

The impact of corporate governance on cost of capital: an application on the firms in the manufacturing industry in Borsa Istanbul[†]

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Abstract

Corporate governance has become an important issue in the aftermath of international financial crises, corruption and corporate scandals since the 1980s. Corporate governance is a broad term and it defines the methods, structure and the processes of a company. In this context, the term corporate governance plays a significant role in ensuring that the firm moves optimally in the right direction. In this study, the effect of corporate governance practices on the cost of capital is investigated empirically in 76 manufacturing industry companies listed on Borsa Istanbul (BIST) between 2008 and 2017. In this context, the system Generalized Method of Moments (GMM) estimator developed by Arellano-Bover (1995), one of the dynamic panel estimation methods, was used. The results showed that the increase in the number of members of the board of directors and the ratio of women in the board of directors, which are the corporate governance mechanisms, have an increasing effect on the cost of capital. We also found that the variables of CEO duality and institutional ownership did not affect the cost of capital.

Keywords: Corporate Governance, Cost of Capital, Generalized Method of Moments, Borsa Istanbul

Introduction

The world has witnessed a series of institutional failures and corporate scandals that have shaken the belief of investors and other stakeholders in financial markets. Traditional governing structures have not properly protected stakeholders from these scandals and corruption. In this context, professional organizations and regulatory authorities in developed countries aimed to regain their trust by adopting a number of management rules to protect the interests of stakeholders. Thus, a number of regulations and guidelines have been issued in developing countries with the support of international organizations such as the World Bank and the OECD.

[†] This study is derived from Berna Doğan's master thesis entitled "The Impact of Corporate Governance on Cost of Capital and Firm Performance: An Application on the Firms in the Manufacturing Industry in Borsa Istanbul".

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In recent years, the need for improving corporate governance has intensified in many developed and developing countries with the increasing number of corporate scandals around the world. However, since past financial scandals, interest in corporate governance in developed economies and developing economies has increased day by day. Good corporate governance practice has become necessary to improve firm performance, protect investor rights, improve the investment environment and promote economic development.

Corporate governance is the rules and practices that govern the relationship between a company's executives and stakeholders. Corporate governance contributes to the growth and financial stability by strengthening market confidence, financial market integrity and economic efficiency. In this context, corporate governance distributes rights and responsibilities among various participants in a firm, such as board members, managers and stakeholders, while at the same time ensuring clear decision-making rules and procedures for the business.

Firms can obtain outcomes such as better access to external financing, higher firm performance, and lower costs by implementing the corporate governance system. Turkey has started corporate governance practices later than other countries and Turkey's ability to benefit from these advantages depends on the ability to solve socio-economic problems, determine how to strengthen the capital market and ethical and general corporate governance standards. However, the 2008 global crisis has increased awareness of the need to improve a corporate governance system to enhance financial transparency in Turkey. Therefore, Turkey has given priority to corporate governance rules in order to have a better economy. In this context, first of all, corporate governance principles and internal control mechanisms should be developed.

Good corporate governance practices prevent controlling shareholders and managers from seizing cash flows and violating minority shareholders' rights. With the increase in corporate governance quality, investors have more confidence in the company. Increasing investors' trust provides the firm with more capital flow at a lower cost (La Porta et al. 2002, p. 1164). Successful corporate governance practices enable firms to decrease their capital costs and increase their financing opportunities and liquidity while enabling them to supply more funds from capital markets (Öztürk and Demirgüneş, 2008, p. 395). In addition, corporate governance practices reduce the risks faced by investors by providing more transparent financial information and making more private information public and make it easier for firms to find financing at a more affordable cost (Ashbaugh et al. 2004, p. 6).

When the national and international literature on the subject is examined; although there are many studies on corporate governance, no research has been found the relationship between the

corporate governance mechanisms and the weighted average cost of capital for the firms listed on BIST. Investigating the factors affecting the costs of firms on the basis of corporate governance may be beneficial for firms and financial regulators in terms of preparation for possible crises. This study aims to fill an important gap in the literature by identifying the impact of management and ownership structures on the capital costs of firms. The relationship between corporate governance practices and cost of capital on BIST manufacturing industry firms between 2008-2017 has been examined empirically. Findings of the study, it can contribute to the determination of the effects of corporate governance practices on firms 'costs and thus to investors' decision-making. However, the study will help financial regulators make decisions about reducing bankruptcies and protecting stakeholders' well-being. Similarly, it is expected to contribute to senior management focusing on corporate governance reforms. In this study, firstly the development of corporate governance practices in Turkey was reviewed, related literature was examined, information was given about the dataset and method, then suggestions were made by evaluating the obtained results.

