Does Firm Volatility Affect Managerial Influence?

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Abstract

The aim of this paper is to develop and test a new theory that firm volatility can affect managerial output. Theoretical underpinnings for the hypothesis are developed and drawn from the existent literature. This hypothesis is then tested with data from 3,296 companies listed on the Korea Stock Exchange (KSE) from 1999 through 2008. The theory and the empirical results in this paper suggest that the effect of managers on firm performance differs with the degree of firm volatility. We find that a higher ratio of directors from top-ranking academic institutions leads to an increase in market value when firms suffer high volatility. Moreover, these results suggest that the interaction between executive characteristics and firm volatility has important consequences for firm performance. The findings expand our view of firm volatility to previous studies.

Keywords Volatility, Managerial Influence, Firm performance

1. Introduction

The role of managers has long attracted a great deal of attention from financial economists. Much research has focused on whether managerial ability can help alleviate the firm value. To understand adequately the landscape of managerial influence, however, one must recognize that the characteristics that the firms suffer. If managerial decisions may affect firm value, firm characteristics could influence the effect. This article uses this idea to develop a simple hypothesis about whether the effect of managerial ability to influence decisions on firm value differs on the basis of firm characteristics such as volatility and risk. Our focus in this paper is that the degree of managerial influence differs with the variation in firm performance, because decisions with extreme consequences are more likely to be taken when the firm's surroundings are more volatile.

This paper investigates the effect of the board of directors on firm value and tries to show how the volatility of a firm influences the effect. Sah and Stiglitz (1991) argue that the centralization of decision making in an organization can affect the impact of managers on firm value. Building on Sah and Stiglitz (1986, 1991) and on a large amount of management and organizational literature on managerial discretion, we argue that in a firm facing volatile situations, the risk arising from judgment errors is not well diversified. That is, the likelihood of either very good or very bad decisions is greater in a firm with high volatility than in a firm with low volatility. Therefore, our hypothesis is that the effect of the same manager on firm value differs according to the degree of firm volatility, because decisions are more uncertain. This paper adds to a large amount of literature in economics, finance, and organizational theory that tries to assess the impact of managers on firm outcomes. Our contribution consists of the documentation of results suggesting that a manager's impact on firm performance depends on a firm's volatility. In particular, specific characteristics of managers should translate more powerfully into firm outcomes if volatility is high.

While many have emphasized the importance of managerial ability and roles in firm performance, previous empirical research on boards of directors has focused on the characteristics of boards themselves, such as board size, outside directors' ratio, and the characteristic composition of the board of directors. As Monks-Minow (1995) and Yermack (1996) argue, the cost of a large board size exceeds its benefits, leading to a negative relation between Tobin's Q and the number of directors. A higher outside directors' ratio improves stock return upon appointment (Rosenstein-Wyatt (1990)), raises premiums on a tender offer (Cotter-Shivdasani-Zenner (1997)), and improves operating performance by initiating corporate restructuring (Perry and Shivdasani (2005)). Moreover, board diversity and the presence of powerful CEOs affect firm value and variance, as examined by Carter et al. (2003) and Adams et al. (2005), respectively. However, there is little empirical evidence that managerial output can differ according to a firm's external situations, such as volatility and risk. Recently, Joh and Jung (2012) examine whether the information transaction costs of each firm can affect the managerial influence.

This paper studies whether managerial influence differs according to a firm's volatility. In particular, we examine whether managerial performance differs when managers with the same characteristics are faced with a volatile situation. Does managerial ability have a more positive effect on firm performance when a firm is facing volatile situations such as high return volatility or high growth? This paper combines a theoretical and empirical analysis of this aspect. Using individual-level personnel data of boards of directors in Korea, we open

the black box through which volatility affects managerial behavior. Our findings draw attention to the interplay between a firm's external surroundings and managerial performance. The topic for future research is whether our results generalize from the firm volatility's effect on managerial performance to the firm's diverse surroundings more generally. Also, we are trying to examine whether the result differs by controlling the characteristics of managers for the future work.

The paper is organized as follows. Section 2 describes the background of the study and develops a theoretical framework for analyzing the effects of volatility on managerial influence. Section 3 discusses how our experiment is designed to identify such effects and presents evidence of the effect of volatility on managerial influence on firm value. Section 4 concludes the paper.

