this book that the businesses in USA that have a capital structure spread on wide basis are prevalent and remarked that the ownership of the capital is scattered among the small shareholders and also the control is concentrated in the hands of the top managers. Therefore, it is thought that this work caused the formation of a literature in a supervisory framework (La Porta, *et. al.,* 1999; Demsetz & Lehn, 1985). After this work, a conflict of the interest between the managers and the shareholders is being intensively studied by researchers who try to understand the nature of the companies (Jensen & Meckling, 1976; Demsetz & Lehn, 1985). Jensen & Meckling (1976). It has been argued that the low-level shareholder managers cannot maximize the shareholder wealth, and this is because these managers have the tendency to use additional funds.

Nevertheless, Demsezt & Lehn (1985) argues that the shareholders have both advantages and disadvantages from their intensity is the ownership structure. According to the authors, the benefits that the owners have in reducing the share of the ownership form a disadvantage for a greater intensity. According to this, the

owners can direct their energy and their time to the works that the benefits of these works remain completely for themselves. The cost of avoiding from ownership will most likely to be lower company performance and the result of this also be shared by all the shareholders at the rate of their ownership.

However, the managerial point of view started to be questioned in the later empirical studies and it is revealed that the ownership is distributed at more reasonable (in a not low intensity) levels in publicly owned businesses both in the examples from USA and other developed and underdeveloped countries. La Porta, *et. al.,* (1999) in their studies, summarized the studies that provided the evidences of increased management ownership at the end of 90's. The authors found in their samples that the 36% of the large companies are in the low-intensity and 30% of them are controlled by the family or individuals, 18% of them are controlled by the government, 5% of them are controlled by a low intensity financial institution and 5% of them are controlled by a low intensity business. For smaller businesses, the percentage of the companies controlled by the family rose to 53%. According to the authors, these studies show that large companies in many countries have large shareholders and that these shareholders also take an active role in corporate governance (La Porta *et. al.,* 1999)

La Porta *et. al.,* (1999) divide the corporate ownership into two as widely held companies and the companies with ultimate owners. However, the authors use the groups as family or individual for important owners, Government, the financial institutions with low intensity partnership (ownership) structure (like bank or insurance companies), the business with low intensity partnership structure and Other (the cooperative that the control is not on single investor, "voting trust" agreements, etc.). Margaritis & Psillaki (2010) divided the important shareholders into three groups as the family or the family related members, financial institutions and the companies with other ownership structure.

2.2.Capital structure

Capital is one of the most essential and basic characteristic requirements for businesses to continue their assets and activities. The businesses meet their capital needs by applying to variety of sources or by supplying them from their own internal structures. A business provides its funds, which are required to continue to its operations, mainly from two resources as equity or foreign resource. It refers to the credit or debt relationship expressed in foreign resources. The expression of equity refers to the ownership, namely ownership relation. The capital structure, as mentioned above, is the result of the combination of the long term foreign resources and the equity resources used to provide the financing of the business. The financing structure of the business includes all the items on the passive side of the balance sheet. There is a difference between the capital structure and the financing structure. The short-term debts and their responses belonging to the business take place in the financing structure. However, these items do not take place in the capital structure of the business. The financing structure refers to the passive side of the balance sheet and reveals the way of financing. As for the capital structure, it refers to the formation of long-term financing resources (Türko, 2002).

The resources that the business supplies from outside its internal structure, namely the debts an be categorized in three ways as short, medium and long according to their duration. The debts reflect the obligations of the company and the concession money that the business has taken to repay under certain conditions and in a certain term (Türko, 2002). These foreign resources can be seen as directly borrowed, the credits drawn from the bank, the bonds that can be subsequently converted into stocks, the bonds connected to the property etc. (Koller, Goedhart & Wessels, 2005).

The equity is defined as the resources that are not tied to any fixed terms, used in the financing of the activities and put into business by the shareholders with the anticipation of return in the certain periods (Babuşçu & Hazar, 2008). The equity

financing can also be provided by the business in itself through funds, undistributed profits and provisions as well as from outside the company through stock issue. Providing in this way, the costs of the funds to the business, the possible effects to the business risk and the market value should also be taken into consideration (Korkmaz, Başaran & Gökbulut, 2009).

The capital structure is a concept closely related to the business' cost of the capital and it is a combination of long-term resources that the business uses in its operations. The main purpose of the capital structure decisions is to maximize the value of the business on the market by bringing long-term funding sources together and providing an appropriate combination of these sources (Berk, 2007).

The businesses can also benefit from the leverage effect of using the foreign resources of financing by using the tax advantages with the recognition of the interest payments as expense, which belongs to the foreign resources that they have used instead of using the equity. However, this method will benefit the businesses up to a certain level and after a certain period of time, some difficulties can be created in their later on activities. This method is defined as the traditional approach in the literature and it states that there is an optimal capital composition for the businesses. When the businesses reach the optimum composition, they will be able to maximize their value by pulling the capital costs to a minimum level (Schwartz, 1959).

Many factors influence the decision of the financial manager in the business to make the most appropriate determination of the capital structure. The main reason for this is the fact that the situation of each business is different from each other and also the economic situation of the country that the company is located in, industry and the company characteristics and the financial manager's tendencies about the risk affect the decisions related to the capital decisions (Akgüç, 1998).

2.3.The relations between the ownership structure and the capital structure

There are many useful theories instead of a single theory in terms of debt-equity selection. According to the trade-off theory, the companies try to find the balance level between the tax advantage gained by loan and the costs of the financial possible dangers. For this reason, the Equilibrium Theorem predicts that the companies that pay the taxes are reasonably indebted. The Pecking Order Theory states that the businesses will become indebted rather than issuance of securities when internal business resources are not sufficient for the asset financing. According to the theory, the total amount of the reflects the need for the foreign resources (Myers & Majluf, 1984). As to Jensen's Free Cash Flow Theory, the conflicts of interest about the payment policies between the shareholders and the managers are severe, especially when they create significant free cash flow in the business. According to Jensen (1986) The main problem is to motivate the managers to consume money instead of wasting it as it is not corporately active or the managers directing to a investment that brings income below the cash capital cost in their hands. For this reason, the high debt ratios can be used as a disciplinary tool to reduce cash flow expenditure generating from the management, such as the liquidity risk (Jensen, 1986). However, when the cash flow form a business' activities is greater than the profitable investment opportunities, the high debt levels will increase company value, despite the risk of financial difficulty. This theory is suitable for the companies that tend to over-investment. In summary the equilibrium theory emphasizes the taxes, the hierarchy theory emphasizes the information differences (asymmetry) and the free cash flow theory emphasizes the agency costs (Myers, 2001).