1. Corporate Governance in Turkey

Corporate governance is based on the basic principles of transparency, equality, accountability and responsibility. Although the awareness of corporate governance and practices all around the world, Turkey has started to work in 2001 for the first time in this area. Like corporate governance practices started with the crisis in other countries, the economic crisis in 2001 and the sinking banks are the major factors in the start of corporate governance practices in Turkey also. Turkey has an increased need for a management system that will make it more resistant to the crisis for some reasons such as the lack of laws to fully protect the rights of investors and stakeholders, the flight of capital, great losses caused by crises, the costs to Turkey caused by poorly managed sectors, and so corporate governance began to apply.

Institutions and legislators which make arrangements regarding corporate governance have established rules by adhering to aforementioned principles. "Corporate Governance Code of Best Practice: Composition and Functioning of the Board of Directories" guide that prepared by the working group Turkish Industrialists' and Businessmen's Association (TUSIAD) in Turkey was the first important step in this regard. Subsequently, Capital Markets Board (CMB) has implemented several activities to encourage compliance with the regulations on corporate governance. The second of these studies, was the establishment of the Turkey Corporate Governance Association to adopt, develop and use the best corporate governance practices by companies in 2003. Another study in the

same year was conducted by the Capital Markets Board and corporate governance principles were put into practice in publicly-held corporations. The study, prepared by the CMB in 2003, is the first legal regulation. Then, in 2006, the Banking Regulation and Supervision Agency (BRSA) regulated corporate governance principles in banks. Besides, important regulations have been made in the area of corporate governance system with the New Turkish Commercial Code No. 6102 (Alp and Kılıç, 2014, p. 106). The new Capital Markets Law No. 6362, published on 30.12.2012, was the beginning of a new period in terms of corporate governance legislation. Aforementioned regulations, which were updated in time and became final under the name of Corporate Governance Communiqué in 2014, is very important in terms of compliance with corporate governance principles of the public company in Turkey. These regulations are based on principles set by OECD. In addition, The Turkish Commercial Code, which entered into force in 2012, introduced important provisions concerning the board of directors and the general assembly. Legislative provisions that will make the audit mechanism more effective have been mitigated by the subsequent amendments, but serious steps have been taken in this regard. The concept of corporate governance in the “Duties and Powers” section of the previous law, was examined in detail in the third section of the New Capital Markets Law under the heading of “Corporate Governance Principles”. One of the important points discussed in this section is the application of equal rules for all firms in equal conditions in order to prevent unfair competition. Another important point, it is compulsory for publicly-held corporations to start the transactions to be determined by the board after the decision of the board of directors. The CMB also established the BIST Corporate Governance Index (XKURY) in 2007. Companies that have a degree of compliance with corporate governance principles are included in the index and discounts on the fees of these firms are maintained. Thus, companies were encouraged to rate their levels of compliance with corporate governance principles to provide cost advantages. At the beginning of the calculation (August 31, 2007), four companies were included in the index and this number increased to seven at the end of 2007. In 2019, the total number of publicly-held corporations in the index increased to 47.

2. Literature Review

The section below discussed presents the review of prior studies conducted. Documentary evidence suggests that the relationship between corporate governance structure and cost of capital can either be positive (Chen et al., 2003; Anderson et al., 2003; Ashbaugh et al., 2004; Klock et al., 2005; Pham et al., 2007; Reverte 2009; Teti et al., 2016) or negative (Regalli and Soana, 2012; Bozec

et al., 2014). There are many studies analysing the relationship between corporate governance and the cost of capital. Chen et al. (2003) examined the impact of public disclosure and other corporate governance mechanisms on the cost of equity in 9 emerging Asian economies. As a result of the study, it was found that both the protection of investors at the country level and corporate governance practices at the firm level was found to be important factors in reducing the cost of equity.

Anderson et al. (2003) examined the effect of constituent family ownership on agency cost in 252 firms registered in Lehman Brothers bond database and S&P's 500 Industrial Index between 1993-1998, and found that potential agency problems between partners and lenders would be less in firms with constituent family ownership. Klock et al. (2005) examined the relationship between the cost of debt and prevention of takeover and a management index with various provisions for the protection of the shareholder by using the data of 678 firms operating in the US markets between 1990 and 2000. As a result of the study, they concluded that the provisions aimed at preventing the takeover to reduce the cost of debt.