2. Theoretical Framework and Hypotheses

Within economics literature, the theoretical argument that is most closely related to our study is found in the work of Sah and Stiglitz (1986, 1991). They compare the outcomes under different structures of group decision making when individuals make judgment errors. In their models, because group members may disagree, group decision making will be a compromise that reflects the different opinions of the group members. In the paper which they published in 1986, Sah and Stiglitz show that larger groups are more likely to reject bad projects because a project will only be accepted if several group members agree that it is good. For the same reason, large groups are also less likely to accept good projects. As they state most clearly in the paper they published in 1991, one of the implications of their theory is that there should be less variation in performance when a greater number of executives influence decisions. Sah and Stiglitz's model does not offer a clear prediction for the effect of the size of the decision-making group on average performance. This relationship depends on variables such as the profitability of projects, probability of projects being good or bad, and on the convexity of the function relating managerial decisions to performance. In their study, the effects of an increase in the size of the decision-making group are similar to those of a decrease in the power of a particular decision maker. Thus, the hypothesis that boards' influence on firm performance differs by firms' variability follows from their setup.

It is also possible to regard our hypothesis as a reinterpretation of Sah's conjecture about the effect of political systems on economic performance. We assume that the volatility and risk of an economy are influenced by the type of leadership. This assumption is also clarified in Sah and Stiglitz (1986, 1991) as they state that group decision making entails a diversification of opinions effect. We assume that less diversification in the decision making implies more risk and volatility. Centralized and decentralized economies definitely have different levels of risk and volatility. For this reason, we define two types of economies, namely, *S* and *S'* as a centralized and decentralized economy, respectively. Since a centralized economy lacks diversification, economy *S* has higher risk and volatility. On the other hand, the decentralized economy *S'* has lower risk and volatility.

Our hypothesis in this paper is a natural consequence of blending together the notions of "volatile situation" and "managerial discretion." Because top managers make decisions in volatile situations, the quality of their decisions is bound to vary. In situations in which a firm is more volatile, top managers have more discretion to influence decisions. The final decision will thus reflect the manager's opinion more directly and will be more variable than that in a less volatile situation.

The relationship between managerial influence and firm volatility is a complicated one. It depends not only on the distribution of managerial ability and the tasks that managers perform, but also on the positive and negative externalities that high-ability and low-ability managers exert on one another. In this section, we examine these aspects using a simple model in which there are only two managers in a more volatile as well as a less volatile economy. We follow the assumptions that Sah and Stiglitz (1991) made in their study on the quality of managers in centralized organizations.

Sah and Stiglitz (1991) argue that the output in the centralized economy is smaller than that in the decentralized economy if the output is concave in the number of good managers. From this statement, we infer that the same group of good managers may generate a different performance according to the firm's leadership type. We show this effect in more detail following Sah and Stiglitz's model.

We assume that there are only two managers, a good manager and a bad manager. The managers differ in terms of their decision-making ability. From the same pool of projects, a good manager accepts a good project with probability p_{11} and a bad project with probability p_{12}. However, a bad manager takes only p_2 fraction of the projects randomly because he/she cannot identify good projects. The fraction of projects accepted by the good manager is $p_1 = ((p_{11} + p_{12}))/2$.

Let us define $\pi(m|s)$ as the probability density of m good managers in economy s, and Y(s) as the profit of economy s. By Sah and Stiglitz, it is shown that the profit gap of economies s and s' is

$$Y(s) - Y(s') = 2\pi(2/s)(1 - 2p_1) + \pi(1/s)(1 - 2p_2). \qquad (1)$$

For simplicity, let p_1 and p_2 have the same fraction p. Then, the gap of profit becomes

$$Y(s) - Y(s') = (1 - 2p)(2\pi(2/s) + \pi(1/s)). \qquad (2)$$

This implies that a gap always exists if p is not one-half. If the economy allows more than half of the projects to be accepted by managers, the gap is negative, which implies that the profit of s is smaller. In contrast, the profit of s is bigger if p is less than a half.

