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Corporate Governance and Corporate Performance Dispersion

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Abstract This study, using a fixed effects model, empirically investigates the relationship between corporate governance and corporate performance dispersion. Suggesting a negative relationship, [1] theorize that when corporate governance improves there is a decrease in shareholder oversight which could permit greater managerial discretion to execute conservative investment policies leading to a decrease in corporate risk taking and hence a decrease in performance dispersion. For a positive link, [2], employing agency theory, contend that with poor corporate governance, managers may choose conservative investment policies for career preservation concerns, giving up value-enhancing risky projects. Our findings indicate that the Gompers and Bebchuk governance indices (institutional ownership) are negatively (positively) associated with the standard deviation of monthly stock returns. The results also indicate that better corporate governance is associated with higher as well as more variable capital expenditures and R&D spending. These findings are consistent with the argument that management of better governed firms behave optimally, follow more aggressive investment policies, leading to the increased dispersion of corporate performance.

Keywords: *corporate governance, corporate performance*

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1. Introduction

The relationship between the quality of corporate governance and firm performance is a fundamental topic in the corporate governance literature. Extant studies of this relationship focus on levels of corporate performance, with little or no focus on the dispersion of corporate performance (e.g. [3,4,5,6]). This is a non-trivial oversight given that dispersion is an important dimension of performance. In this study, we extend the literature by examining the relationship between the corporate governance measures and performance dispersion and put forth a plausible explanation for the relationship.

We show that performance dispersion or variability increases as corporate governance quality improves. The findings hold for within-firm, over-time corporate performance variability, even after controlling for endogeneity and fixed effects. The results also indicate that better corporate governance is associated with higher as well as more variable capital expenditures and R&D spending. These findings extend the literature in several ways. A growing literature (see [7,8,9]) documents that corporate governance is associated with performance variability. However, much less is known about the nature of the relationship. We offer an insight into this subject by providing a connection between corporate governance and performance variability. Particularly, we document that better corporate governance leads to higher performance variability through increased capital expenditure and R&D spending. Additionally, this study extends the limited research on firm-level volatility.

Most of the emergent literature on the relationship between corporate governance and firm performance focus on the cross-sectional differences in firm value. Studies such as [3] and [6] document that corporate governance has a positive impact on firm performance. [10] show that poor governance firms with large cash reserves spend on value-reducing acquisitions leading to a reduction in firm value. [11] document that corporate governance has a positive impact on firm value through its impact on the value of cash.

A few studies examine the relationship between corporate governance and performance variability. [7] document that more informed risk arbitrage, which is related to better investor protection and better corporate governance, is related to more value enhancing capital budgeting decisions. [8] shows that firms with larger boards have lower variability of corporate performance. [9] examine the association between investor protection and management's incentive to take value-enhancing risks. The authors find that corporate risk taking, measured by cash flow volatility, is positively associated with the quality of investor protection.

2. Relationship between Corporate Governance and Performance Dispersion

Examining the extant literature, there are arguments for both a negative and a positive relationship between corporate governance and performance variability. A theoretical explanation for a negative relationship is given by [1]. The authors theorize that when investor protection and corporate governance improve there is a decrease in the fear of expropriation by insiders and hence a decrease in the necessity for concentrated ownership by dominant shareholders. Dominant shareholders may have the incentives and power to decrease the discretion enjoyed by management [12]. The decrease in ownership of dominant shareholders could permit greater managerial discretion to execute conservative investment policies leading to a decrease in corporate risk taking. [13], examining a sample of United Arab Emirates firms, finds a negative relationship between a firm's corporate governance index and its risk. [14] find that corporate governance aims at reducing managerial opportunistic behavior and reduce excessive risk taking. And [15] find that better governed firms have lower risk of bankruptcy. The result is a negative relationship between corporate governance quality and performance variability.

A positive link between corporate governance quality and performance variability can be obtained from agency theory. For instance, [2], contend that managers may choose conservative investment policies for career concerns, giving up value-enhancing risky projects. Managers may even diversify their companies' operating risks to protect their career. We contend that more effective monitoring, better corporate governance, will alleviate such conservative actions leading to higher risk-taking in positive NPV projects.