Pham et al. (2007) investigated the role of corporate governance practices in creating value and the impact of firms on capital costs by using the data of the 150 largest publicly-held corporations in Australia between 1994-2003. As a result of their studies, they found a significant and inverse relationship between financial expense/total debt ratio and the cost of debt represented by corporate governance and the increase in corporate governance quality reduces the cost of debt. Paige Fields et al. (2012) examined the relationship between the quality of the board of directors of firms and bank loan costs between 2002-2005 and concluded that as the quality of the board increased, firms could borrow with lower cost and more comfortable conditions.

Regalli and Soana (2012) examined the impact of corporate governance quality on the cost of equity in 122 financial institutions operating in the USA between 2002-2006. As a result of the study, the quality of corporate governance practices in firms increased as the cost of equity increased. Tanaka (2014) investigated the relationship between debt costs and corporate governance practices of Japanese firms and it was found that CEO ownership and family firms faced higher bond costs and the firms with high corporate investors have low bond costs.

Bozec et al. (2014) examined the relationship between the cost of debt and equity and the weighted average cost of capital of the majority shareholder companies. The findings of the study clearly showed the significant and same impact of excess power on the weighted average cost of capital. Teti et al. (2016) investigated the effect of corporate governance practices implemented by publicly-held corporations in Latin America on firms' equity costs. The results of the analysis reveal the inverse relationship between the quality of corporate governance and the cost of equity. Zhu

(2014) examined the firms operating in 24 developed countries between 2002 and 2005, investigating whether the increase in corporate governance quality would lead to a reduction in debt and equity costs and found that in countries with stronger legal regulations, more transparent and better management quality, both the cost of debt and the cost of equity were lower.

3. Empirical Strategy

3.1. Data and Sample

In this study, it was examined 76 manufacturing industry firms that are traded continuously between 2008 and 2017 on Borsa Istanbul and whose financial statements and annual reports can be reviewed continuously. Such firms in Turkey have a significant share of the manufacturing sector in economically and technologically. Manufacturing industry firms are the basic building block of Turkey's economy as they create export, employment and added value. It has approximately 4.5 million employees and its share in exports is 93%. The sample firms are distributed among many sectors of the economy (Table 1). The data used in the research were obtained from the Public Disclosure Platform, Borsa Istanbul, investing.com and the official websites of the companies and assumed to be current and accurate.

Table 1. Data description - Firms by Industry

Industry	No.	Share
Basic Metal	4	0.05
Chemicals, Petroleum Rubber and Plastic Products	12	0.16
Fabricated Metal Products Machinery Electrical Equipment and Transportation Vehicles	15	0.20
Food, Beverage and Tobacco	11	0.14
Non-Metallic Mineral Products	18	0.24
Other	1	0.01
Paper and Paper Products, Printing and Publishing	7	0.09
Textile, Wearing Apparel and Leather	8	0.11
Total	76	100.00

The period of the study was limited to 10 years between 2008 and 2017 in order to examine the effects of corporate governance practices on capital costs of firms. The reason for the use of the 2008-2017 period in the study is that besides the availability of data, the corporate governance practices of companies have gained importance since the beginning of the 2000s as a result of the scandals experienced and regulations have been developed in recent years.

Cost of capital indicator was used as the dependent variable in the study. The weighted average cost of capital (WACC) represents the cost of capital. The WACC separates the total capital into common equity, preferred equity, long-term debt, and short-term debt. The weights of each financing resource are calculated by dividing each amount by total capital. The weighted average cost of capital is meaningful to firms. The cost of capital reflects the minimum required rate of return on a project in order to make it worthwhile. It also provides the necessary return to the providers of capital, which is based on the risk of the firm's current operations. Management must efficiently allocate capital within the company to meet the WACC. If the WACC is set too high, the firm has to reject valuable opportunities leading to demolishing shareholder value. Strong governance practice can lower the WACC by reducing monitoring costs through aligned interests between top management and shareholders.

Demsetz and Lehn (1985), Anderson et al. (2004), Hail and Leuz (2006), Piot and Missonier-Piera (2007), Pham et al. (2007), Lorca et al. (2011), Singhal (2014), Zhu (2014) and Bozec et al. (2014) have chosen WACC as the dependent variable in their studies.

In this study, WACC was calculated with the following formula:

$$WACC = W_d i_d (1 - t) + W_e i_e$$

where i_d represents the cost of debt, i_e represents the cost of equity calculated using the Capital Asset Pricing Model (CAPM), W_d represents the weight of the debt, W_e represents the weight of equity and t represents the corporate tax rate. The weight of the debt is calculated as the value of the debt / (the value of the debt + the value of the equity), while the weight of the equity is calculated as the value of the equity / (value of the debt + the value of the equity). In this equation, $W_d + W_e = 1$.

