

Causality Between Firm-Level Governance and Firm Value

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Abstract. This paper investigates empirically whether there is a causal relation between firm-level governance and firm value. The firm-level governance quality is quantified by using anti-takeover provisions, which are classified boards, fair price, and poison pill. The firm value is measured by Tobin's Q and return on assets in the part of Robustness Check. The data was found in platform WRDS, with database vendors of Compustat and Institutional shareholder services (ISS), ranged from 1998 to 2006, after data matching and data cleaning, with 1645 left. The regression results indicate that there is causality between firm-level governance and firm value, specifically that poor governance significantly contributes to the reduction of firm value. The robustness check has certified that the results in the regression analysis are credible. Further research will be desirable for firm data from countries such as China. In addition, the range of observation years of the data is expected to expand as data vendors have increased authority to access to the data.

Keywords: Tobin's Q; firm-level governance; firm value; causality; anti-takeover provisions.

1. Introduction

This paper projects to examine the causality between the firm value and firm governance, based on the model adopted by Bebchuk and Cohen (2005), using database vendors of Compustat and ISS, on the platform of WRDS from the period 1998-2006 [1]. The measure of firm value is determined by Tobin's Q, defined by several empirical research papers [2-7]. Determining the firm governance quality is not liable, which the process requires transforming qualitative data to quantitative data. However, the firm governance quality, enlightened by Thomas J. Chemmanur et al. (2011), is measured by the anti-take-over provisions, which can be the determinators of measuring the governance quality [8]. In particular, their article made clear that companies with better management tend to have more anti-takeover clauses [8]. Moreover, firms with higher management quality and more anti-takeover clauses command higher IPO valuations after going public and outperform other companies in terms of stock returns and operating performance. In this case, the governance index is created to measure firm governance quality, using three common antitakeover provisions, located in two different sections referenced by Gompers (2003), which are Classified boards (Sorted by "Delay"), Fair Price (Sorted by "Other"), and Poison Pill (Sorted by "Other"). The directors are placed into various sections and have overlapping periods on Classified Boards, also known as Staggered Boards [9]. As a result, an outsider who takes over the company or organization will likely have to wait a few years before they can exert more authority over the board. Overall, the classified board's slow replacement of members can effectively delay the takeover actions. Any buyer must pay what the bylaws decide to be a fair price for the Fair Price provision, making a hostile takeover prohibitively expensive for the buyer. Last but not least, a poison pill can successfully stop the accumulation of shares above a specific proportion of a company's issued shares by offering to give additional, deeply discounted shares to everyone except those who trigger the provision. To find the causality between firm value and firm governance, this paper conducts a regression analysis using Tobin's Q as the determinator of firm value, and independent variables of Log (Assets), Log (Company Age), Log (Return on Assets), CAPEX/Assets, and R&D/Sales, with G-index as the key regressor, which these controls are stated by Bebchuk and Cohen (2005) [10]. The results indicate that there is causality between firm value and firm-level governance. Then, in order to establish causation, the regression model's robustness will be examined using Return on Assets (ROA), another indicator of business value, and annual regression, which discovered a markedly inverse relationship between ROA and the firm governance index.