Apart from these, Zwiebel's Theory of the Administrative Consolidation reveals that it is a negative situation for the shareholders to increase managers' share of capital in the business. According to the theory, the managers can spend unnecessarily and go on the road of excessive borrowing (due to the possibility of hostile takeover) (Zwiebel, 1996). As to the Representation Theory, the increase in

the ratio of the foreign resources within the total resources increases the efficiency of the managers and reduces the problem of the representation over the equity. This means that on the contrary to the Modigliani & Miller Theory, it shows that the business value is not independent of the cost of the capital (due to the cost of the representation) (Jensen & Meckling, 1976). The relations between the ownership and the capital structures have been examined less relatively to the wide literature between the ownership and the company performance. These studies make predictions intended to managerial avoidance from the risk, monitoring and bankruptcy costs, the threats intended to take over the company and high or low borrowing (financial leverage) in the active financing, according to the growth opportunities of the companies. The theories of ownership and capital structures emphasize the role of the debt in reducing the problem of proxy between the managers and the capital structures (King & Santor, 2008) Jensen & Meckling (1976) argued that the managers prefer low borrowing because it reduces the bankruptcy risk and also Jensen (1986) argued that the shareholders high leverage, especially in the companies with excess free cash flow, because it reduces over investment problem.

In addition to the studies on the ownership and the capital structures is the US companies, Brailsford *et. al.,* (2002) has reviewed the Australian companies, Short, *et. al.,* (2002) reviewed the United Kingdom companies and King & Santor reviewed the Canadian companies. Brailsford *et. al.,* (2002) has found evidence about the non-linear relation between the management ownership level and the leverage; and the linear and positive relation between the outside the business block shareholders and the leverage. As the proxy conflict arises more debt usage need in the low-level management ownership, the managers in the high level management ownership try to reduce their risks to have low borrowing. Anderson & Reeb (2003) has found a significant result that internal business ownership by the managers or the family has no effect on the level of the borrowing.

There are not many theories correlating with the control strengthening mechanisms (binary stock and Pyramid Structure) and the capital structures. In case of binary shares, the organizations, which give the credit, can monitor the control holding shareholders and can put limitations to the contracts. It is expected that the companies with binary stocks will use the lower leverage than those with other low intensity ownership structures (King & Santor, 2008). Bianco & Nicodano (2006) estimated that the owners in the pyramid structure businesses will prefer to enter the loan market and therefore they have to have higher leverage than the single-handed companies.

2.4.The relations between the ownership structure and the capital structure

As stated earlier, there are various aspects of relations between the capital structure and the ownership structures of the businesses. In these studies, examining the relationships between the capital structure and the various forms of the ownership (outside the business block shareholders, management ownership, internal business ownership, control strengthening mechanisms), the effects of the externally taken ownership and on the capital composition were investigated (Jensen, 1986; Brailsford, Oliver & Pua, 2002; King & Santor, 2008). Brailsford, Oliver & Pua (2002) found a nonlinear relationship between the management ownership and the leverage. According to this, the proxy conflict in the businesses with low management ownership is reduced and this leads to a higher level of borrowing. However, where the managers have a significant share of the business' ownership, the managerial ownership leads to the managerial opportunities and lower debt usage (Margaritis & Psilakis, 2010). In addition to this, Demsetz & Villalonga (2001) argued in the empirical studies that it is a low possibility that the professional managers of the businesses are one of the top five shareholders of the business. the 223 companies that were in the samples of the authors, only 138 % of

the companies had a portion of the shares as a management group, while 192 companies have a share of the management at 10%.

One of the problems in the studies that examine the capital and the ownership structures is the causality. In the studies on these two structures, as mentioned above, the effects of the various ownership structures especially on the capital structure or borrowing decisions have been examined. In addition to this, there also studies in which the ownership is used as endogenous (Demsetz, 1983; Demsetz & Lehn, 1985; La Porta, *et. al.,* 1999; Jensen, Solberg & Zorn, 1992). Demsetz & Villalonga (2001) give two examples that show that the company performance influences the ownership structure. According to the authors, leverage purchase of non-managerial shares is an extreme example of changing the ownership structure of the anticipated company performances. The benefits provided by the governance in the form of option contracts on stocks are also the examples of this causality (Demsetz & Villalonga, 2001).

Along with the company performance, the leverage and various other debt ratios, such as industry-specific rates and the sector puppets can also be the determinants of the ownership structure. The leverage, which is an important management mechanism, can also influence the choice of the other management mechanism at the same time (Litov, 2005). However, the effects on the ownership structure of the capital structure indicators as leverage are usually researched indirectly.

There are various studies on the effect of the decisions about the capital structure on internal ownership. Stulz (1988) argues that the high level of leverage enables the managers to control more voting rights according to their shares and thus the debt ratio deviating from a certain value leads to a decrease in the share of the managers. In addition to this, the shares of the company become more risky due to the increase in debt. It is possible that the managers will have to avoid risk when the company's debt increases and have lower share combinations due to their limited wealth. However, there is a possibility of losing his/her job in case of the bankruptcy of the company by not fulfilling the various obligations based on foreign resource usage, and this causes a decrease in the steps to consolidate the stock (Pindado, & de la There, 2008).