Corporate tax rate is obtained from www.finnet.com.tr. The cost of equity is calculated with the CAPM as follows:

$$i_e = r_f + \beta_i \times (r_m - r_f)$$

where r_f is the risk-free rate of return, β_i is the systematic risk of shares (sensitivity to market risk), r_m is the return of the market portfolio, and $r_m - r_f$ is the market risk premium.

As a risk-free rate of return in the cost of equity calculation and CAPM calculation were used 10-year bond interest data of Turkey's Treasury. As the return of the market portfolio, the annual return of the BIST 100 Index was taken and these data were obtained from the official website of Borsa Istanbul. Risk-free rate of return in the relevant period is subtracted from the market return and market risk premiums are calculated. Annual beta coefficients and cost of debt data were obtained

from www.finnet.com.tr. When the market risk premium and beta coefficient are multiplied, total risk premium data is reached.

Four explanatory variables were used in the study. These are board size (BOARD), the ratio of women managers on the board of directors (WOMEN), range of institutional ownership (OWN) and CEO duality (CEO). These variables are explained below.

Board Size: This variable, which represents the size of the board, was added to the model by taking the logarithm of the number of board members. The Board of Directors (BD), within the framework of the authority granted by the shareholders at the general assembly, uses their powers and responsibilities in line with internal regulations, legislation, policies and main contract and represents the company (SPK, 2014, p. 24). BD is committed to maximizing the firm's market value when making decisions. To this end, BD conducts its business in a manner that ensures that its shareholders make a long-term and stable profit. While doing this, it also takes care not to disturb the delicate balance between the stakeholders and the growing requirements of the firm (SPK, 2003, p. 37). Authors such as Bhagat and Black (2002), Kiel and Nicholson (2003), Beiner et al. (2006), Pathan et al. (2007), Kyereboah-Coleman (2007), Mashayekhi and Bazaz (2008), Adams and Ferreira (2009), Larmou and Vafeas (2009), Chahine and Safieddine (2011), Elsayed (2011), Swastika (2013), García-Meca et al. (2015), Vintilă and Paunescu (2016), Georgantopoulos and Filos (2017) and Ersoy and Aydın (2018) have also used the size of the board as an independent variable in their models.

The Ratio of Women Executives on the Board of Directors: This variable was added to the model by proportioning the number of women board members to the total number of board members. The representation of women in the board of directors has recently been examined as an important topic. Because women's board of directors highlights the benefits of gender diversity on financial performance (Julizaerma and Sori, 2012, p. 1083). Most of the regulations on gender diversity that occur with the participation of women in the board of directors based on the opinion that women board members will affect the corporate governance of the firm in a good way. According to this view board of directors can increase their activities by incorporating female board members and creating a wider pool of talent (Adams and Ferreira, 2009, p. 292). At the same time, it is stated that women board members can contribute positively to the firm's value with different perspective that they will contribute to the decision-making process (Karayel and Doğan, 2014, p. 76).

Concerning women members in Turkey Serial: IV, No: 57 on "Communiqué Amending the Communiqué on Determination and Application of Corporate Governance Principles" was published in the Official Gazette in February 11, 2012, and numbered 28201 and was entered into force. With this communique, "There is at least one female member on the board of directors" principle has been

introduced and it is not obligatory to apply it. This principle is recommended in accordance with the principle of “apply, explain if you do not apply” (Karayel and Doğan, 2014, p. 76). Authors such as Randøy et al. (2006), Rose (2007), Campbell and Minguez-Vera (2008), He and Huang (2011), Ujunwa (2012), Mirza et al. (2012), Horváth and Spirollari (2012), Fauzi and Locke (2012), Mahadeo et al. (2012), Vo and Phan (2013), Cook (2013), Karayel and Doğan (2014), Vintilă and Paunescu (2016), Detthamrong et al. (2017) and Topaloğlu and Ege (2018) used the proportion of women managers on the board as an independent variable in their models.

Institutional Ownership: It is obtained by dividing the number of shares held by institutional investors by the number of shares in the circulation of the firm. This ratio shows how much of the shares in circulation are purchased by institutional investors. Since institutional investors are investors who avoid risky investments, increasing institutional ownership (OWN) may mean that the firm reduces its risk level or follows a more risk-free policy than other firms. The performance of the companies with less risk may increase, and the performance of these firms may decrease as they cannot take advantage of the opportunities. Authors such as Lefort and Walker (2000), Iglesias-Palau (2000), Almazan et al. (2005), Mashayekhi and Bazaz (2008), Çelikand Isaksson (2014), Acaravcı et al. (2015), McCahery et al. (2010), Bebchuk et al. (2017) and Lewellen and Katharina (2018) used institutional investor ownership as an independent variable in their models.