2. Literature Review

Numerous studies have thoroughly examined the question of whether there is a causality between company-level governance and firm value, as seen in various articles, including Gompers et al. (2003), Bebchuk and Cohen (2005), Core et al. (2006), etc. [9-11]. Stronger shareholder rights are associated with higher company value, fewer acquisitions by corporations, and higher profitability, according to Gompers et al. (2003) [9]. In particular, Gompers et al. (2003) employed 1500 corporations annually during the 1990s and 24 divergent corporate governance provisions to create a Governance Index (denoted as G) that measures the agency problems between managers and shareholders of each company [9]. After that, Gompers et al. (2003) examined the empirical connection between this index's business performance [12]. The findings revealed a strong correlation between governance and valuation: for every one-point rise in G, Tobin's Q falls by 11.4 percentage points. As a result, Gompers et al. (2003) came to the conclusion that there are two possible reasons for the linkage between the return of stocks and firm governance: governance with risk or other factors that can impact returns and governance with agency costs that investors may underestimate [9]. The staggered boards, sometimes referred to as the classified boards, are the focus of Bebchuk and Cohen's (2005) study since they are linked to poorer company value [10]. However, the analysis's conclusion also reveals that unlike the charter-based staggered boards, the bylaws-based staggered boards did not exhibit the same adverse link with company value. The findings demonstrate that just a limited number of provisions have a significant impact on the relationship between business valuation and all anti-takeover clauses. Institutional shareholder services (ISS), a separate gauge of corporate governance, has a favorable link with a number of indicators of firm value and performance. The earlier studies provide evidence that the target's stage of incorporation is not a significant factor in how hostile offers turn out [12]. Other research examined at how the usage of a poison pill affects stock prices, why the price of the poison pill's share will affect the effect it is predicted to have, and management's personal knowledge of the likelihood of a bid [13, 14]. Additionally, Garvey and Hanka (1999) analyzed how the antitakeover charter provision has affected several areas of company performance [15]. An effective staggered board, according to Bebchuk et al. (2003), has a detrimental influence on shareholder returns following a hostile takeover [12]. The discovery of an unfavorable association between staggered boards and Tobin's Q was supported by Faleye (2005) [16]. However, staggered boards are positively correlated with other rules that restrict shareholder rights, according to Gompers et al. (2003) [9]. To determine if staggered boards were associated with firm value, Bebchuk and Cohen (2005) controlled the other governance parameters [10]. Building on the findings of Gompers et al. (2003) that companies with inadequate shareholder rights exhibit considerable stock market underperformance, Core et al. (2006) sought to establish a link between weak governance and weak stock returns. The findings contradict the claim that inadequate governance drives poor stock returns since unexpectedly low performance that surprises the market is not justified by analysts' forecasting errors or earnings announcement returns. Gompers et al. (2003)'s paper by Core et al. attempts to distinguish between two interpretations of the nexus between governance and stock returns [9, 11]. Examining the operational return on assets is the first step in determining whether there is a connection between governance and operational success. The findings reveal it to be negative, adding to the data from Gompers et al. (2003) that enterprises with greater G-indexes have higher agency costs [9]. It carries out two more tests to look at the second explanation: examining the connections between forecast error and governance and the links between governance and earnings disclosure returns. The idea that governance causes anomalous returns in stocks is not supported by any research.

3. Data Selection and Descriptive Statistics

The goal is to find out the causality between firm value and firm governance quality during the period 1990-2006. Mentioned in the previous introduction section, the firm value is created as a evaluation of Tobin's Q and the governance quality index was created based on three unique anti-

takeover provisions, which are classified boards, fair price, and poison pill [10]. The G-index ranged from 0 to 3, where 0 demonstrate that the firm takes 0 anti-takeover provisions, and 3 demonstrates that the firm is taking all 3 of the anti-takeover provisions. The anti-takeover data was found in the Institutional shareholder services, ISS (formerly RiskMetrics) Corporate Takeover Defence and Governance Data (risk_governance), provided by wrds, which is the Wharton research data services. Other data was found in Fundamentals Annual, data vendor by Compustat North America, provided by wrds. Table 1 provides the number of observations for all firms from 1990 to 2006. The first column shows the years that the dataset has. The second column shows the numbers of observations for the firms in the raw dataset. As Table 1 shown, the raw data has 13998 data, and years are not consistent. It does not affect the results because most of the companies do not change their anti-takeover strategies in years.

Table 1. Raw data firm summary

Year	All Firm
1990	1467
1993	1463
1995	1496
1998	1913
2000	1887
2002	1894
2004	1982
2006	1896
Total	13998

After matching up the corresponding data from Compustat to the Governance Data, the remaining data has 2458 left. The progress of utilizing the Vlookup function in Excel automatically culls the data points that either do not match or has missing values along with the determine variable – Ticker, CIK, and Year. The Company Name does not utilize as a determine variable because the format of different database varies. To avoid biasness in the dataset, it is necessary to do a process of data cleaning. After omitting all the missing values, NA values, and Blank values, the sample left out with 1645 data which shows in Table 2. However, future data used in the Methodology part ended up with 1494 data after omitting the outliers in R&D/Sales. Table 2 shows the remaining data after doing data cleaning, which removes all missing data, and in some cases, zero, which will stop R-studio in calculating the logs in the regression formula. The first column shows the years that the dataset has. The second column shows the numbers of observations for the firm in the filtered data.

Table 2. Firm summary data after data cleaning

Year	All firm
1998	224
2000	227
2002	427
2004	408
2006	359
Total	1645

The realcompanyage is computed by subtracting the IPO date, by the year the corresponding data is recorded. Furthermore, the market value of all firms was provided by Compustat directly, therefore, this paper uses it as a direct result to calculate Tobin's Q, which was computed by using the market value of the firm divided by its total assets.

Table 3 demonstrates the summary statistics for the numbers and percentages of firms with 0, 1, 2 and 3 anti-takeover provisions in the data. From the period 1998 to 2006, It does not show a specific trend of the percentages for each of the observation year with No ATPs, but the overall trend is

downward sloping. For firms with 1 ATP, the trend is very uniform, with around 38% in every observation year, which also consists the largest proportion each observation year. For firms that has 2 ATPs, the overall trend of the percentage is increasing, and for the firms that has 3 ATPs, the trend is decreasing, which also consists the smallest proportion in each observation year.