[16] present another argument for a positive relationship between corporate governance quality and performance variability. They contend that the amount of corporate resources abstracted for management's private benefit is inversely related to the level of investor protection. Thus, with enhanced investor protection management's behavior is optimal and their investment policies are more aggressive. One can also argue that better corporate governance also leads to optimal management behavior and hence more aggressive investment policies. Additionally, [17] examining Japanese firms, finds that governance structures are positively related to corporate risk taking. And [18] document a positive relationship between corporate governance level and corporate risk-taking. The result of the above arguments is a prediction of a positive relationship between corporate governance quality and performance variability. The conflicting theoretical possibilities motivate our empirical investigation.

In summary, theories exist supporting arguments for both a negative and a positive relationship between corporate governance quality and corporate performance variability. Owing to the fact that the theories do not indicate the relative strengths of these relationships, we do not take an a priori position on which direction the relationship leans. Instead, we consider the relationship between corporate governance quality and corporate performance variability an empirical issue. Hence, we state the hypothesis in the null form: corporate governance quality is not related to corporate performance variability.

3. Data and Method

In this section we present a framework to test the previously developed hypothesis.

Our empirical approach consists of tests to determine the relationship between corporate governance quality and corporate performance variability. The sample consists of firms with data in the Investor Responsibility Research Center (IRRC) database, COMPUSTAT database, and CRSP for at least two consecutive years during the period 1990 to 2006. We required two usable observations to calculate standard deviation of returns. Of the 1754 firms with the required data, we excluded 220 financial firms (sic codes 6000 to 6999) and 180 utilities (sic codes 4000 to 4999). The resulting sample is 1354 firms and 23018 firm-year observations.

Consistent with [19] and [8], we used the standard deviation of monthly stock returns to measure the variability of corporate performance. As a second measure of corporate performance, we used the standard deviation of market-adjusted monthly stock returns.

To capture corporate governance quality, we used numerous measures of external and internal corporate governance quality including the presence of large shareholder monitoring and the extent of managerial entrenchment owing to takeover defenses. These governance measures were jointly examined in [3] and [6], who document that governance quality is positively related to firm value. Large shareholders' monitoring enhances governance of the firm internally, by acting to guard their own investments due to potential managerial agency conflicts. Alternatively, takeover protection provisions impact firm decision making, given that the market for corporate control can serve as an external tool for disciplining management.

We employed two measures to capture the extent of managerial entrenchment owing to takeover protection and one measure to capture large shareholders' monitoring. The first measure, the [3] corporate governance index, tracks the number of anti-takeover provisions in a company's charter and in the legal code of the state of incorporation. [3] established an inverse relationship between the number of anti-takeover provisions and the quality of corporate governance. The index data are reported about every two years (1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006) by the IRRC and the index ranges from 0 and 24. In using data for periods in which the IRRC does not report data, we assumed that the governance score is the same as that in the year after the most recent reported score (see [3]). The second measure is an index created in [6]. This index uses the same raw data as the Gompers et al. index but tracks only six of the provisions that [6] show to have the most effect on firm value. Additionally, we used the total institutional ownership in a firm as a measure of large shareholder monitoring. Institutional ownership data are obtained from SEC EDGAR files (form 13F).

We introduced several control variables into the analyses to control for firm and industry characteristics that may affect performance variability (see [8]). Firm size was measured as the natural logarithm of the book value of total assets. We used the capital expenditures scaled by the book value of total assets as a proxy for growth opportunities. Given that we were investigating the effect of corporate governance quality on performance variability, we had to control for firm diversification since it is a determinant of performance variability. We used the number of business segments as a proxy for firm diversification. Return on assets (ROA) was calculated as earnings before interest and taxes (EBIT) scaled by the book value of total assets. Financial leverage was the total debt scaled by the book value of total assets. To control for industry effects, we introduced industry dummy variables. Each industry dummy variable was set to one for each three-digit SIC code in our sample. All variables were winsorized at the 5% and 95% percentiles for each year to reduce the effects of outliers.