CEO Duality: CEO duality is that the general manager is also the chairman of the board of directors. The general manager is also defined as 1 if the chairman of the board of directors, and 0 if not. According to representation theory, the duality application creates a unity of command will make decisions faster and focuses on the company's objectives (Boyd, 1995, p. 302). According to the resource dependence theory, the fact that the chairman or member of the board is the CEO at the same time may reduce the amount and diversity of resource links outside the company. Therefore, a strong leadership structure resulting from duality will adversely affect firm performance. Kula and Mühsürler (2003), Chen et al. (2005), Elsayed (2007), Peng et al. (2007), Mashayekhi and Bazaz (2008), Bhagat and Bolton (2008), Aygün and İç (2010), Gill and Mathur (2011a), Gill and Mathur (2011b), Erkens et al. (2012), Ujunwa (2012), Alves et al. (2015) and Topaloğlu and Ege (2018) have chosen CEO duality as an independent variable for corporate governance principles in the models they have established.

In the study, leverage ratio was taken as the control variable. Leverage ratio is calculated by proportioning the total debts of the firms to their total assets. As a result of this ratio, it is concluded that what percentage of the assets are financed by debts. The ability of firms with high total debt ratios to continue their operations depends on the debts. If this ratio is too high, the risk of the firm may

increase and fall into financial distress or even bankruptcy. While highly leveraged firms are risky, they will not always be able to repay their debts and have new loans. While high leverage is often a negative situation, the debt investment relationship can positively affect the return on equity of firms (Doğan, 2013, p. 127). Authors such as Lam (2002), Cheng et al. (2006), Ferreira and Laux (2007), Obradovich and Gill (2012), Taghizadeh and Saremi (2013), Liao and Young (2013), Moscu (2013), Aghabaki (2014), Teti et al. (2016), Atidhira and Yustina (2017) and Ferrara et al. (2018) used leverage ratio as the control variable in their models.

The data related to the variables used in the analysis were obtained from financial statements and footnotes of companies, investing.com website and annual activity reports. The relevant tables and annual reports are obtained from the Borsa Istanbul Financial Archives of 2008. In 2009 and later, it was obtained from the annual reports, web sites, footnote and Public Disclosure Platform of the companies. Annual data were used in the study and 10 periods were examined in total. Variables and calculation methods used in the research are given in Table 2.

Table 2. Research Variables and Calculation Methods

Codes	Variable	Calculation Method
<i>Dependent Variables</i>		
WACC	Weighted Average Cost of Capital	$(\text{Debt Weight} \times \text{Cost of Debt}) * (1 - \text{Tax Ratio}) + (\text{Weight of Equity} \times \text{Cost of Equity})$
<i>Independent Variables</i>		
BOARD	Board Size	Logarithm of the total number of board members within one year
WOMEN	Ratio of Women Executives on the Board of Directors	The ratio of the total number of women board members to the total number of board members within a year
CEO	CEO Duality	The general manager is also defined as 1 if the chairman of the board of directors, and 0 if not.
OWN	Institutional Ownership	Number of Shares of Institutional Investors / Total Number of Shares
<i>Control Variable</i>		
LEV	Leverage Ratio	Total Debt / Total Asset

4. Method and Empirical Results

Economic and financial relations generally have a dynamic structure. Events that occur over a period are largely the result of past experiences and behaviour. Therefore, it is important to include lagged values of variables among explanatory factors when examining relationships. Among factors affecting the dependent variable may include lagged values of independent variables or dependent

variable. The panel data model allows researchers to better understand these dynamic relationships. The models in which the lagged values of the dependent variable are included as independent variables are called dynamic panel data models (Dökmen, 2012, p. 46). Dynamic models are generally shown in the following equation:

$$Y_{it} = Y_{i(t-1)} + \beta_1 X_{it} + \eta_i + \epsilon_{it} \quad i=1, \dots, N; t=1, \dots, T$$

Where;