Denis & Sarin (1999) has reviewed the ownership and the board structure during 1983-1992. The authors tested whether there is a relationship between the ownership and the management board structures and the changes in the company specific and owner specific determinants of these structures and the previous company performance and the external corporate control threats. Among them, the debt ratio from the company-specific rates (ratio of the total of total debts assets) and the negative relation between the ownership and the ownership of the board have been obtained. Accordingly, one-unit increase in the debt ratio leads to a 6.65% decrease in the internal company and board ownership ratio. The authors did not find a significant relationship between the debt ratio and the ownership of the independent board members.

Jensen, Solberg & Zorn (1992) have examined the relationship between the internal ownership and the debt policies. The authors analyzed horizontal cross-sectional observations of the companies in 1982 and 1987 with a system equilibrium containing separate equations for the ownership, debt and dividend policies. The t values for both years were -0.99 and 1.32, respectively, as the dependent variable for internal ownership, so the authors could not obtain any meaningful evidence that the financial policies are an important determinant of the internal ownership. In other words, after for business-specific characteristics size, operational risk, share of the research and development expenditures in the total assets etc) that affect the internal ownership, the borrowing or the capital structure (also the dividend policy at the same time) does not give an idea about the level of the internal ownership of the company.

Holderness, Krozner & Sheehan (1999) showed that the proportion of the managers ownership's weighted average to the company sizes listed in the New

York stock exchange increased to 21% in 1995, which was 13% in 1935. The authors investigated the effect of the debt ratio, which is company-specific characteristics as the determinant of the manager ownership such as company size, volatility, company age, to the manager ownership. According to this, it was determined that the ratio of the long-term debt to the total value of the company (stock + debt) changed from 0.42-0.43 in 1935 to 0.98-1.00 in 1995. For both years, the sign debt ratio is negative and there is evidence that the manager ownership in the businesses with high debt usage is lower and it is even lower today than in the past.

Demsetz & Villalonga (2001) examined the effects of the various ownership, accounting and stock price data on the ownership of 223 companies from all the sectors in the US economy between 1976-1980. In the study, in which two different ownership structures were taken endogenously as the management ownership and the ownership of the top five shareholders, the evidence has been obtained that the borrowing level received as a variant had a negative effect on both types of ownership. According to this, both ownership level decreases while the ratio of the debts (the foreign resources) to the total asset carrying amount increases. This rate indicates the possibility of the creditors (or otherwise the shareholders) being able to monitor the management. For this reason, the high debt ratio should lead to the fact that the five major shareholders have lower shares. According to the authors, if the credit providers contribute to the control of the business (monitoring), this can cause these companies assets to abandon from the movements to strengthen their assets more with the share ownership of the management at the same time. The statistically significant negative relationships determined between the leverage and the ownership also confirm this theoretical basis empirically.

Pindado & de la Torre (2008) investigated how the debts, dividends and the investment decisions effect the external and internal ownership intensity level and whether this effect differs between the companies controlled and not controlled by the family. For this, the authors have defined two models describing the ownership intensity and the internal ownership and extended these models to Spanish companies that are controlled and not controlled by the families. The authors reached the conclusion that the companies controlled by the families, the external owners and the managers decreased their share combinations due to the risk evasion. This result, which shows the negative effect of the debt on ownership intensity, was also seen in the external owners, being even stronger at the managers of the companies controlled by the families. The coefficient of debt ratio in family-controlled companies is -0.0539 while the companies not controlled by the family this ratio is estimated as -0.1048. The authors interpreted this result as the families are more concerned with maintaining their control over the company and they are less concerned with the financial risk. As to the model where the internal ownership is the dependent variable, it has been estimated that the coefficient of the debt ratio at the companies controlled by the families is -0.1281 and -0.0162 in the companies not controlled by the families. According to the authors, the results are explained by the fact that the managers of the family controlled companies are avoiding more risks.

The studies showing the effect of the capital structure variables on the ownership structures are summarized in the following table:

Table 1. *The Effect of the Capital Structure on the Ownership Structure*

The Effect of the Leverage on the Ownership Intensity	The Effect of the Leverage to the Internal Business Ownership
Demsetz & Villalonga (2001)	Jensen (1986)
Pindado & de la Torre (2008)	Stulz (1988)
	Denis & Sarin (1999)
	Holderness, Krozner & Sheehan (1999)
	Pindado & de la Torre (2008)

3. Methodology

3.1. The purpose of the research

The main purpose of this study is to examine the relations between the ownership and the capital structures of 142 businesses operating in the BİST and having continuity in the related period bidirectionally with the Granger causality test. In the related study, it will be attempted to explain with an empirical model whether there is a bidirectional relationship between the free float rate, the foreign share, corporate investor existence, the number of the partners, the data belonging to the biggest partner and the leverage ratio variable representing the capital structure of the company.

3.2. Granger causality test

Granger causality is a statistically test of hypothesis of the usefulness condition of a set of generated time series to estimate again another time series (Granger, 1969). The generated X time series, some t tests on X's deferred values and Y's deferred values and the possible future values of X values the formation of the Y with F tests put a meaningful information statistically, it is the Granger reason of the time series belonging to Y.

The model created to measure the Granger causality does not represent an economic model in a structural style. The relevant model aims to carry out causality tests, not the predictions of the future situation. Therefore, the variables belonging to the model must first be subjected to an elimination or go for stabilization (Granger, 1988).

The general VAR model consisting of two variables is as follows;

$$X_t = A(L)X_t + B(L)Y_{t+}{}^{u}{}_{1t}$$
$$Y_t = C(L)X_t + D(L)Y_t + {}^{u}{}_{2t}$$

In this equation A, B, C and D express the parameters and L shows the delay processor. For stability, the characteristic equation's roots belonging to the parameter matrix should be outside the (-1 and +1) ranges. u_{1t} and u_{2t}, which express the regression residuals, are considered to have both independent and zero average variance.

After the appropriate delay structure belonging to number 1 model is determined in the model selection terms, then the model parameters are predicted by the smallest squares method. Testing an empty hypothesis as "Y is not the Granger reason of the X" requires a test to be done about the parameters belonging to Y are zero together in an equation where X takes place as a dependent variable. Tests like F, Likelihood ratio and Wald tests can be used as application to perform the test. According to the performed F test, in case that the hypothesis defined as empty is not accepted, an interpretation as the B(L) parameters are different from zero statistically will come out.

