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The Effects of Blockholder Diversity on the Firm Risk: Evidence from Korea

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Abstract

This study examines the effect of block diversity on the risk of firms listed on the Korean Stock Exchange between 2010 and 2017. To examine the effect of block diversity on corporate risk, we measure block diversity in terms of a single component, portfolio size, by referring to prior literature. This diversity component accounts for the differences in portfolio size across corporate blocks. In line with existing research on corporate risk, we consider several variables to measure corporate risk: volatility, beta, and idiosyncratic risk. The results show a negative relationship between the size of a block shareholder's portfolio and corporate risk. We also show no difference in the effect of block diversity on the corporate risk between KOSPI and KOSDAQ. This implies that the difference in portfolio size among corporate blocks reduces corporate risk. This may be due to the effect of inter-block monitoring activities in the Korean securities market, which benefits from block diversity. This empirical result supports previous studies that predicted that block diversity would have beneficial influences on firm monitoring in general. This study is significant in that it analyzes the relationship between block diversity and firm risk and provides relevant information to business practitioners and investors.

Keywords: Blockholder Diversity, Volatility, Beta, Idiosyncratic Risk

JEL Classification Code: G30, G32, G35

1. Introduction

In the field of finance, the risk of stock returns is a central theme in portfolio theory, asset pricing models, and option valuation. These three theories assume that the risk of stock returns is known and constant. However, the risk of stock returns can vary. It has been reported that the risk of the U.S. stock market has been constant for the past 30 or 40 years, while the risk of individual stock returns has increased substantially over the same period (Campbell et al., 2001). For financial theory and investors, the risk of stock returns is a very important issue (Campbell et al., 2001; Zhang, 2010).

According to previous studies, public companies in the United States have, on average, four-block shareholders. These shareholders are owned by different types of owners. Blocks may differ in terms of whether they are owners or agents, and they may also differ in terms of their investment horizons and portfolio sizes. The existing empirical and theoretical literature addresses the impact of the level of block ownership on firm characteristics. While some evidence suggests variation in influence across specific groups of blocks, Volkova (2018) examines the impact of the presence of different blocks on firm value. More recently, there has been growing interest in the relationship between block diversity and firm performance. The positive impact of diversity on firm performance is based on the effectiveness of diversity, while the negative impact of block diversity on firm performance is based on the cost of diversity. There are not only studies that show the positive impact of block diversity on firm performance, but there are also studies

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that show the negative impact of block diversity on firm performance (Volkova, 2018). Therefore, the effect of block diversity on firm performance is mixed.

In recent years, several studies have been conducted on the relationship between block ownership and corporate risk. They define block ownership as founder (Anderson & Reeb, 2003), largest block (Rossetto & Stagliano, 2012), investor base, portfolio concentration (Jankensgard & Vilhelmoosn, 2015), and individual largest blocks (Newton & Paeglis, 2019). However, little research has been done on the relationship between block diversity and firm risk. How does block diversity affect corporate risk? The relationship between block diversity and corporate risk is explained by the degree of risk-taking behavior of firms and their block monitoring activities. Therefore, the purpose of this study is to examine how the diversity of blocks affects corporate risk.

The differences between this study and foreign studies are as follows. First, block ownership in Korea differs from that in the US in terms of identity and portfolio size. For example, in the U.S., the institutional investor block is the first block, while in Korea, the family, including affiliated persons and affiliates, is the largest block. Therefore, it would be meaningful to investigate the relationship between the diversity of blocks and corporate risk in companies with the same governance structure as in Korea. Second, the results of this study's analysis can contribute to the expansion of the existing literature by providing suggestions for countries with ownership structures similar to Korea.