Therefore, we conclude that the total performance of managers with the same quality can be affected by the volatility of a firm, assuming that the managers' tendency to screen is fixed. The preceding explanations lead us to the following hypothesis.

Hypothesis: The effect of managerial ability on firm value will differ according to firm characteristics such as risk and volatility.

3. Empirical Analysis

On the basis of the theory we discuss, we investigate the connection between firm volatility and managerial influence on firm value in Korea. Empirical evidence that supports the relationship between the organization structure and managerial performance has been offered by Almeida and Ferreira (2002). They cite high communication costs and differences in people's abilities to process information as the justification for their assumption that there are disagreements among managers. Hannan and Freeman (1977) de-emphasize the impact of managerial choices on firm performance as they hold that the scope of managerial actions is constrained by the organization and its environment. In addition to the organization structure, this study examines whether firm's risk factors such as volatility affect the managerial influence.

Our sample consists of the nonfinancial, publicly traded firms listed on the Korea Stock Exchange from 1999 to 2008. To control managerial ability, we divide top managers into two groups: managers who graduated from the top 10% universities and managers who have not graduated from the top 10% universities. In addition, we investigate the relationship between managerial influence on firm value measured by Tobin's Q and firm volatility.

We have collected information on each director on the boards of the firms included in the sample from the Korea Listed Companies Association and KISLINE, a database maintained by Korea Investors Service, Inc. The top management team files of the Korea Listed Companies Association and KISLINE supply quarterly updated information on the name, title, intra-company rank, birth date, educational background, and career of the top managers of listed companies. In addition, accounting data for the firms in our sample were taken from FnDataguide. There are 3,296 firms with a complete set of board of director data and complete financial data. We have selected Korean firms and management to test the effects of top managers' influence on firm value for the following reason: It is very difficult and important to control managerial ability equally in order to examine the volatility effect on managerial influence. Since Korean society is highly education motivated[1] and has established a very strong academic ranking system that is directly correlated with students' ability, it is a good base for controlling managerial ability across the sample. Therefore, Korean data offers an advantage for testing whether the influence of managers with the same ability differs according to a firm's volatility.

In this paper, we examine whether the effects of managerial ability would change when a firm faces volatile economic situations or risks. If the importance of managerial ability increases in such volatile conditions, it will have a greater impact. In addition to explanatory variables in the basic model, we include interaction terms between a firm's volatile conditions with a variable indicating managerial ability. We examine the effects of market risk, return volatility, and sales growth rates. Market risk is examined through beta (systematic risk) and return volatility, through standard deviation of stock returns.

Further, to control manager quality, we limit the managers to those who graduated from the top 10% universities in Korea. Joh and Jung (2009) insist that graduation from prestigious schools is correlated with managerial ability. The model used for analysis included certain firm-specific variables, which are also likely to influence firm value. These firm-specific variables are board size, board's average age, largest ownership, board composition, CAPEX/assets, leverage, firm size, and operating profitability, following Yermack (1996).

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[1] Jeon and Ahn (2001) report that Korean society has a male-dominated and seniority-based hierarchy, and a highly education-motivated culture.

Following previous studies on corporate governance and performance issues that have been published after Morck et al. (1988), we use Tobin's Q—the ratio of the firm's market value to the replacement cost of its assets—as a measure of corporate value. Market value is measured through the market value of common equity plus the book value of preferred stock and long-term debt.

We examine how managerial influence on firm value differs according to firm volatility when we control for factors that determine firm value. As discussed earlier, we use the proportion of managers who graduated from the top 10 % colleges as a proxy for good managerial influence on firm value. We use Tobin's Q to estimate firm value.

$$
\begin{aligned}
\text{Tobin's Q} = \alpha &+ \beta_1 (\text{Ratio of managers who graduated from top schools: Managerial ability}) + \beta_2 (\text{Board size}) \\
&+ \beta_3 (\text{Board's average age}) + \beta_4 (\text{Board composition}) + \beta_5 (\text{Largest ownership}) + \beta_5 (\text{CAPEX/Assets}) \\
&+ \beta_6 (\text{Leverage}) + \beta_7 (\text{Firm size}) + \beta_8 (\text{Operating profitability}) + \beta_9 (\text{Distress dummy}) \\
&+ \beta_{10} (\text{Market risk}) + \beta_{11} (\text{Volatility}) + \beta_{12} (\text{Managerial quality*Volatility}) \\
&+ \beta_{13} (\text{Industry dummy}) + \beta_{14} (\text{Year dummy}) \qquad (3)
\end{aligned}
$$

On average, 53.8% of the board members graduated from schools with the 10th percentile ranking. Board composition is the ratio of directors who are outsiders. The outside directors system was introduced in 1998, and all listed firms are legally required to include outside directors on their boards.