3.3. Data set and sampling

In this study, a total of 205 companies trading their shares in BİST with the indexes of XUSIN (Industrial Index) and XUHIZ (Service Index) are operating. However, the data of 63 businesses were excluded from the analysis because they were not continuous in the examination period.In this sense, there are 142 businesses' 9 years of data belonging to the 2006-2014 period takes place in the analyzes. During the analysis, it was determined that the series were not stationary due to the unit root problem. In order to ensure the stability of the series, the differences from the first and second degrees and square root and logarithmic transformations were made. The financial data belonging to the companies examined within the analysis were obtained in two different ways. The financial data for the 2008 and the early periods of the businesses included in both indexes were collected from the official internet page of the BİST. As to the all the data

regarding to 2009 and later were collected from BİST, KAP and MKK internet pages and the public information published in the official web sites related to the businesses with the Finnet Stock Expert and Analysis Expert programs.

In the study, primarily dependent, independent and control variables were selected. In the determination of the variables, it has been started from the variables that reached the most consensus on the literature. Variables used are classified under 3 titles as the capital structure, the ownership structure and the control variables.

The variables used in the research and their calculations are presented in detail in the following tables.

Table 2. *Ownership structure variables*

	Variable Names	Symbol	Variable Calculations
Ownership Structure	Share of the Biggest Partner	EBOP	Capital Amount of the Biggest Partner / Total Equities
	Public Rate	HAO	Public Capital Amount / Total Equities
	Number of Partners	PARTNER	Number of partners with more than 10% share ratio
	Foreign Share	YAP	Foreign Capital Amount / Total Equities
	Corporate Investor Ratio	KURY	Corporate Investors Percentage in the Total Capital of the Business

Note: Table 2 contains the independent variables of the ownership structure used in the analysis and their calculations.

Table 3. *Capital structure variables*

	Variable Name	Symbol	Variable Calculations
Capital Structure	Leverage Ratio	TBTV	Total Debt / Total Assets

Two main hypotheses have been developed to be tested in the analyzes. From this point of view, the bidirectional relationship between the ownership and the capital structure is tested in line with these main hypotheses.

The hypotheses tested in the analyzes are established as follows.

H_1: The ownership structure affects the capital structure of the business.

Supporting Hypotheses:

H1a: The share of the largest shareholder in the business affects the capital structure of the business.

H1b: The free float ratio of the business affects the capital structure of the business.

H1c: The corporate investor ratio of the business affects the capital structure of the business.

H1d: The number of the partners of the business affects the capital structure of the business.

H1e: The foreign share of the business affects the capital structure of the business.

H_2: The capital structure affects the ownership structure of the business.

Supporting Hypotheses:

H2a: The leverage ratio of the business affects the share of the largest shareholder of the business.

H2b: The leverage ratio of the business affects the free float ratio of the business.

H2c: The leverage ratio of the business affects the corporate investor ratio of the business.

H2d: The leverage ratio of the business affects the number of the partners of the business.

H2e: The leverage ratio of the business affects the foreign share of the business.

Before analyzing whether there is a meaningful relationship between the dependent and the independent variables given above for the 2006-2014 period, it was researched whether there is a cointegrated condition in these variables.

Time series are the sequences of the observations made at periodic time intervals. One of the most important issues in time series is stability. Almost all the statistical conclusions are made under the assumption of series stability. If the

series is not stable, the series must be stabilized in any way before proceeding to the conclusions (Akdi, 2010). As in the analysis of the whole-time series and the panel data analysis, which performs both time and horizontal cross-sectional analysis together, the variables should be stable so as not to cause false relations between the variables. It is suggested that the stability should be examined in two ways. The common unit root process was examined with Levin, Lin & Chu (2002) test and each unit was examined with Im, Pesaran, & Shin (2003), ADF-Fisher Chi-Square (1979) test. The panel unit root test results are shown in Table 4. The unit roots were first examined in the level; when the unit root is detected in the level, it is stabilized by taking the first or second differences respectively.

The statistics obtained as a result of the analysis related to the service sector are as in Table 3. The hypotheses for the ADF unit root in the service index are established as follows.

H_0 = Series is not stable (there is unit root)

H_1: Series is stable (there is no unit root)

Table 4. *The series' stability (Unit Root) test results*

Series	LLC	IPS	ADF[1]
EBOP	-0,596	-5,935**	57,842*
L(D2HAO)	-3,600**	-2,593**	79,876**
LKURY	-47,587**	-6,654**	65,679
PARTNER	-15,144**	-5,822**	65,056**
LYABP	-3,05**	-0,278	91,129**
D(TBTV)	-35,703**	-8,769**	171,632**

Notes: *p<0,05; **p<0,01; [1:] Asymptotic X^2

In table 4, Ho is accepted since all the variables are not stable at level I(0) values. Then, when the first (I(1) differences of these variables are taken, as the p value is less than 0,05, the stability is obtained and H_1 is accepted.

It is seen that the best values of the information criteria are obtained in the first delay (Table 4). In this case, after ensuring the variables to be stable by taking their first delays to determine the appropriate model in the cointegration analysis, the maximum delay length should be determined for the series before proceeding to the Engle Granger Cointegration analysis. For this purpose, the VAR (vector autoregressive) model was used to determine the maximum delay length to identify how many years of delay the interaction between the series occurred and the Akaike and Schwarz information criteria were practiced. The maximum delay lengths determined according to the Akaike and Schwarz information criteria are given in Table 5.