2. Literature Review and Hypothesis Development

2.1. The Relationship between Ownership and Firm Risk

The investor base argues that the relationship between ownership structure and corporate risk. Merton (1987) argues that, given imperfect information, there is a positive relationship between the number of investors and stock prices. Wang (2007) argues that the size of the investor base reduces volatility by increasing the accuracy of stock price signals (the degree to which stocks reflect the underlying fundamentals). Dennis and Strickland (2004) show a positive relationship between the ownership of financial institutions and mutual funds and the volatility of stock returns. Campbell et al. (2001) and Zhang (2010) show a positive relationship between institutional investor ownership and stock return volatility. However, Rubin and Smith (2009) examine that the effect of institutional investor ownership on stock return volatility depends on whether dividends pay or not. They show a negative relationship between institutional ownership and stock return volatility when dividends pay, and a positive relationship between institutional ownership and stock return volatility when dividends pay. Li et al. (2011) shows that foreign investors in emerging markets reduce stock return volatility by improving monitoring and governance. Chichernea et al. (2015) report that investors with short-term investment tendencies, such as institutional investors, are associated with higher stock return volatility. Jankensgard and Vilhelmsson (2015) report a negative relationship between institutional ownership and stock return volatility and a positive relationship between the number of minority shareholders and stock return volatility.

The portfolio concentration argues that the relationship between ownership structure and firm risk by previous studies on Faccio et al. (2011) show that firms controlled by a diversified (dispersed) largest shareholders choose riskier investment options than firms that are controlled by undiversified (concentrated) largest shareholders. Rosetto and Stagliano (2012) argue that the determinant of stock return volatility is the existence of blocks and the number of blocks. They find that there is a positive relationship between the existence and number of blocks and firm risk. The reason for this is that the largest blocks are more likely to choose the investment with higher risk and return to mitigate conflicts of interest among the blocks. Ekholm and Maury (2014) find that whether a firm prefers low-risk and stable policies is related to the concentration or dispersion of major shareholders within the firm. They argue that the more concentrated a particular shareholder's share is in the largest shareholder, the less risky investments choose and the lower the abnormal rate of return.

2.2. The Size of Block Portfolio and Firm Risk

Block diversity refers to differences in portfolio size among blocks within a firm. Faccio et al. (2011) find a large diversity in portfolio diversification among large stockholders of European firms. Using this diversity, they demonstrate that firms controlled by diversified major shareholders invest riskier than firms controlled by less diversified major stockholders. Fich et al. (2015) focus on the portion of an institutional investor's portfolio that is accounted for by firms. They hypothesize that in the context of mergers and acquisitions, institutional investors' monitoring activities are maximized when the target company accounts for a large allocation of funds in the institutional investor's portfolio. They show that measuring institutional ownership leads to higher bid completion rates, higher premiums, and lower bid returns. Kempf et al. (2016) show that firms with distracted shareholders are more likely to diversify, acquire, and bring about value destruction. They also show that distracted shareholders are more likely to grant stock options to the CEO, less likely to fire the CEO, and more likely to cut dividends when performance is poor. Firms with distracted shareholders have unusually

low stock returns. However, the power of monitoring may increase with the number of blocks in the portfolio (Edmans et al., 2016). Thus, blockholders with different portfolio sizes may have different monitoring approaches and preferences for firms to take on additional risks.

There are several studies on the relationship between block ownership and firm risk. For example, Anderson and Reeb (2003) find that the impact of the founding family on total and firm-specific risk depends on the generation in which the founding family was in charge of the firm. Rossetto and Stagliano (2012) find a negative relationship between largest block ownership and total risk. Jankensgard and Vilhelmoosn (2016) examine the relationship between ownership structure and the risk of stock returns using investor base and portfolio concentration. Newton and Paeglis (2019) show that the largest blocks of an individual are more likely to be risk-averse and diversified than those of firms. However, prior research has not analyzed the relationship between block diversity and firm risk.

The largest blockholder in a Korean listed company is the family, including affiliated persons and affiliates. The second-largest blockholder is institutional investors and foreign investors. Institutional investors and foreign investors reduce corporate risk by monitoring the largest block and preventing arbitrary decision-making. Therefore, we presume that the diversity of the largest blockholder reduces corporate risk and formulate the following hypotheses.