Table I
Descriptive statistics for sample firms

This table presents descriptive statistics for sample firms over 1999–2008. The sample is drawn from FnDataguide. Data related to board of director characteristics are taken from Korea Listed Companies Association and KISLINE. Tobin's Q is the ratio of the sum of the market value of common equity, book value of preferred equity, and book value of long-term debt to the book value of assets. The 10th percentile school ratio is the proportion of directors who graduated from the TOP 10th percentile universities on the boards based on the average score of Korean SAT. Board composition is the fraction of directors who are outsiders. Director age is as of the end of the year and the natural logarithm of the age. Largest ownership is the percentage shareholding of the largest shareholder. CAPEX/Assets is the ratio of capital expenditures to total assets. Leverage is the ratio of total debt to total assets. Firm size is the natural logarithm of (total assets/1,000,000). Operating profitability is the ratio of earnings before interest and taxes (EBIT) to beginning total assets. Distressed is a dummy that takes 1 when a firm experienced ordinary income losses in the past 3 years, or an equity loss in the last year. Chaebol dummy is a dummy variable that indicates whether a firm belongs to one of the 50 largest chaebols. The Korea Fair Trade Commission updates the list of the 50 largest chaebols annually. Market risk (beta) is the estimate from the market model in which the firm's monthly returns over the last year are regressed on the KOSPI monthly returns. Sales growth is a log value of the net sales between year t and year t – 1.

Variable	First quartile	Mean	Median	Third quartile	Standard deviation	Sample size
Tobin's Q	0.373	0.718	0.517	0.785	0.489	3,296
10th percentile school ratio	0.385	0.538	0.611	0.763	0.247	3,296
Board size	1.609	1.946	1.956	2.197	0.419	3,296
Board composition	0.200	0.274	0.222	0.286	0.128	3,296
Director age	3.946	3.927	4.004	4.055	0.129	3,296
Largest ownership	0.170	0.346	0.303	0.452	0.177	3,296
CAPEX/Assets	0.005	0.037	0.028	0.058	0.358	3,296
Leverage	0.338	0.573	0.496	0.648	0.626	3,296
Firm size	4.402	5.421	5.242	6.282	1.529	3,296
Operating profitability	0.008	0.021	0.033	0.069	0.148	3,296
Distressed dummy	0.000	0.323	0.000	1.000	0.472	3,296
Chaebol dummy	0.000	0.180	0.000	0.000	0.399	3,296
Market risk (beta)	0.412	0.636	0.648	0.942	0.300	3,296
Return Volatility	0.375	0.552	0.517	0.700	0.239	3,296
Sales growth	-0.013	0.075	0.049	0.137	0.270	3,296

We control for firm size, capital expenditure, leverage, operating profitability, and firm risk as well as the board characteristics such as size, age, and composition. Firm size is measured by the log value of total assets. We also control for leverage as the ratio of total debt to total assets, because debt can enhance or hinder a firm's ability to create value by, for example, changing its contracting environment through constraints imposed by

debt covenants. Following Yermack (1996) and Faleye (2007), we include operating profitability, which is defined as the ratio of operating income before depreciation to total assets at the beginning of the year, as a measure of current profitability. Board size is a log value of the total number of directors on the board. Further, we include two-digit primary SIC code dummies to control for industry differences. We also include interaction terms between managerial quality and volatility to examine the effect of volatility on managerial influence on firm value.

The regression results show the interaction terms between good managerial quality and the firm's characteristics of variations, sales growth, and R&D activity. The first basic model without the interaction terms shows that the managers who graduated from top schools increase firm value, while managers who graduated from non-top schools decrease firm value. Moreover, the coefficients of the interaction terms between good quality and volatility are positive, indicating that Tobin's Q has a stronger positive relation with good managerial influence when the firm faces greater risks or experiences high growth or volatility. These results suggest that managerial ability becomes more important when firms suffer certain volatile situations.