Table 5. *Determination of the appropriate model for cointegration analysis*

Model	Akaike	Schwarz
Fixed termless, without trend	-2,39(1)	-1,08(1)
Fixed term, with trend	-3,14(1)	-1,79(1)
Linear, fixed term, without trend	-3,13(1)	-1,69(1)
Linear, fixed term, with trend	-3,13(1)	-1,64(1)
Quadratic, fixed term, with trend	-3,14(1)	-1,57(1)v

In both information criteria with the cointegration, the model with the first delayed second model (fixed term, with trend) cointegration is the model in which the zero hypothesis cannot be rejected (Table 5). According to the results of the cointegration analysis, the trace statics shows two and the max-eigen statics shows 1 cointegration vectors were found (Table 6). In other words, it shows that there is a long-lasting relationship (they move together long-lasting) between the variables. The error correction models are used when there is a long-run relationship between the variables. There was a lost of long-lasting information during the stabilization of the series by taking the differences. The error models are applied to remove the imbalances created by these losses. In the error correction models, the error terms of the regression series are formed and a delayed version of the obtained error

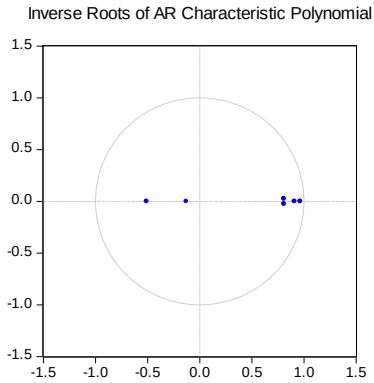
terms is added to the model. According to the Trace and Max-Eigen statistics, Johansen-Juselius cointegration test findings are presented in Table 6.

Table 6. *Co-Integration Analysis Results*

		Trace		Max-Eigen	
Hypotheses	Eigenvalue	Test statistic	Critical value	Test statistic	Critical value
N/A*	0,635	*263,71***	103,84	*133,34***	40,95
At most 1*	0,438	*130,36***	76,97	*76,10***	34,80
At most 2*	0,177	*54,27**	54,07	25,73	28,58

Note: H0: There is no cointegration. The zero hypothesis was rejected at 5%* significance level **1% significance level.

In the next step, the VAR (Vector Autoregressive) model was estimated to determine the presence and direction of the causality relationship between the series. In the econometric studies using the VAR model, no distinction is made between the internal and external variables and the variables or sizes are examined simultaneously. Moreover, the restrictions that may arise from the economic theory are not allowed to distort the model definition of the assumptions. Thus, the model allows the correct establishment of the relationship between the variables (Bahar, 2006: 143). The stability of the estimated model depends on the eigenvalue of the coefficient matrix. If all of the eigenvalues of the coefficient matrix are within the unit circle, the system is stable or steady and if at least one of the eigenvalues is over or outside the unit circle, the system is not stable or shows a gradually expanding feature (Hendry & Juselius, 2000: 11).



Graph 1. *VAR Model Stability Graphic*

The positions of the inverse roots of the AR characteristic polynomial in the unit circle show that the model is stable (Graph 1).

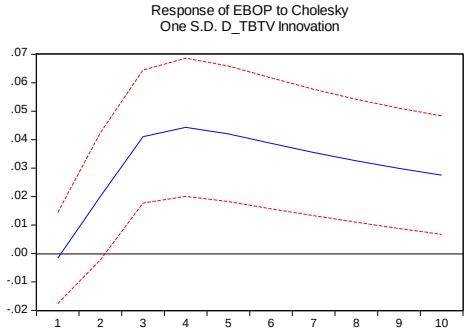
Two-way causality has been assessed in order to research the reciprocal effects of the ownership structure and the capital structure. VAR Granger causality test results are shown in Table 7.

Table 7. *Delayed VAR model-Granger causality test results*

The dependent variable: Capital Structure (TBTV)	Granger Causality / Block Exteriority Wald			VAR Prediction		
Basic hypothesis	X^2	df	p	ß	t	p
EBOP is not the cause of TBTV	0,026	1	0,871	0,122	1,346	0,178
HAO is not the cause of TBTV	3,430	1	0,064	-0,472	-1,444	0,148
KURY is not the cause of TBTV	0,167	1	0,682	-0,164	-1,373	0,169
ORTAK is not the cause of TBTV	0,632	1	0,426	0,011	0,352	0,724
YABP is not the cause of TBTV	0,291	1	0,589	0,000	0,004	0,996
Independent variable: TBTV						
TBTV is not the cause of EBOP	15,17	1	0,000	-0,913	-1,971	0,048
TBTV is not the cause of HAO	4.705	1	0,030	-0,813	-2,173	0,030
TBTV is not the cause of KURY	5,272	1	0,021	1,721	2,254	0,024
TBTV is not the cause of ORTAK	3,180	1	0,074	1,356	0,817	0,414
TBTV is not the cause of YABP	2,732	1	0,098	3,085	0,527	0,598

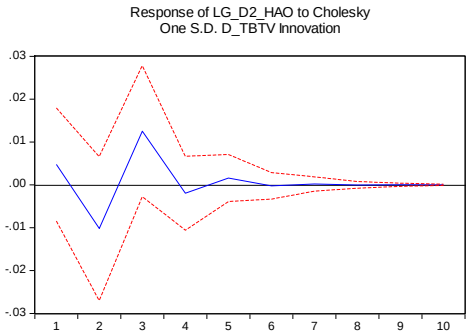
Note: H0: There is no causality relationship from independent variable to the dependent variable.

In the model where the capital structure (TBTV) is a dependent variable, the finding that none of the independent variables belonging to the ownership structure has a causality relation to the TBTV was found. In the model where the variables belonging to the ownership structure were dependent variables, the finding that independent variable belonging to the capital structure (TBTV) is the reason of the change in the ownership structure variables EBOP (X^2= 15, 17; p<0,05), HAO (X^2 = 4,71; p<0,05) and KURY (X^2 = 5,27; p<0,05). According to the results obtained, 1 period delay in the capital structure causes decrease in EBOP and HAO; increase in KURY. The response of the ownership structure to a standard failure capital shock is seen in Graphic 2a, b,c.



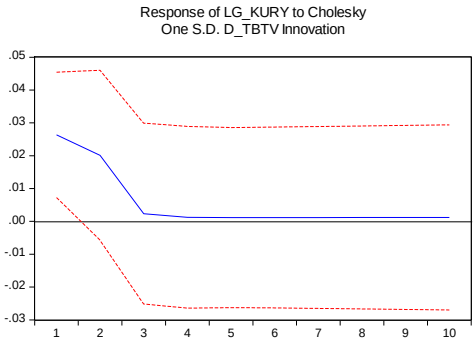
Graph 2a: *The Response of the EBOP to TBTV (Impulse-Response Function)*

In return to a standard failure shock in TBTV, EBOP variable first responds increasingly, and gives a decreasing response from the fourth period (Graph 2a).