Table 3. ATP summary

Year	No ATP	1 ATP	2 ATP	3 ATP	No ATP(%)	1 ATP(%)	2 ATP(%)	3 ATP(%)
1998	63	85	61	15	28.13%	37.95%	27.23%	6.70%
2000	52	85	70	20	22.91%	37.44%	30.84%	8.81%
2002	100	166	137	24	23.42%	38.88%	32.08%	5.62%
2004	74	155	156	23	18.14%	37.99%	38.24%	5.64%
2006	75	134	130	20	20.89%	37.33%	36.21%	5.57%

4. Methodology

4.1 Regression Model

This research employs Tobin's Q as the measure of firm value in order to investigate the connection between company-level governance and firm value. Market value of assets divided by total company assets would be how Tobin's Q defines Q [2-7]. Then, the industry-adjusted Tobin's Q, which represents the firm's Q less the median Q in the firm's industry during the observation year, serves as the independent variable. The company's two-digit primary SIC code designates the industry to which it belongs.

To construct the governance index as the key regressor, instead of using a dummy variable revealing if the firm's level of governance quality exceeds the median, the original numbers of the ATPs are used because it resulted in a more significant conclusion. In addition, the controls, used by Bebchuk and Cohen (2005) are included in regression model, except for the Delaware Dummy, which is found to be no correlation with firm value in this paper [10]. The function is as follows:

$$\text{Industry-adjusted Tobin's Q} = \beta_0 + \beta_1 * \text{G-index} + \beta_2 * \log(\text{assets}) + \beta_3 * \log(\text{company age}) + \beta_4 * \log(\text{return on assets}) + \beta_5 * (\text{CAPEX/assets}) + \beta_6 (\text{R\&D/Sales}) \quad (1)$$

Furthermore, there has been found exaggerated outliers in R&D/Sales, therefore, there are necessity to remove those outliers before conducting the summary statistics. Since some companies, for instance - software, e-commerce, social media – will be having an unexpected high ratio on R&D/Sales. For the other outliers in the remaining variables, has been found out that they do not affect the model. Then, before running regression, the summary statistics are formulated, and the correlation check is utilized. Table 4 provides the summary statistics of all the variables in function (1), displaying the descriptive statistics, which includes the mean, standard deviation, minimum, 25% percentile, median, 75% percentile, maximum and the number of observations.

Table 4. Summary statistics

Variable	Mean	Std.	Minimum	Q1	Median	Q3	Maximum	N
Industry-adjusted Tobin's Q	0.494	1.867	-1.389	-0.560	-0.003	0.951	27.931	1494
G-index	1.242	0.875	0	1	1	2	3	1494
Log(firm age)	1.976	0.675	0	1.609	2.079	2.485	3.611	1494
Log(Assets)	6.703	1.248	2.915	5.828	6.644	7.519	11.788	1494
Return on assets	-0.015	0.273	-3.531	-0.017	0.042	0.0863	0.872	1494
CAPEX/assets	0.0449	0.045	0.00029	0.019	0.034	0.057	0.904	1494
R&D/sales	0.115	0.103	0.00017	0.024	0.092	0.174	0.483	1494

4.2 Robustness Check

To check how the "core" regression coefficient estimates behave, this paper changes the measurement to operating performance and conduct tests on separate periods. Specifically, the first method is to find another dependent variable to determine firm performance, and to check whether the result is still significant, while the second is for each test year, test whether this significant negative correlation is maintained for most of the time period by conducting annual regression. The determination of the market value of equity and book to market equity, which market value of equity is measured by total market value defined in the variable displays by Compustat, which includes trading and non-trading issues, the total market value is the sum of all issue-level market values. The book to market equity is computed by dividing Common/Ordinary Equity, which symbolizes the interest in the corporation held by the ordinary shareholders, by the total market value. Operating income after depreciation was found directly from Compustat. In order to fit in the formula of log, the negative values of the corresponding independent variables have been removed, remaining 1064 data. Thus, these are the independent variables, defined by log (market value of equity), log (book-to-market equity), and log (operating income after depreciation) in the equation. The industry-adjusted ROA, which is computed employing operating income and the firm's industry's two-digit primary SIC code, is the dependent variable. It is calculated by subtracting the firm's ROA from the industry's median ROA for the observation year. Then, the regression for robustness check is defined by the function (2).

$$\text{Industry-adjusted ROA} = \beta_0 + \beta_1 * G\text{-index} + \beta_2 * \log(\text{MVE}) + \beta_3 * \log(\text{BME}) + \beta_4 * \log(\text{oiad}) \quad (2)$$

5. Empirical Results

5.1 Summary Statistics

The statistics are informatively shown in Table 4, where the industry-adjusted Tobin's Q has a high variation with the standard deviation of 1.867. The mean which is 0.494 has significant difference between the median -0.003, because of the relatively extreme values in this sample database. The variable Log (Asset) has a standard deviation of 1.248, other than that, all other variables have a relatively concentrated distribution. To conclude the summary statistics, the variables can be said to be reliable before the running of the regression.