Table II
Volatility, managerial ability, and firm value

This table presents the regression results examining whether firm volatility affects the managerial influence between 1999 and 2008. The dependent variable is Tobin's Q, which is the ratio of the sum of the market value of common equity, book value of preferred equity, and book value of long-term debt to the book value of assets. Managerial ability is the proportion of directors who graduated from the 10th percentile universities. Regression (2) shows the fixed effect regression of firm performance and managerial ability. Industry dummies are employed to control for industry compensation practices, and year dummies are employed to account for economy-wide shocks. Standard errors are shown in parentheses. Levels of significance are indicated by ***, **, and * for 1%, 5%, and 10%, respectively.

Variable	(1)	(2)	(3)	(4)	(5)
Managerial ability	0.072***	0.078***	−0.041	−0.117*	0.110***
	(0.020)	(0.022)	(0.078)	(0.066)	(0.039)
Board size	0.058**	0.057**	0.051**	0.063**	0.054**
	(0.025)	(0.026)	(0.024)	(0.026)	(0.025)
Largest ownership	0.010	0.009	−0.001	0.012	−0.013
	(0.041)	(0.047)	(0.049)	(0.045)	(0.048)
Board composition	0.489***	0.504***	0.382***	0.344***	0.349***
	(0.088)	(0.086)	(0.085)	(0.083)	(0.085)
CAPEX/Assets	−0.008	−0.006	−0.003	0.004	−0.006
	(0.021)	(0.021)	(0.023)	(0.022)	(0.024)
Leverage	−0.209***	−0.203***	−0.210***	−0.301***	−0.199***
	(0.041)	(0.044)	(0.042)	(0.041)	(0.043)
Firm size	0.006	0.006	0.011	0.024***	0.011
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Operating profitability	−0.068	−0.062	−0.008	−0.101	−0.113
	(0.065)	(0.067)	(0.068)	(0.067)	(0.069)
Distressed dummy	−0.019	−0.020	−0.009	−0.071***	−0.012
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Chaebol dummy	0.018		0.041*	0.036	0.031
	(0.023)		(0.024)	(0.024)	(0.024)
Market risk (beta)	0.113***	0.115***	0.054*		0.114***
	(0.022)	(0.024)	(0.032)		(0.026)
Return volatility				0.473***	
				(0.045)	
Sales_growth					0.115***
					(0.036)
Managerial ability *** Market risk (beta)**			0.222***		
			(0.089)		
Managerial ability *** Return volatility**				0.498***	
				(0.105)	
Managerial ability ***Sales_growth**					0.152*
					(0.091)
Industry dummy	Yes		Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes
Firm fixed effect		Yes			
Number of firms	3,296	3,296	3,296	3,296	3,296
Adj. R^{2}	0.273	0.439	0.273	0.278	0.282

4. Summary and conclusion

In an era of heightened corporate governance scrutiny, there has been a substantial debate on the effectiveness of the role of boards of directors. Recent research, however, has focused on the effects of board size and board composition on strategic decisions and firm performance. This paper examines the relation between the board's influence on firm value and firm characteristics such as volatility and risk using the school quality data of the directors of Korean firms after the Asian economic crisis.

We suggest a model based on Sah and Stiglitz (1991) to show that the effect of volatility differs according to managerial influence. Further, we test the model empirically. OLS regressions suggest that a higher ratio of directors who have graduated from top-ranking schools has a more positive effect on corporate value when the firm has high volatility.

On the whole, we conclude that managerial ability assumes greater importance in firms that face challenges and in which managers are given more discretion. Our model and empirical findings contribute to the literature on firm value and management by showing that managerial ability plays a more important role when managers have more discretionary power in certain business environments.

Therefore, we infer that firms having good managerial ability can optimize volatile situations. Because monitoring and decision making are more influential when a volatile situation arises, it is important to also consider the board's ability and effectiveness when the firm faces risks or a volatile situation. We suggest that managerial influence is affected by the volatility of the conditions faced by the firm.

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