Graph 2b: *The Response of the HAO to the TBTV (Impulse-Response Function)*

In return of a standard failure shock in the TBTV, the HAO variable first responds decreasingly and then gives gradually increasing consecutive responses; however, this reaction transforms to a gradually decreasing reaction and stabilizes in long term (Graph 2b).



Graph 2c: *The Response of the KURY to the TBTV (Impulse-Response Function)*

Note: In return of a standard failure shock in TBTV, the KURY variable first responds decreasingly; then it stabilizes (Graph 2c).

H1a Rejection: EBOP variable is not the cause of the capital structure.
H1b Rejection: HAO variable is not the cause of the capital structure.
H1c Rejection: KURY variable is not the cause of the capital structure.
H1d Rejection: ORTAK variable is not the cause of the capital structure.
H1e Rejection: YABP variable is not the cause of the capital structure.
H1 Rejection: The ownership structure is not the cause of the capital structure.
H2a Acceptance: The capital structure is the cause of the EBOP variable. The 1 term delay in the capital structure causes a decrease in the EBOP variable.
H2b Acceptance: The HAO variable is the cause of the HAO variable. The 1 term delay in the capital structure causes a decrease in the HAO variable.
H2c Acceptance: The KURY variable is the cause of the KURT variable. The 1 term delay in the capital structure causes an increase in the KURY variable.
H2d Rejection: The ORTAK variable is not the cause of the ORTAK variable.
H2e Rejection: The EBOP variable is not the cause of the YABP variable.

The statistics obtained as a result of the analyzes related to the industrial sector are as in Table 8. The hypotheses for the ADF unit root in the industrial index are established as follows.

H_0 = Series is not stable (there is unit root)
H_1: Series is stable (there is no unit root)

The results of the stability analysis of the ownership structure and the capital structure variables of the companies in the industrial sector are presented in Table 8 below.

Table 8. *The series' stability (Unit Root) test results*

Series	LLC	IPS	ADF[1]
EBOP	-1189,73**	-7580,91**	247,365**
LDHAO	-45,390**	-4,503**	275,045**
SKURY	-27,248**	-4,956**	355,621**
PARTNER	-26,047**	-6,498**	109,204**
LYABP	-42,158**	-10,642**	491,237**
TBTV	-29,693**	-7,727**	440,954**

Notes: *p<0,05; **p<0,01; [1]:Asymptotic X^2

In Table 8, Ho is accepted since all the variables are not stable at level I(0) values. Then, when the first (I(1) differences of these variables are taken, as the p value is less than 0,05, the stability is obtained and H_1 is accepted. First delays of the variables will be used to determine the appropriate model in the cointegration analysis since the best values of the dependent and independent variables take the most appropriate information criteria in the first delays.

Table 9. *Determination of the appropriate model for cointegration analysis*

Model	Akaike	Schwarz
Fixed termless, without trend	-6,045	-5,672
Fixed term, with trend	-6,559	-6,151
Linear, fixed term, without trend	-6,555	-6,109
Linear, fixed term, with trend	-6,549	-6,099
Quadratic, fixed term, with trend	-6,544	-6,053

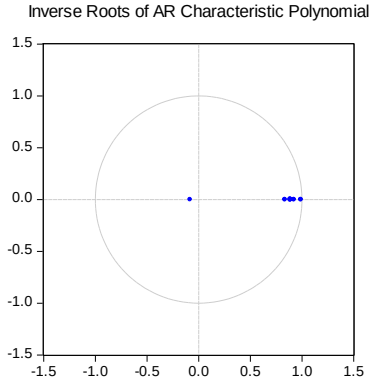
In Table 9, the second model (fixed term, with trend) was accepted as the model with the cointegration since the zero hypothesis was not rejected in both information criteria that have cointegration. Johansen-Juselius cointegration test findings according to the Trace and Max-Eigen statistics are presented in Table 10.

Table 10. *Co-integration analysis results*

		Trace		Max-Eigen	
Hypotheses	Eigenvalue	Test statistic	Critical value	Test statistic	Critical value
N/A*	0,133	*202,5***	83,9	*94,9***	36,6
At most 1*	0,065	*107,8***	60,1	*45,0***	30,4
At most 2*	0,043	*62,8***	40,2	*29,8***	24,2
At most 3*	0,041	*33,1***	24,3	*28,0***	17,8

Note: H0: There is no cointegration. The zero hypothesis was rejected at 5%* significance level **1% significance level.

According to the results of the cointegration analysis, the trace and max-eigen statistics show that 3 cointegration vectors were found (Table 10). In other words, it shows that there is a long-run relationship (they move together long-run) between the variables. For this reason, error terms of the regression series were added to delayed model.



Graph 3. *VAR Model Stability Graphic*

Note: The positions of the inverse roots of the AR characteristic polynomial in the unit circle show that the model is stable (Graph 3).

Two-way causality has been assessed in order to research the reciprocal effects of the ownership structure and the capital structure. VAR Granger causality test results are shown in Table 11.

Table 11. *Delayed VAR Model-Granger Causality Test Results*

The dependent variable: Capital Structure (TBTV)	Granger Causality / Block Exteriority Wald			VAR Prediction		
Basic hypothesis	X^2	df	p	ß	t	p
EBOP is not a cause of TBTV.	0,171	1	0,680	0,011	0,593	0,552
HAO is not the cause of TBTV	2,271	1	0,132	1,221	2,042	0,041
KURY is not a cause of TBTV	0,679	1	0,410	0,001	0,069	0,944
ORTAK is not the cause of TBTV	0,744	1	0,388	0,011	1,895	0,058
YABP is not a cause of TBTV	0,364	1	0,546	-0,121	-3,019	0,003
Independent variable: TBTV						
TBTV is not a cause of EBOP	0,124	1	0,723	-0,009	-0,784	0,433
TBTV is not a cause of HAO	2,154	1	0,142	0,017	1,420	0,155
TBTV is not a cause of KURY	0,004	1	0,948	0,002	0,091	0,927
TBTV is not a cause of ORTAK	0,158	1	0,691	0,023	0,404	0,686
TBTV is not a cause of YABP	1,832	1	0,176	0,447	1,537	0,124

Note: H0: There is no causality relationship from independent variable to the dependent variable.