Y_{it} : Dependent variable

$Y_{i(t-1)}$: Lagged value of dependent variable

X_{it} : Independent variable vector in dimension $K \times 1$

β_1 : Coefficient matrix in dimension $K \times 1$

η_i : Unobservable individual effects

ϵ_{it} : The element of the error which varies over group and time

One of the most common methods used in classical panel data analysis estimates is the “Least Squares Estimator” (OLS). The OLS estimator generates biased and inconsistent estimates if the explanatory variables are endogeneity in the model and prevent effective estimations (Terzioğlu and Dal, 2018, p. 41). As a result of weak effectiveness of OLS estimator, the development of a second estimation method known as the Generalized Method of Moments (GMM) has become inevitable. Therefore, GMM is the most common and appropriate estimation method in studies using panel data since it does not include above- mentioned problems. GMM is an effective estimation method classified as semiparametric. There are significant advantages to using the GMM estimator instead of other estimators using panel data. First, it is possible to control constant effects that do not change over time and horizontal cross-sectional effects using this method. Another advantage is that means that lagged explanatory variables can be used as instruments to solve the endogeneity problem that may occur in the independent variables (Çetin and Şeker, 2014, p. 135).

In the dynamic panel analysis, there are two GMM estimators including difference GMM and system GMM. Arellano and Bover (1995) GMM estimator is based on the first method. The system GMM estimator, developed by Arellano and Bover in 1995, is based on the combination of difference equation and level equations. This estimator was obtained by making some improvements to the first difference GMM estimator. Blundell and Bond (1998) and Blundell et al. (2000) demonstrated that difference GMM has a weak predictive power in a finite sample and coefficient estimates are deviated, and found that system GMM has higher predictive power (Dökmen, 2012, p. 46). In this context, due to its features such as lower deviation and higher efficiency, the system GMM estimator is superior to many estimators, especially the first difference GMM estimator. Moreover, if the

number of horizontal cross-sectional is small, the system GMM better than the first difference GMM estimator. For these reasons, it is stated that the system GMM estimator performs better than the difference GMM estimator (Bond et al., 2001, p. 9).

Whether the GMM estimator is consistent it is tested by the Sargan test, which asymptotically exhibits a χ^2 distribution. The system GMM estimator developed by Arellano-Bover (1995), one of the dynamic panel estimation methods, was used to test the impacts of corporate governance on weighted average capital cost since the data considers the time series feature and does not include biased results.

The aim of this study is to investigate the relationship between corporate governance practices and the cost of capital. For this purpose, the existence/absence of the relationship between capital cost and corporate governance practices and if there is a relationship, the direction of this relationship will be revealed. The descriptive statistics presented the output of the mean, maximum, minimum and standard deviation for the data. The results are included in Table 3.

Table 3: Descriptive Statistics

	Mean	Maximum	Minimum	Std. Dev.
WACC	1.376151	9.410000	-11.69500	2.612442
BOARD	1.943846	2.708050	1.098612	0.281075
WOMEN	0.104307	0.500000	0.000000	0.120951
CEO	0.378947	1.000000	0.000000	0.485444
OWN	56.76227	64.41000	0.000000	27.94349
LEV	0.479526	1.710000	0.060000	0.241846

Table 3 presents the descriptive statistics of firm characteristics and cost of capital. When Table 3 is examined, it is seen that the weighted average cost of capital of the firms' subject to the research is 1.38. The data in Table 3 on the corporate governance variables shows that the mean log board size of the companies has the maximum log board size of about 2.70 while the minimum is about 1.09. This suggests that, on average, the companies considered have moderate board sizes. This is good in respect of the performance of these companies because it supports recent thinking about board sizes. Onboard composition, the study shows that on average, 10% of all board members are women. Institutional ownership ranges from 0 to 100, with an average of 57, and the average of the CEO duality, which measures whether the general manager is the chairman or not, is 0.38. The average of the leverage ratio, which is the control variable, is approximately 0.48.

Table 4 shows the correlation matrix for the variables used in models and robustness control.

Table 4: Correlation Matrix

Correlation Probability						
	WACC	BOARD	WOMEN	OWN	CEO	LEV
WACC	1.000000					
BOARD	0.129328 0.0101*	1.000000				
WOMEN	-0.025702 0.6106	0.244742 0.0000**	1.000000			
OWN	0.035038 0.4875	0.191562 0.0001**	-0.207840 0.0000**	1.000000		
CEO	-0.028779 0.5685	0.112342 0.0256*	0.001190 0.9812	-0.269112 0.0000**	1.000000	
LEV	-0.143855 0.0042**	-0.134999 0.0072**	0.052327 0.2995	-0.173994 0.0005**	0.049344 0.3280	1.000000

(*) and (**) indicate significance at 5% and 1%, respectively.

According to Table 5, it was determined a positive and statistically significant relationship between the board size and the dependent variable WACC. When the relationship between the control variable and the dependent variable is examined, there is a negative and statistically significant relationship between leverage ratio and WACC.