The central focus of this paper is to examine the effect of corporate governance quality on performance variability. Consistent with [20] and [8], we defined a firm's over-time performance variability as the standard deviation of the firm's monthly stock returns over the sample period. We employed the following fixed effects model:

$$\begin{aligned}\sigma &= \alpha_0 + \alpha_1 Ln\left(Governance\ measure\right)\\ &+\alpha_2 ROA + \alpha_3 Ln\left(Total\ Assets\right)\\ &+\alpha_4 Capital\ Expenditures / Total\ Assets\\ &+\alpha_5 Financial\ leverage\\ &+\alpha_6 Number\ of\ business\ segments + I_i + \varepsilon_i\end{aligned} \quad (1)$$

where σ was the standard deviation of monthly stock returns over the sample period, *Ln(Governance measure)* was the natural logarithm of the governance measure, I_i was the industry fixed effect for each three-digit SIC code and ε_i was a heteroskedastic error term.

In Model (1), the independent variables were averaged over the sample period (see [8]) making the regression cross-sectional and hence we did not use fixed firm effects.

4. Results

In this section we present the results of our empirical tests and conduct some robustness checks. Table 1 presents descriptive statistics for the main variables used in the study. The mean and standard deviation of monthly returns are 0.0132 and 0.191 respectively. The Gompers et al. index for the sample ranges from 1 to 19 and has a standard deviation of 2.72.

Table 2 presents the results of the regression analysis in Model (1). The coefficients on the Gompers and Bebchuk indices are negative and statistically significant. Given that the lower the governance score the higher the governance quality, the results suggest that corporate governance quality is positively related to the standard deviation of corporate performance. The coefficients on the other independent variables are consistent with [8].

Given that performance variability is related to the unpredictable component of performance, we considered "unexpected" performance using the market-adjusted monthly stock return as a proxy (see [8]). The market-adjusted monthly stock return is the difference between the firm's monthly stock return and the market's value-weighted monthly stock return. We replaced the standard deviation of monthly return with the standard deviation of the market-adjusted monthly return in Model (1) and reestimate the model. The results from this regression confirm our results from the first regression. Particularly, the coefficients on the Gompers and Bebchuk indices are also negative and statistically significant. Additionally, the institutional ownership coefficient in the market-adjusted return regression is also statistically significant (*p-value* = 0.059), and this is consistent with the earlier finding that governance quality is positively related to performance variability.

Table 1. Descriptive Statistics

	N	Mean	Median	SD	Min.	Max.
Monthly Stock Returns	276216	0.0132	0.0057	0.1910	-0.9881	4.9545
Market-Adjusted Monthly Stock Returns	276216	0.0034	-0.0064	0.1862	-1.0600	5.0140
ROA	23018	0.0673	0.0587	0.0750	-0.1972	0.4978
Total Assets ($Billions)	23018	5.7360	1.0800	13.0620	0.1000	99.6620
Total Debt / Total Assets	23018	0.3251	0.3516	0.2224	0.0000	0.7500
Capital Expenditures / Total Assets	23018	0.0243	0.0146	0.0268	0.0004	0.0999
Number of Business Segments	23018	2.5750	2.0000	1.8029	1.0000	10.0000
Gompers Governance Index	10832	9.0199	9.0000	2.7230	1.0000	19.0000
Bebchuk Governance Index	9392	2.6315	3.0000	1.1392	1.0000	6.0000
Institutional Ownership (%)	13608	39.2490	34.2000	30.8575	0.1000	99.7000

The sample consists of 1354 firms with governance index data from the Investor Responsibility Research Center's (IRRC) data set over the period 1990-2006. The IRRC database contains data on the 24 provisions tracked by the Investor Responsibility Research Center. Data on financial items and stock returns are obtained from COMPUSTAT and CRSP respectively. COMPUSTAT is a database of market, statistical, and corporate financial information about active and inactive firms. CRSP is a database of daily and monthly stock return data as well as other market and corporate action data. Institutional ownership data is obtained from SEC EDGAR files. The SEC EDGAR files are financial statements submitted regularly to the SEC by publicly traded firms as part of the public listing disclosure requirements. The market-adjusted monthly stock return is the difference between the firm's monthly stock return and the market's value-weighted monthly stock return. The Gompers index and Bebchuk index data are reported about every two years (1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006) by the IRRC. Return on assets (ROA) is income before interest and taxes (EBIT) scaled by the book value of total assets. The other variables are self-explanatory.