H1: *The diversity of the blocks within a company lowers firm risk.*

3. Methodology

3.1. Sample and Data

Our sample is taken from the KIS VALUE Library (similar to CRSP in the U.S.) of the Korea Investors Service corporation between 2010 and 2017. The three risks of a firm are obtained from KIS VALUE Library. Information on block ownership and financial statement are collected using TS-2000(similar to COMPUSTAT in the U.S.) of the Korea Listed Companies Association. We use the following criteria to construct our sample:

1. The companies must be traded on KOSPI (Korea Composite Stock Price Index) and KOSDAQ (Korean Securities Dealers Automated Quotations).
2. The following variables will be used in the analysis: (i) daily return on equity; (ii) sales; (iii) total assets; (iv) leverage; (v) Tobin's *Q*; (vi) daily trading volume of equity.
3. All companies included in the sample must have disclosed information to the Korea Exchange (KRX). Companies whose annual reports are not listed in the KRX directory are excluded.
4. Companies in the financial sector and public utilities are excluded.
5. To control for the impact of outliers on the results of our analysis, we remove the top or bottom 1% of each variable.

Our sample includes 2,128 observations for 501 unique firms between 2010 and 2017.

3.2. Model and Variables Measures

Equation (1) is used to analyze the impact of block diversity on firm risk. We employ a panel analysis based on panel data. Hsiao (2007) reports that panel data analysis has several advantages. First, the parameters of the model can be estimated more accurately. Second, it is more capable of capturing complex human behavior than single cross-sectional data or time-series data. Third, it simplifies computation and statistical inference. The Lagrange multiplier test proposed by Breusch and Pagan (1980) confirmed the existence of firm and time (year) characteristic effects. In addition, the Hausman test confirmed that the fixed effects model is more suitable than the probability effects model.

$$FR_{it} = \alpha_0 + \beta_1 DS_{it-1} + \beta_2 X_{t-1} + \mu_t + \lambda_t + \varepsilon_{it} \quad (1)$$

Where FR stands for firm's risk. We use three types of firm risk: Volatility, beta, and idiosyncratic risk. We use blocks diversity as the size of the block shareholders portfolio (DS). X is control variables: Sales growth, firm size, leverage, Amihud (2002) liquidity, and Tobin's Q. μ means firm characteristic effect. λ means time characteristic effect, ε is an error, i mean firm 1, …, N. t or $t-1$ means year from 2009 to 2017.

This study measured volatility by the standard deviation of the firm's daily returns since the year the ownership information was obtained (Rosetto & Stagliano, 2012). We measured beta by the regression coefficient of a market model that regresses the daily returns of firms on a value-weighted market portfolio for the period of interest in the annual sample (Rosetto & Stagliano, 2012). We also measured idiosyncratic risk by a market model using the daily stock returns and daily market index returns for each form in year t of firm i (Cao et al., 2006; Dennis & Strickland, 2004; Rossetto & Stagliano, 2012). In model (2), we perform a year-by-year regression analysis of firm i.

$$R_{i,T} = \beta_{1,i} + \beta_2 R_{MKTi,T} + \varepsilon_{i,T} \quad (2)$$

Where is the return of firm i at time T, $R_{MKTi,T}$ is the return of a market index, is a firm-specific shock.

To estimate the idiosyncratic risk, we use the residual estimates from model (2) as well as equation (3) to calculate the magnitude of the idiosyncratic risk of firm i in year t (Ang et al., 2006).

$$IR_{i,t} = \sqrt{\frac{1}{n}\sum_{d=1}^{n}\left(\varepsilon_{i,d,t}\right)^2} \quad (3)$$

The portfolio size of a blockholder is measured as in Equation (4). The reason for using the portfolio size of a block is that the portfolio size of a block influences diversification preferences (Faccio et al., 2001) and monitoring activities (Edmans et al., 2016).

$$DS_{i,t} = 1 - \sum_{k=1}^{4}\left(\frac{H_k}{B_H}\right)^2 \quad (4)$$

Where H_1, H_2, H_3, and H_4 are the ownership of the first, second, third, and fourth blockholders, respectively.