The independent variables strongly linked to each other are called multicollinearity. If the correlation coefficients are greater than 90%, it is recommended that one or more variables not be included in the analysis (Çokluk et al. 2012, p. 35). According to the correlation analysis, there was no problem of multiple linear correlations between the variables. It is concluded that all the values in Table 4 are below 90% and therefore there is no problem of multiple linear correlations between the independent variables used in the analysis.

In order to measure the effectiveness of the variables, the J test, also known as the Sargan test, is insignificant and the acceptance of the null hypothesis indicates shows that the instruments are valid and also gives more confidence about the model. Sargan test is used to check the overall validity of the instruments. Since J-statistic probability value is insignificant in the established model, it is accepted that the independent variables are significant.

Table 5 presents the system GMM estimator results of the model related to the relationship between the cost of capital and corporate governance mechanisms and it presents the coefficients of the independent variables to represent the change in WACC.

$$WACC_{it} = \beta_0 + \beta_1 WACC_{i(t-1)} + \beta_2 BOARD_{it} + \beta_3 WOMEN_{it} + \beta_4 OWN_{it} + \beta_5 CEO_{it} + \beta_6 LEV_{it} + \varepsilon_{it}$$

where, $WACC_{i(t-1)}$ is the lagged value of WACC dependent variable and in the study, five variables, four independent variables and one control variable, were used.

Table 5: Panel Data Analysis Results

Dependent Variable (WACC)		Arellano-Bover Estimator
Variables	Coefficients	p Value
WACC(-1)	-0.326668	0.0000**
CEO	-0.234537	0.1888
OWN	-0.007331	0.2524
BOARD	0.986527	0.0027**
WOMEN	0.528092	0.0437*
LEV	-0.002814	0.0000**
J-statistic (p value)		0.231967
AR(1)		0.0008
AR(2)		0.1160
Observations		760

(*) and (**) indicate significance at 5% and 1%, respectively. In the null hypothesis test without autocorrelation, the null hypothesis was rejected in the test of the presence of autocorrelation related to the model in the second-order autocorrelation (AR2) test of Arellano and Bond (1991). Thus, it is provided that there is no second order autocorrelation required for the suitability of the model.

According to Table 5, it is accepted that J-statistic value is insignificant for the established model and therefore the validity of instruments hypothesis cannot be rejected. In the model established within this scope, $WACC_{i(t-1)}$ is the lagged value of WACC dependent variable and was found to be significantly opposite in relation to 1% statistical level with WACC. According to the results of the system GMM, the coefficient of this relationship was -0.326668. When all other variables are considered constant, one unit increase in $WACC_{i(t-1)}$ causes a decrease of 0.326668 units in WACC ($p < 0,000$). Therefore, the negative impact of the previous period's WACC on cost of capital of firms can be mentioned.

As shown in Table 5 P (0.2524) which is the significant value of the institutional ownership variable and p (0.1888) which is the significant value of the CEO duality, that represents whether the general manager is also the chairman or not, is greater than the critical values. There is no statistically significant relationship between WACC and institutional ownership and CEO duality, both at 1% and 5% significance levels. According to this result, any changes in institutional ownership or CEO duality do not affect WACC positively or negatively. When the other results are examined, the

variables that were associated with WACC at 1% statistical significance level were board size and leverage rate, and the variable with 5% level was ratio of women executives on the board of directors.

When the results of the model are examined, it is seen that the size of the board (BOARD), one of the variables related to the structure of the board of directors, has an effect on the weighted average cost of capital (WACC). The significance value of BOARD variable, p (0.0027), has a similar relationship at 1% statistical significance level. A 1% increase in the size of the board leads to an increase of 0.986527 units in the WACC. Accordingly, it can be said that the size of the board of directors increased the WACC and negatively affected firms. There is a positive and statistically significant relationship between board size and WACC. In other words, the increase in the number of board members increases the weighted average capital costs of firms. This finding was confirmed by the studies of Evans John and James (2003), Pham et al. (2007), Rad (2014), Bradley and Chen (2011). The negative cost of capital can be related to proxy theory. According to the proxy theory, there should be a limitation on the number of board members. It is argued that there may be conflicts in terms of group dynamics in firms that exceed the specified limits and therefore it may be adversely affected cost of capital. The increase in the number of board members may create a conflict of interest and non-compliance between the members and may increase the costs of the company.