Table 2. Analysis of Performance Variability as a function of Corporate Governance

	Standard Deviation of Monthly Stock Returns			Standard Deviation of Market-Adjusted Monthly Stock Returns		
	Gompers Index	Bebchuk Index	Institutional Ownership	Gompers Index	Bebchuk Index	Institutional Ownership
Ln(Governance Measure)	-0.0277 (0.000)	-0.0114 (0.000)	-0.0040 (0.154)	-0.0252 (0.000)	-0.0098 (0.002)	0.0051 (0.059)
Mean ROA	-0.1564 (0.000)	-0.1482 (0.000)	-0.1967 (0.000)	-0.1477 (0.000)	-0.1391 (0.000)	-0.1817 (0.000)
Ln (Total Assets)	-0.0103 (0.000)	-0.0114 (0.000)	-0.0106 (0.000)	-0.0108 (0.000)	-0.0119 (0.000)	-0.0113 (0.000)
Capital Expenditures / Total Assets	0.0000 (0.737)	0.0000 (0.546)	-0.0019 (0.035)	0.0000 (0.727)	0.0000 (0.530)	-0.0018 (0.035)
Total Debt / Total Assets	0.0048 (0.528)	0.0077 (0.384)	0.0182 (0.112)	0.0095 (0.194)	0.0137 (0.101)	0.0245 (0.026)
Number of Business Segments	-0.0014 (0.394)	-0.0017 (0.330)	-0.0041 (0.055)	-0.0011 (0.473)	-0.0015 (0.372)	-0.0040 (0.054)
Intercept	0.2669 (0.000)	0.2263 (0.000)	0.2266 (0.000)	0.2588 (0.000)	0.2213 (0.000)	0.2278 (0.000)
Adjusted R square	0.4307	0.4125	0.4802	0.4216	0.4046	0.4706
Observations	1354	1174	972	1345	1174	972

This table presents the results of regression Model (1):

$$\sigma = \alpha_0 + \alpha_1 Ln(Governance\ measure) + \alpha_2 ROA + \alpha_3 Ln\ (Total\ Assets) + \alpha_4\ Capital\ Expenditures / Total\ Assets + \alpha_5 Financial\ leverage + \alpha_6 Number\ of\ business\ segments + I_i + \varepsilon_i \quad (1)$$

where σ is the standard deviation of monthly stock returns over the sample period, *Ln(Governance measure)* is the natural logarithm of the governance measure, I_i is the industry fixed effect for each three-digit SIC code and ε_i is a heteroskedastic error term. In Model (1), the independent variables are averaged over the sample period.

To analyze "unexpected" performance we use the market-adjusted monthly stock return as a proxy. Next, we replace the standard deviation of monthly return with the standard deviation of the market-adjusted monthly return in Model (1) and reestimate the model. The market-adjusted monthly stock return is the difference between the firm's monthly stock return and the market's value-weighted monthly stock return. The Gompers index and Bebchuk index data are reported about every two years (1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006) by the IRRC. Return on assets (ROA) is income before interest and taxes (EBIT) scaled by the book value of total assets. The other variables are self-explanatory.