We use the characteristic factors of the firms as control variables. We adopted the five firm characteristics used in previous studies (Kim & Cho, 2020; Yim, 2020; Al-Dubai & Abdelhalim, 2021): Sales growth, firm size, leverage, Amihud (2002) illiquidity, and Tobin's Q. This study measured sales growth rate by an annual growth rate of sales. We measured firm size as the natural logarithm of total assets (1million won). Leverage is the ratio of debt to equity. As a proxy for stock liquidity, we use the Amihud (2002) illiquidity measure, which is the weekly ratio of absolute stock returns to volume in Won (Korean currency units) averaged over one year. This study measured Tobin Q as the ratio of equity market value and debt book value to total assets.

4. Results

4.1. Descriptive Statistics

Table 1 presents descriptive statistics on firm risk, block diversity, and firm characteristics. The sample covers 2128 firm years for all variables. The mean (median) of the volatility is 39.80% (36.44%). This is much larger than Anderson and Reeb's (2003b) 7.9% and Rossetto and Staglianò's (2012) 3.36% (2.93%) for U.S. firms. The mean (median) of the betas is 0.7038 (0.6645). This is smaller than the mean (median) of 0.812 (0.571) reported by Rossetto and Staglianò (2012). The mean (median) of idiosyncratic risk is 2.45% (2.22%). This is smaller than the 3.1% (1.7%) of U.S. firms reported by Rossetto and Staglianò (2012). However, it is lower than the average of 7.0% of U.S. firms in Anderson and Reeb (2003). Despite the differences in the year of analysis and sample size, the volatility of Korean firms is larger than that of U.S. firms, and their beta and idiosyncratic risk are smaller than that of U.S. firms.

The mean (median) diversity size of the block is 41.80% (39.73%). This is slightly smaller than the 44.3% (44.8%) for Volkova (2019). The average growth rate of sales is 5.14%, which is greater than the median of 3.24%. The average firm size is 13.0029, which is larger than the median of 12.7456. The average leverage is 103.70%, which is greater than the median of 66.24%. Amihud's (2002) mean of illiquidity is 18.41%, which is greater than the median of 2.49%. The mean of Tobin's Q is 1.1344, which is greater than the median of 0.9665. These results indicate no significant difference between the mean and median of the firm characteristic variables and that each variable is not significantly affected by outliers. For each variable, outliers that deviated from the upper and lower

Table 1: Descriptive Statistics

Variables	Acronyms	Obs.	Mean	Std. Dev.	25p	50p	75p
Volatility	VO	2128	0.3980	0.1624	0.2845	0.3644	0.4748
Beta	BT	2128	0.7038	0.4018	0.4085	0.6645	0.9750
Idiosyncratic Risk	IR	2128	0.0245	0.0101	0.0175	0.0222	0.0288
Diversity Size	DS	2128	0.4180	0.2939	0.2151	0.3973	0.6319
Sales Growth	SG	2128	0.0514	0.2210	−0.0508	0.0324	0.1307
Ln (Firm Size)	FS	2128	13.0029	1.5366	11.9103	12.7456	13.7433
Leverage	LV	2128	1.0370	1.2644	0.2919	0.6624	1.2262
Amihud Illiquidity	AL	2128	0.1841	0.6143	0.0031	0.0249	0.0923
Tobin's Q	TQ	2128	1.1344	0.6491	0.7625	0.9665	1.2508

Note: All variables are winsorized at the top and bottom 1 percentile to mitigate the impact of outliers.

limits of 1% were removed, resulting in a somewhat stable distribution for the variable.

4.2. Correlation Matrix

Table 2 shows the Pearson correlations among a subset of variables used in this study. Three firms' risks show a clear tendency to co-vary with the independent variables, and the signs of the correlation are roughly in line with empirical predictions. Sales growth (+), size (−), leverage (+), Amihud (2002) illiquidity (−), and Tobin's *Q* (+) are highly correlated with firm risks. Variance inflation factors (VIF) were measured separately for the regression coefficient. The results show that the VIF value of the sales growth rate was the highest at 1.21. One of the independent variables is correlated, but the coefficient generally does not exceed 0.6, so multicollinearity is not considered to be a problem in this sample (Kennedy, 2008).