In the model where the capital structure (TBTV) is a dependent variable, the finding that none of the independent variables belonging to the ownership structure has a causality relation to the TBTV was found. In the model where the variables belonging to the ownership structure are dependent variables respectively, the finding that none of the independent variables of the capital structure (TBTV) has a causality relation through the ownership structure.

H1a Rejection: EBOP variable is not the cause of the capital structure.
H1b Rejection: HAO variable is not the cause of the capital structure.
H1c Rejection: KURY variable is not the cause of the capital structure.
H1d Rejection: ORTAK variable is not the cause of the capital structure.
H1e Rejection: YABP variable is not the cause of the capital structure.
H1 Rejection: The ownership structure is not the cause of the capital structure.
H2a Rejection: The capital structure is not the cause of the EBOP variable.
H2b Rejection: The HAO variable is not the cause of the HAO variable.
H2c Rejection: The KURY variable is not the cause of the KURY variable.
H2d Rejection: The ORTAK variable is not the cause of the ORTAK variable.
H2e Rejection: The EBOP variable is not the cause of the YABP variable.
H2 Rejection: The capital structure is not the cause of the ownership structure.

4. Conclusion

In the BİST Industrial Index and Service Index, it has been examined whether there is a causality relation to the ownership structure between the model, where the company capital structure (TBTV) is the dependent variable, the independent variables belonging to the ownership structure and in the model, where the variables belonging to the ownership structure re dependent respectively, to the independent variable (TBTV) through the ownership structure of the companies operating in 2006-2014 period. However, before analyzing whether there is a meaningful relationship between the dependent and the independent variables, it was examined whether there is a cointegrated condition in these variables. It was seen that the best values of the information criteria were obtained in the first delay (Table 5). In this case, after ensuring the variables to be stable by taking their first delays to determine the appropriate model in the cointegration analysis, the maximum delay length should be determined for the series before proceeding to the Engle Granger Cointegration analysis.

For this purpose, the VAR (vector autoregressive) model was used to determine the maximum determine length to identify how many years of determine the interaction between the series occurred and the Akaike and Schwarz information criteria were practiced. The error correction models were used because of the long-run relationship between the variables. There was a lost of long-lasting information during the stabilization of the series by taking the differences. The error correction models were applied to remove the imbalances created by these losses. In the error correction models, the error terms of the regression series were formed and a delayed version of the obtained error was added to the model. According to the Trace and Max-Eigen statistics, Johansen-Juselius cointegration test findings are presented in Table 9.

As a result of analyzing statistics about the service index; in the model where the capital structure (TBTV) is a dependent variable, the finding that none of the independent variables belonging to the ownership structure has a causality relation to the TBTV was found. In the model where the variables belonging to the ownership structure were dependent variables, the finding that independent variable belonging to the capital structure (TBTV) is the reason of the change in the ownership structure variables EBOP (X^2 = 15, 17; p<0,05), HAO (X^2 = 4,71; p<0,005) and KURY (X^2 = 5,27; p<0.05) According to the results obtained, 1 period delay in the capital structure causes decrease in EBOP and HAO; increase in KURY.

As a result of analyzing the statistics about the industrial index: Two-way causality has been assessed in order to investigate the reciprocal effects of the ownership structure and the capital structure. In the model where the variables belonging to the ownership structure are dependent variables respectively, the finding that none of the independent variables of the capital structure (TBTV) has a causality relation through the ownership structure.

In the model where the variables belonging to the ownership structure are dependent variables respectively, the finding that none of the independent variables of the capital structure (TBTV) has a causality relation through the ownership structure was found.

The first of the obtained finding is that the variables representing the ownership structure of the businesses in the service index do not have causality factor about the capital structure of these businesses. However, as to the variable representing the capital structure is the reason of the changes in the EBOP (Share of the Biggest Partner), HAO (Free Float Rate) and KURY (Corporate Investor Rate) variables of the ownership structure. A one period delay in the capital structure of the businesses causes a decrease in the EBOP and HAO variables and an increase in the KURY variable. As to the businesses in the industrial index, a causality relationship was not seen between the ownership structures and the capital structures in the context of these variables and the two structures do not effect each other.

It is thought that the study has a genuine attribution with regard to revealing the bi-directional relationship between the ownership structure and the capital structure through the variables representing the ownership structure and the capital structure, having a wide scope in terms of used variables and the analysis period, cointegration in the methodology used, VAR granger causality test, using the impulse and response methods and it is also thought that it contributes to the related literature. The relevant study can be developed by means of further studies about the subject, including the comparison of the scope of the analysis with different indexes, the expansion in the context of the period and the sector, the use of different ownership and capital structure variables and the application of different methods. However, in order to be able to make more precise judgments, it is necessary to carry out studies that can analyze the long-run equilibrium and causality relations between these variables.

References

Akdi, Y. (2010). *Zaman Serileri Analizi (Birim Kökler ve Kointegrasyon)*, Gazi Kitabevi, Ankara.

Akgüç, Ö. (1998). *FinansalYönetim*, 7. Baskı Avcıol Basın-Yayın, Istanbul.

Anderson, R.C., & Reeb, D.M. (2003). Founding-family ownership, corporate diversification, and firm leverage. *The Journal of Law and Economics*, 46(2), 653-684. doi. 10.1086/377115

Babuşçu, Ş., & Hazar, A. (2008).*SPK İleri Düzey Lisanslama Sınavlanna Hazırlık*, 2.Baskı, Akademi Consulting & Training.