Table 3. Analysis of Performance Variability as a function of Corporate Governance: endogeneity tests

	Standard Deviation of Monthly Stock Returns			Standard Deviation of Market-Adjusted Monthly Stock Returns		
	Gompers Index	Bebchuk Index	Institutional Ownership	Gompers Index	Bebchuk Index	Institutional Ownership
$Ln(Governance\ Measure)_{t-3}$	-0.0020 (0.002)	-0.0053 (0.000)	-0.0086 (0.549)	-0.0018 (0.003)	-0.0052 (0.000)	0.0085 (0.530)
ROA	-0.0887 (0.000)	-0.0918 (0.000)	-0.0885 (0.000)	-0.0777 (0.000)	-0.0804 (0.000)	-0.0766 (0.000)
Ln (Total Assets)	-0.0023 (0.068)	-0.0018 (0.180)	-0.0003 (0.823)	-0.0013 (0.283)	-0.0008 (0.515)	0.0005 (0.731)
Capital Expenditures / Total Assets	0.0014 (0.028)	0.0015 (0.023)	0.0385 (0.000)	0.0015 (0.015)	0.0016 (0.012)	0.0306 (0.000)
Total Debt / Total Assets	0.0384 (0.000)	0.0398 (0.000)	0.0477 (0.000)	0.0410 (0.000)	0.0421 (0.000)	0.0508 (0.000)
Number of Business Segments	-0.0061 (0.000)	-0.0061 (0.000)	-0.0063 (0.000)	-0.0061 (0.000)	-0.0061 (0.000)	-0.0063 (0.000)
Intercept	0.1437 (0.000)	0.1360 (0.000)	0.1421 (0.020)	0.1262 (0.000)	0.1202 (0.000)	0.1281 (0.026)
Adjusted R square	0.5031	0.5120	0.5436	0.5001	0.5115	0.5429
Observations	5972	5376	4178	5972	5376	4178

This table presents the results of regression Model (2):

$$\sigma \text{ or } \sigma_m = \alpha_0 + \alpha_1 Ln(Governance\ measure)_{(t-3)} + \alpha_2 ROA + \alpha_3 Ln\ (Total\ Assets) + \alpha_4\ Capital\ Expenditures / Total\ Assets + \alpha_5 Financial\ leverage + \alpha_6 Number\ of\ business\ segments + I_i + \mu_i + \varepsilon_i \quad (2)$$

where σ is the standard deviation of monthly stock returns over the sample period, σ_m is the standard deviation of market-adjusted monthly stock returns over the sample period, $Ln(Governance\ measure)_{(t-3)}$ is the natural logarithm of the three year lag value of the governance measure, I_i is the industry fixed effect for each three-digit SIC code, μ_i is the firm fixed effect, and ε_i is a heteroskedastic error term. The market-adjusted monthly stock return is the difference between the firm's monthly stock return and the market's value-weighted monthly stock return. The Gompers index and Bebchuk index data are reported about every two years (1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006) by the IRRC. Return on assets (ROA) is income before interest and taxes (EBIT) scaled by the book value of total assets. The other variables are self-explanatory.

These results are not only statistically significant, they are also economically significant. For instance, an increase in the Gompers index by one standard deviation, 2.723, results in a ln(Gompers index) increase of 0.265 for

a Gompers index mean of 9.0. Using the results in Table 2 column (1), the standard deviation of monthly returns changes by -0.0277 x 0.265 = -0.0073, signifying a 3.88% (4.53%) decrease from the mean (median) value of 0.188 (0.161). Hence, the effect of corporate governance quality on corporate performance variability is economically significant.

The above discussions suggest a causal relationship from corporate governance to corporate performance variability. However, according to [4], corporate governance could be endogenously determined. There could be a reverse causality from performance variability to governance quality. Hence, we addressed this endogeneity concern by using a 2SLS approach. We employed three-year lag values of the governance measures as instrumental variables. We used three years since it is the longest time between two governance index reporting years during the sample period. Additionally, we analyzed individual firms and hence controlled for fixed firm effects. We employed the following two-way fixed effects model:

$$\begin{aligned}&\sigma \text{ or } \sigma_m = \alpha_0 + \alpha_1 Ln\left(Governance\ measure\right)_{(t-3)}\\&+\alpha_2 ROA + \alpha_3 Ln\ \left(Total\ Assets\right)\\&+\alpha_4 Capital\ Expenditures / Total\ Assets\\&+\alpha_5 Financial\ leverage\\&+\alpha_6 Number\ of\ business\ segments + I_i + \mu_i + \varepsilon_i\end{aligned} \quad (2)$$

where σ was the standard deviation of monthly stock returns over the sample period, σ_m was the standard deviation of market-adjusted monthly stock returns over the sample period, $Ln(Governance\ measure)_{(t-3)}$ was the natural logarithm of the three year lag value of the governance measure, I_i was the industry fixed effect for each three-digit SIC code, μ_i was the firm fixed effect, and ε_i was a heteroskedastic error term.