WOMEN variable, which is related same directional to WACC at 5% statistical significance level, has a coefficient of 0.528092. When all other variables are considered constant, one-unit increase in WOMEN leads to 0.528092 units increase in WACC and this could be interpreted negatively ($p < 0.0437$). Accordingly, it can be said that that the ratio of women members among the members of the board of directors of the firms increases the cost of capital. WACC increases when the ratio of women executives on the board of directors increases. Similar results were observed in the studies of Rose (2007) and Rad (2014). On the other hand, it could not be determined a significant relationship between WACC and institutional ownership (OWN) and CEO duality.

When the results of the control variable were examined, negative and statistically significant relationship was found between leverage ratio (LEV) and WACC. Coefficient of inverse relationship at 1% statistical significance level between LEV variable representing the ratio of total debts to total assets and WACC was calculated as -0.002814. When all other variables are considered constant, one-unit increase in LEV is a decrease of 0.002814 units in WACC ($p < 0.0000$). Accordingly, it can be said that the increase in total debts in firms or the decrease in total assets, while the total liabilities are fixed, have a negative effect on the cost of capital. This result was also observed in the studies of Sagala (2003), Singhal (2014), Zhu (2014) and Bozec et al. (2014).

The findings show that WOMEN and BOARD variables, except the CEO and OWN, are important in explaining the changes in the company's cost of capital. WOMEN and BOARD have the same impact on WACC.

Conclusions

The purpose of this study is to examine the effect of corporate governance practices on the cost of capital of manufacturing industry companies whose stocks traded on Borsa Istanbul (BIST). 76 firms that have been continuously involved in the BIST manufacturing industry between 2008-2017 and whose annual reports can be accessed and the data obtained in the research. As corporate governance practices, the relationship between board size of firms, the ratio of women executives on the board of directors, CEO duality and institutional ownership variables and weighted average cost of capital were tested. In this context, in order to achieve more accurate results, because data can be fully observed, dynamic panel data analysis was performed. In this study, due to the fact that takes into account the time series feature of data and does not include biased results, the system GMM approach which was introduced by Arellano-Bond (1991) and then developed by Arellano-Bover (1995) was used as one of the dynamic panel estimation methods. In order to measure the effectiveness of the variables, the J test, also known as the Sargan test, is insignificant and the acceptance of the null hypothesis indicates shows that the instruments are valid and also gives more confidence about the model.

As a result of the analysis, it was found that firms with the large number of board members had to bear more the cost of capital. In weighted average cost of capital calculations, the cost of equity is higher as more risk is incurred than cost of debt. In this context, conflicts of interest and attitudes contrary to the interests of the company may adversely affect shareholders and hence cost of capital. The increase in the number of board members for the firms included in the study increases the cost of capital incurred by the firms. As a result, there is a negative relationship between BOARD and WACC, that is, increasing the cost. In this case, it can be said that there should be compliance with agency theory and limitation of the number of board members. On the other hand, a statistically significant relationship was determined between ratio of women executives on the board of directors (WOMEN) and the cost indicator WACC. This result shows that the ratio of women executives on the board of directors have an effect on the WACC. It is seen that the ratio of women executives on the board of directors is positive on WACC. When the results of the control variable were examined, negative and statistically significant relationship was found between leverage ratio (LEV) and

WACC. Reducing the effect of the leverage ratio on capital cost can be attributed to having tax advantage and thus the debt is cheaper than equity.

The general purpose of firms is to get the maximum benefit from the minimum cost. In this context, for firms operating in Turkey the improvement in market conditions is important to decreasing the cost of equity which is the most intensive in weighted average cost of capital. Corporate governance practices are an important factor at the ensure the protection of investors and reduce the cost of equity and therefore also the weighted average cost of capital. In this context, companies can reduce their cost of equity by reducing their risk-taking behaviours. Furthermore, the risk-free rate of return and the risk premium should be reduced. Thus, the cost of obtaining funds from the equity will decrease.

Findings obtained in the study are important for investors in terms of improving the investment environment, financial regulators in terms of promoting economic development, researchers in terms of developing new models and management of the companies in terms of improving the company performance. As a result of this study, it will be easier for investors to make decisions by determining the impact of corporate governance practices on the costs of the firm. The results of this study will also contribute to the senior management focusing on corporate governance reforms. In addition, in terms of management and ownership structures, it will shed light on companies that are traded in BIST manufacturing industry to make more accurate decisions about their future.

In future studies, the relationship between corporate governance practices and the cost of capital can be examined in terms of different sectors. In addition, the number of general assembly meetings, educations and experiences of board members can also be investigated. Apart from all this, the impact of the number of committees and the presence of committees such as audit and corporate governance can also be examined on the cost of capital.

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