Bahar, O. (2006). Turizm sektörünün Türkiye'nin ekonomik büyümesi üzerindeki etkisi: VAR analizi yaklaşımı. *Yönetim ve Ekonomi: Celal Bayar Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 13(2), 137-150.

Berk, N. (2007). *FinansalYönetim*, 9. Baskı, Türkmen Kitabevi, Avcı Ofset Matbaacılık, Istanbul.

Berle, A.A., & Means, G.C. (1932). *The Modern Corporation and Private Property*, New York: Macmillan.

Bianco, M., & Nicodano, G. (2006). Pyramidal groups and debt. *European Economic Review*, 50(4), 937-961. doi. 10.1016/j.euroecorev.2004.11.001

Brailsford, T.J., Oliver B. R., Pua, S.L. (2002). On the relation between ownership structure and capital structure. *Accounting & Finance*, 42(1), 1-26. doi. 10.1111/1467-629X.00001

Chen, S., & Dodd, J.L. (1997). Economic value added (EVA™): An empirical examination of a new corporate performance measure. *Journal of Managerial Issues*, 318-333.

Demsetz, H. (1983). The structure of ownership and the theory of the firm. *The Journal of Law and Economics*, 26(2), 375-390. doi. 10.1086/467041

Demsetz, H., & Lehn, K. (1985). The structure of corporate ownership: Causes and consequences. *The Journal of Political Economy*, 93(6), 1155-1177. doi. 10.1086/261354

Demsetz, H., & Villalonga, B. (2001). Ownership structure and corporate performance. *Journal of Corporate Finance*, 7(3), 209-233. doi. 10.1016/S0929-1199(01)00020-7

Denis, D.J., & Sarin, A. (1999). Ownership and board structures in publicly traded corporations. *Journal of Financial Economics*, 52(2), 187-223. doi. 10.1016/S0304-405X(99)00008-2

Granger, C.W. (1988). Some recent development in a concept of causality. *Journal of econometrics*, 39(1-2), 199-211. doi. 10.1016/0304-4076(88)90045-0

Granger, C.W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, 37(3), 424-438. doi. 10.2307/1912791

Hendry, D.F., Juselius K. (2000). Explaining cointegration analysis: *Part II.* [Retrieved from].

Holderness, C.G., Kroszner, R.S., & Sheehan, D.P. (1999). Were the good old days that good? Changes in managerial stock ownership since the great depression. *The Journal of Finance*, 54(2), 435-469. doi. 10.1111/0022-1082.00114

Im, K.S., Pesaran M.H., Shin Y. (2003). Testing for unit roots in heteregeneous panels *Journal of Econometrics,* 115(1), 53-74. doi. 10.1016/S0304-4076(03)00092-7

Jensen, G.R., Solberg, D.P., & Zorn, T.S. (1992). Simultaneous determination of insider ownership, debt, and dividend policies. *Journal of Financial and Quantitative analysis*, 27(2), 247-263. doi. 10.2307/2331370

Jensen, M.C. (1986). Agency costs of free cash flow, corporate finance and takeovers. *The American Economic Review*, 76(2), 323-329.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360. doi. 10.1016/0304-405X(76)90026-X

King, M.R., & Santor, E. (2008). Family values ownership structure, performance and capital structure of Canadian firms. *Journal of Banking & Finance*, 32(11), 2423-2432. doi. 10.1016/j.jbankfin.2008.02.002

Koller, T., Goedhart,M.and Wessels,D.(2005). *Valuation: Measuring and Managing the Value of Companies*, Fourth Edition, Mc Kinsey & Company, Wiley Publishing.

Korkmaz, T., Başaran, Ü. & Gökbulut, R.İ., (2009). İMKB'de işlem gören otomotiv ve otomotiv yan sanayi işletmelerinin sermaye yapısı kararlarını etkileyen faktörler: Panel very analizi, *İktisat-İşletme ve Finans Dergisi*, 24(277), 30.

Levin, A., Lin, C.F., & Chu, C.S.J. (2002). Unit root tests in panel data asymptotic and finite-sample properties. *Journal of Econometrics*, 108(1), 1-24. doi. 10.1016/S0304-4076(01)00098-7

Litov, L.P. (2005). Corporate governance and financing policy: New evidence. Unpublished Working Paper.

Margaritis, D., & Psillaki, M. (2010). Capital structure equity ownership and firm performance. *Journal of Banking & Finance*, 34(3), 621-632. doi. 10.1016/j.jbankfin.2009.08.023

Modigliani, F., & Miller,M.(1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, 48(3), 261-297.

Myers, S.C. (2001). Capital structure. *Journal of Economic Perspectives*, 15(2), 81-102. doi. 10.1257/jep.15.2.81

Myers, S.C., & Majluf, N.S. (1984). Corporate financing and investment decisions when firms have investment that investors do not have. *Journal of Financial Economics*, 13(2), 187-221. doi. 10.1016/0304-405X(84)90023-0

Pindado, J., & de la Torre, C. (2008). Financial decisions as determinants of ownership structure: Evidence from Spanish family controlled firms. *Managerial Finance*, 34(12), 868-885. doi. 10.1108/03074350810915824

Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (1999). Corporate ownership around the world. *The Journal of Finance*, 54(2), 471-517. doi. 10.1111/0022-1082.00115

Schwartz, E. (1959). Theory of the Capital Structure of the Firm. *The Journal of Finance,* 14(1), 18-39. doi. 10.1111/j.1540-6261.1959.tb00483.x

Short, H., Keasey, K., & Duxbury, D. (2002). Capital structure, management ownership and large external shareholders: a UK analysis. *International Journal of the Economics of Business,* 9(3), 375-399. doi. 10.1080/1357151021000010382

Stulz, R. (1988). Managerial control of voting rights: Financing policies and the market for corporate control. *Journal of Financial Economics*, 20, 25-54. doi. 10.1016/0304-405X(88)90039-6

Türko, R.M. (2002). *Finansal Yönetim*, Alfa Yayın Dağıtım, 2. Baskı Istanbul, s. 496-498.

Zwiebel, J. (1996). Dynamic capital structure under managerial entrenchment. *The American Economic Review*, 86(5), 1197-1215.