The results of the two-way fixed effects model estimation are presented in Table 3 and are similar to the results in Table 2. Particularly, the coefficients on the Gompers and Bebchuk indices are negative and statistically significant at the 1% level, even after controlling for endogeneity, firm and industry fixed effects. These results indicate that causation runs from corporate governance to corporate performance variability.

The investigation up to this point, has established a positive association between corporate governance quality and corporate performance variability. Next, we put forth a plausible explanation for this relationship. Better corporate governance leads to optimal management behavior and hence more aggressive investment policies (see [2]). Aggressive investment policies should translate into higher R&D and higher capital expenditure in general. Since both R&D and capital expenditures are typically associated with higher uncertainty ([21]), we hypothesized that better corporate governance leads to higher performance variability through higher investment spending. We analyzed the relationship between the expenditures and governance quality next.

Consistent with [8], the analysis used both level and variance data, since both are potentially associated with corporate performance variability. We used the means and standard deviations of both R&D scaled by the book value of total assets and capital expenditures scaled by the book value of total assets over the sample period as dependent variables and reestimate Model (1). The results for capital expenditures, presented in Tables 4, show that governance quality is positively associated with capital expenditures and the variance of capital expenditures. Specifically, the coefficient on the institutional ownership variable in the mean capital expenditures regression is positive and statistically significant (*p-value* = 0.000) and the coefficient on the Gompers index in the standard deviation of capital expenditures regression is negative and statistically significant (*p-value* = 0.026).

Table 4. Analysis of Capital Expenditures as a function of Corporate Governance

	Mean of Capital Expenditures			Standard Deviation of Capital Expenditures		
	Gompers Index	Bebchuk Index	Institutional Ownership	Gompers Index	Bebchuk Index	Institutional Ownership
Ln(Governance Measure)	-0.0032 (0.356)	0.0011 (0.624)	0.0075 (0.000)	-0.0058 (0.026)	-0.0008 (0.660)	0.0016 (0.251)
Mean ROA	0.0209 (0.001)	0.0243 (0.000)	0.0162 (0.024)	-0.0026 (0.589)	0.0016 (0.745)	-0.0068 (0.255)
Ln (Total Assets)	-0.0009 (0.268)	-0.0005 (0.499)	-0.0012 (0.131)	-0.0033 (0.000)	-0.0035 (0.000)	-0.0034 (0.000)
Total Debt / Total Assets	-0.0084 (0.124)	-0.0092 (0.084)	-0.0036 (0.541)	-0.0041 (0.311)	-0.0063 (0.147)	-0.0005 (0.912)
Number of Business Segments	0.0017 (0.383)	-0.0015 (0.411)	0.0004 (0.852)	-0.0022 (0.129)	-0.0037 (0.012)	-0.0032 (0.047)
Intercept	0.0730 (0.000)	0.0685 (0.000)	0.0451 (0.000)	0.0767 (0.000)	0.0694 (0.000)	0.0606 (0.000)
Adjusted R square	0.2964	0.3901	0.3788	0.2660	0.3138	0.2985
Observations	1354	1174	972	1354	1174	972

This table presents the results of the regression of the mean and standard deviation of capital expenditures scaled by book value of total assets on the natural logarithm of the governance measure, return on assets (ROA), firm size, financial leverage, the number of business segments, the industry fixed effect for each three-digit SIC code, and a heteroskedastic error term. All independent variables are averaged over the sample period. The Gompers index and Bebchuk index data are reported about every two years (1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006) by the IRRC. Return on assets (ROA) is income before interest and taxes (EBIT) scaled by the book value of total assets. The other variables are self-explanatory.