4.3. The Effects of Diversity Size on Firm Risk

To examine the impact of the magnitude of block diversity on firm risk, we attempt to consider three dimensions of risk. This study uses volatility, beta, and idiosyncratic risk as proxy variables for firm risk. One independent variable, the size of the blocks' portfolio, is used in this study. We use the controls as sales growth, firm size, leverage, Amihud (2002) illiquidity, Tobin's *Q*, and period time. A panel regression model is applied after statistical testing procedures such as the Lagrange multiplier test and Hausman test. The Lagrangian multiplier test shows that the firm characteristic effect and the time characteristic effect are significant at the 1% level. The Hausman test confirms that the fixed effect model is more effective than the probability effect model. Also, the goodness of fit of the model is significant at the 1% level. In model (1), we analyze the relationship between volatility and the control variables. In models (2), (3), and (4), we examine the relationship between firm risk and the size of blocks' portfolios.

Our findings can be summarized as follows.

First, model 1 in Table 3 shows that the relationship between volatility and controls. We use the five controls: Sales growth rate, firm size, leverage, Amihud's (2002) illiquidity, and Tobin's Q. Sales growth, leverage, and Tobin's Q appear to have a positive effect on volatility at the 1% level. However, firm size and Amihud's (2002) illiquidity seem to have a negative effect on volatility at the 1% level. Therefore, there is a significant relationship between the control variables used in this study and volatility.

Second, model 2 in Table 3 shows that the relationship between volatility and portfolio size. It appears that portfolio size has a negative influence on volatility at the 1% level (efficient = −0.064, *t*-value = −4.85). Model 3 in Table 3 shows that portfolio size has a negative effect on beta at the 1% level (efficient = −0.138, *t*-value = −3.94). Model 4 in Table 3 also shows that portfolio size has a negative influence on idiosyncratic risk at the 1% level (efficient = −0.002, *t*-value = −2.78). This indicates that there is a negative relationship between block diversity and firm risk. This implies that block diversity reduces firm risk in the Korean stock market. This result is consistent with Faccio et al. (2011) who argue that the size of large shareholders' portfolios affects the level of corporate diversification and the power and intensity of monitoring activities on large shareholders. It is also consistent with the argument of Edmans et al. (2016) that the power of monitoring activities changes the percentage of investment in the portfolios. The reason for this is that the first block is the individuals

Table 2: Correlation Matrix

	VO	BT	IR	DS	SG	FS	LV	AL	TQ	VIFs
VO	1									
BT	0.384***	1								
IR	0.786***	0.232***	1							
DS	−0.086***	−0.029	−0.081***	1						1.11
SG	0.074***	0.030	0.026	−0.057***	1					1.09
FS	−0.295***	0.248***	−0.270***	0.182***	−0.012	1				1.21
LV	0.256***	0.083***	0.126***	0.062***	0.028	0.145***	1			1.08
AL	−0.001	−0.140***	−0.001	−0.039*	−0.049**	−0.177***	0.025	1		1.07
TQ	0.202***	0.105***	0.165***	0.110***	0.114***	0.048**	−0.041*	−0.126***	1	1.11

Note: This table presents the Pearson correlation matrix for all variables. All variables are defined in Table 1. ***, **, *Indicate significance at the 1%, 5%, and 10% level, respectively.

Table 3: The Effect of Block Diversity on Firm Risk

Variables	Panel (Fixed Effect Model)			
	Model 1	**Model 2**	**Model 3**	**Model 4**
	Volatility	**Volatility**	**Beta**	**Idiosyncratic Risk**
Constant	1.013*** (6.77)	1.030*** (6.93)	−1.028*** (−2.62)	0.064*** (6.51)
Diversity Size$_{t-1}$		−0.064*** (−4.85)	−0.138*** (−3.94)	−0.002*** (−2.78)
Sales Growth Rate$_{t-1}$	0.033*** (2.62)	0.034*** (2.73)	−0.006 (−0.20)	0.001** (2.32)
Firm Size$_{t-1}$	−0.055*** (−4.75)	−0.054*** (−4.75)	0.135*** (4.45)	−0.003*** (−4.49)
Leverage$_{t-1}$	0.012*** (3.03)	0.011*** (2.85)	0.003 (0.34)	0.000 (0.15)
Amihud Illiquidity$_{t-1}$	−0.024*** (−4.97)	−0.023*** (−4.81)	−0.032** (−2.47)	−0.001*** (−3.47)
Tobin's Q_{t-1}	0.072*** (10.28)	0.073*** (10.56)	0.062*** (3.40)	0.004*** (8.86)
Year effect	Yes			
R-squared	0.2736	0.2840	0.2362	0.2094
Observations	2128			
Number of *i*	501			
F-value	50.69***	49.26***	38.40***	32.89***
Lagrange multiplier test	534.78***	560.91***	819.66***	640.96***
Hausman test	61.80***	59.19***	29.65***	39.30***

Note: *t*-value is in parenthesis. ***, **, * Indicate significance at the 1%, 5%, 10% levels, respectively.

and their families, including affiliates person and affiliates. Therefore, the second and third blockholder (institutional and foreign investors) are considered to be engaged in monitoring activities.

Third, we use sales growth rate, firm size, leverage, stock liquidity, and Tobin *Q* as control variables in this study. They show a highly significance among the variables in previous studies and they are also likely to explain corporate risk well. As a substitute for growth potential, we use the sales growth rate. The higher the sales growth rate, the higher the firm's risk. The results show a positive relationship between sales growth rate and firm risk, except for Model 3 in Table 3. Prior studies have shown mixed results between corporation size and firm risk. Previous studies show a negative relationship between corporation size and firm risk (Dennis & Strickland, 2004; Faccio et al., 2011; Li et al., 2011; Pástor & Pietro, 2003). However, Schwert (2002) reports that technology is a factor explaining stock return's volatility in NASDAQ markets. However, his study not show that firm size and immaturity explain stock return's volatility.

Previous studies show mixed results between firm size and firm risk. Prior studies have shown a negative relationship between firm size and stock return volatility (Dennis & Strickland, 2004; Faccio et al., 2011; Li et al., 2011; Pastor and Veronesi, 2003). However, Schwert (2002) reports that while technology is a factor explaining stock return volatility in NASDAQ markets, there is no evidence that firm size and firm immaturity explain stock return volatility. The results show that there is a negative (−) relationship between firm size and firm risk in Model 2 and Model 4 in Table 3. However, in Model 3 in Table 3, we found that there is a positive (+) relationship between firm size and firm risk. Therefore, we can see that there are different results between firm size and firm risk. Black (1986) argues that the volatility of stock returns is determined by leverage. In empirical studies, the impact of leverage on the volatility of stock returns varies. For example, some studies show a positive relationship between leverage and the volatility of stock returns (Dennis & Strickland, 2004; Faccio et al., 2011; Jankensgard & Vilhelmsson, 2015; Li et al., 2015).

However, the relationship between corporate risk and leverage is negatively (-) related in some studies (Cao et al., 2012). The results show that Model 2 in Table 3 shows a positive relationship between corporate risk and leverage. As a proxy for stock liquidity, we use Amihud's (2002) illiquidity. Prior studies show a positive relationship between stock turnover and stock return volatility (Dennis & Strickland, 2004; Li et al., 2011) and Jankensgard and Vilhelmsson (2015) show a positive relationship between spread and stock return volatility. Therefore, we expect