Table 5. Analysis of R&D expenses as a function of Corporate Governance

	Mean of R&D			Standard Deviation of R&D		
	Gompers Index	Bebchuk Index	Institutional Ownership	Gompers Index	Bebchuk Index	Institutional Ownership
Ln(Governance Measure)	-0.0065 (0.240)	-0.0055 (0.175)	0.0073 (0.022)	0.0057 (0.534)	-0.0007 (0.924)	0.0120 (0.032)
Mean ROA	-0.1907 (0.000)	-0.1910 (0.000)	-0.2235 (0.000)	-0.2840 (0.000)	-0.2931 (0.000)	-0.3020 (0.000)
Ln (Total Assets)	-0.0030 (0.017)	-0.0033 (0.019)	-0.0040 (0.008)	-0.0046 (0.027)	-0.0048 (0.045)	-0.0049 (0.063)
Capital Expenditures / Total Assets	-0.0356 (0.000)	-0.0339 (0.001)	-0.0199 (0.085)	-0.0326 (0.023)	-0.0282 (0.101)	0.0001 (0.997)
Total Debt / Total Assets	0.0631 (0.153)	0.0955 (0.092)	0.1631 (0.011)	0.0270 (0.711)	0.0780 (0.418)	0.1035 (0.355)
Number of Business Segments	-0.0115 (0.000)	-0.0113 (0.001)	-0.0087 (0.020)	-0.0112 (0.030)	-0.0107 (0.070)	-0.0097 (0.144)
Intercept	0.0496 (0.006)	0.0376 (0.022)	-0.0074 (0.727)	0.0308 (0.300)	0.0357 (0.201)	-0.02821 (0.449)
Adjusted R square	0.4445	0.4405	0.4523	0.2648	0.2581	0.2114
Observations	1354	1174	972	1354	1174	972

This table presents the results of the regression of the mean and standard deviation of R&D expenses scaled by book value of total assets on the natural logarithm of the governance measure, return on assets (ROA), capital expenditure scaled by the book value of total assets, firm size, financial leverage, the number of business segments, the industry fixed effect for each three-digit SIC code, and a heteroskedastic error term. All independent variables are averaged over the sample period. The Gompers index and Bebchuk index data are reported about every two years (1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006) by the IRRC. Return on assets (ROA) is income before interest and taxes (EBIT) scaled by the book value of total assets. The other variables are self-explanatory.

The results for R&D expenses are presented in Table 5. As in Table 4, the results are consistent with a positive relationship between governance quality and investment. However, the evidence is weak. Overall, these results signify that firms with higher governance quality have higher and more variable R&D and capital expenditures. Hence governance quality may affect corporate performance variability through its effect on capital expenditures and R&D spending.

5. Conclusions

This paper documents that the variability of corporate performance increases as corporate governance quality improves. The results from 1354 firms in the Investor Responsibility Research Center's (IRRC) data set over the 1990-2006 period establish this relationship for monthly stock returns. The results hold for within-firm, over-time corporate performance variability, even after controlling for endogeneity and fixed firm and industry effects. The results also indicate that better corporate governance is associated with higher as well as more variable capital expenditures and R&D spending. These results are consistent with the argument that management of better governed firms behave optimally, follow more aggressive investment policies, leading to the increased variability of corporate performance.

The results in this paper contribute to our understanding of the role of corporate governance in performance variability. A small and growing literature shows that corporate governance is related to performance variability. However, much less is known about how corporate governance quality affects performance variability. We offer an insight into this issue by providing a link between corporate governance and performance variability. Specifically, we find that better corporate governance leads to higher performance variability through increased capital expenditure and R&D spending. Finally, this study extends the limited research on firm-level volatility.

The main limitation of the study is that there are other measures of corporate governance that we did not employ due to a lack of data access. Secondly, we used a fixed effects model in the study and one disadvantage of the model is that time-invariant variables may not be estimated accurately.

Future research direction following this study could examine evidence of the relationship between corporate governance and corporate performance dispersion in firms in emerging markets.

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