Table 4: The Effect of Block Diversity on Firm Risk: KOSPI vs. KOSDAQ

Variables	KOSPI			KOSDAQ		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Volatility	Beta	Idiosyncratic Risk	Volatility	Beta	Idiosyncratic Risk
Constant	0.939*** (−5.08)	−1.462*** (−2.88)	0.059*** (−4.69)	1.110*** (−4.18)	−0.455 (−0.71)	0.070*** (−4.17)
Diversity Size$_{t-1}$	−0.053*** (−3.58)	−0.122*** (−2.97)	−0.001 (−1.39)	−0.089*** (−3.20)	−0.187*** (−2.78)	−0.004*** (−2.77)
Sales Growth Rate$_{t-1}$	0.039*** (−2.52)	−0.015 (−0.35)	0.001* (−1.78)	0.025 (−1.13)	0.015 (−0.27)	0.001 (−1.33)
Firm Size$_{t-1}$	−0.048*** (−3.47)	0.159*** (−4.19)	−0.003*** (−3.20)	−0.061*** (−2.71)	0.109** (−2.00)	−0.004*** (−2.82)
Leverage$_{t-1}$	0.018*** (−4.17)	0.007 (−0.66)	0.000 (−1.16)	−0.007 (−0.84)	−0.009 (−0.42)	0.000 (−1.48)
Amihud Illiquidity$_{t-1}$	−0.018*** (−3.08)	−0.030* (−1.83)	−0.001** (−2.45)	−0.032*** (−3.48)	−0.041* (−1.86)	−0.001** (−2.38)
Tobin's Q_{t-1}	0.068*** (−8.67)	0.087*** (−4.02)	0.003*** (−6.95)	0.083*** (−5.86)	0.015 (−0.44)	0.004*** (−5.44)
Year Effect	Yes					
R-squared	0.2933	0.2408	0.2096	0.2902	0.2541	0.2320
Observations	1532			596		
Number of *i*	319			182		
F-value	38.32***	29.28***	24.48***	12.61***	10.51***	9.32***
Lagrange multiplier test	440.76***	832.32***	441.76***	96.47***	79.20***	95.38***
Hausman test	40.04***	21.75**	32.45***	31.61***	21.04**	28.23***

Note: *t*-value is in parenthesis. ***, **, *Indicate significance at the 1%, 5%, 10% levels, respectively.

that a positive (+) relationship between stock liquidity and stock return volatility. Tobin's *Q* is a factor that has been frequently used as a proxy for growth options in prior studies. Prior studies show a positive relationship between market value to book value and the volatility of stock returns (Cao et al., 2005; Jankensgard & Vilhelmsson, 2015; Pástor & Pietro, 2003). Therefore, we expect a positive (+) relationship to be established between market value to book value and the volatility of stock returns. The results show a positive (+) relationship between Tobin's *Q* and firm risk.

4.4. Additional Test

In addition, we analyze the relationship between portfolio size and corporate risk separately for KOSPI and KOSDAQ. The reason for this is that KOSPI is different from KOSDAQ. The results of all model show that diversity size has a negative influence on the firm risk, except for model 3 in Table 4. In general, there is no evidence of a difference between KOSPI and KOSDAQ in the effect of diversity size on firm risk. However, KOSDAQ is higher than KOSPI in that diversity size affects firm risk. The reason for this is the KOSDAQ is relatively smaller than the KOSPI in terms of corporate size.

5. Conclusion

In this paper, we examine the impact of block diversity on corporate risk using a cross-section of firms listed on the Korean stock exchange. We hypothesize, based on prior research, that the diversity size reduces corporate risk. The results are summarized as follows. First, we find that diversity size measuring by block diversity is associated with lower risk. Second, this result shows that there is no difference in the effects of portfolio size on the firm risk between KOSPI and KOSDAQ.

This study has several contributions. First, this study analyzes the relationship between block diversity and

corporate risk. The analysis results of this study have implications for business practitioners and investors. As far as we know, previous studies have overlooked this topic. Our study expands on existing literature on the relationship between blockholder ownership and corporate risk. Second, the ownership structure of Korean companies is different from that of American companies. The analysis results of this study can be applied to companies in countries similar to Korea. Third, we additionally examined KOSPI and KOSDAQ separately. The results of the analysis show that there is no evident of difference in the impact of the size of diversity on corporate risk in the two markets.

However, this study has the following limitations, and future research directions are as follows. First, we use the diversity of blockholder ownership as a proxy for diversity size. In the future, it is necessary to introduce the factors such as blockholder identity and contestability among blockholders. Second, we used five control variables. In the future, it is necessary to introduce more diverse control factors.

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