5.2 Relationship Between Governance and Firm Value

Table 5 reveals the regression outcomes of the industry-adjusted Tobin's Q on G-index and several control variables. The numbers without parentheses are White (1980) Robust. Robust standard deviations appear in the parentheses [17]. The significance level is indicated by ***, **, and * for 1%, 5%, and 10%, respectively. Column (1) shows the regression results from function (1), after dealing with the outliers. Column (2) shows the regression results before dealing with the outliers. The last three rolls display the R-Square, F-statistics and the number of observations.

As Table 5 displays, Column (1) shows the regression results from function (1), after dealing with the outliers, which regressed on the industry-adjusted Tobin's Q with G-index as the key regressor and the control variables from Bebchuk and Cohen (2005) [10]. Table 5 shows that the coefficient of G-index is negative (-0.201) at 1% significant level, which means that firms with weaker shareholder rights significantly underperformed firms with stronger shareholder rights, with the scale of 0-3 demonstrated in the creation of G-index, when the performance of the company is measured by the industry-adjusted Tobin's Q. In addition, it should be noted that this statistically and economically significant influence of governance quality on firm value is derived by adding the control variables in which four of them have the statistically significant coefficients at 1% level, except for the log of company age. Therefore, it can be concluded that there is a negative connection between governance quality, determined by the G-index variable, generated from the combination of three ATP's

(classified board, fair price, and poison pill), and firm value, is defined by industry-adjusted Tobin's Q.

Table 5. Regression results

Variable	(1)	(2)
G-index	-0.201***	-0.211***
	(0.051)	(0.052)
Log(Firm Age)	-0.008	0.048
	(0.067)	(0.068)
Log(Assets)	0.124***	0.002
	(0.037)	(0.0037)
Return on Assets	2.184***	1.143***
	(0.176)	(0.155)
CAPEX/Assets	7.697***	4.819***
	(1.014)	(1.013)
R&D/Sales	5.706***	0.007
	(0.465)	(0.005)
Numbers of Observations	1487	1638
R ²	0.157	0.048
F-statistic	47.46	14.81

The regression findings of the industry-adjusted Tobin's Q on the G-index and various control variables are shown in Table 6 as residuals. The numbers without parentheses are the residuals. For the regression without outliers from R&D/Sales, for the residuals, the median is quite far from 0 since the minimum is -2.83, compares to -0.358, which demonstrates that data is not quite symmetrical. Specifically, the distribution is right-skewed, which means that the model is not predicting as well at the higher Tobin's Q ranges as it does for lower ranges.

Table 6. Residuals of regression

Minimum	Q1	Median	Q3	Maximum
-2.8294	-0.9076	-0.358	0.378	26.558

5.3 Robustness Check

If the measurement error is disregarded, the findings that bad governance contributes to poor business performance can be drawn from the results above, thus the robustness check is needed. The results of two ways to conduct the robustness check are displaying as follows. The summary statistics are showed in Table 7. It includes the mean, standard deviation, minimum, 25% percentile, median, 75% percentile, maximum and the number of observations, corresponding to all variables in function (2).

Table 7. Summary statistics of variables in robustness check

Variable	Mean	Std.	Minimum	Q1	Median	Q3	Maximum	N
Industry-adjusted ROA	0.058	0.146	-1.252	0.013	0.079	0.132	0.637	1064
G-index	1.26	0.881	0	1	1	2	3	1064
Log (MVE)	7.064	1.619	-2.829	6.172	7.082	8.021	13.041	1064
Log (BME)	-1.0651	1.107	-5.722	-1.674	-1.072	-0.561	8.293	1064
Log (oiap)	4.419	1.425	-0.4526	3.615	4.410	5.317	9.439	811

As another measurement of firm performance, the industry-adjusted ROA is regressed on the model with three control variables specified in formula (2). For log(oiap), there is necessity to omit all the negative values in order to fit in Log, which remains 811 data. For the standard deviation, the results certifies that the sample is fairly distributed, and also the mean and median are very close to

each other for each of the variables. The correlation matrix from Table 8, the results show that the firms with poorer governance tend to be having less value and profit than firms with strong shareholder rights.

Table 8. Correlation matrix of variables in robustness check

	Industry-adjusted ROA	G-index	Log (MVE)	Log (BME)	Log (oiap)
Industry-adjusted ROA	1				
G-index	-0.776	1			
Log (MVE)	0.241	-0.038	1		
Log (BME)	-0.385	0.081	-0.671	1	
Log (oiap)	-0.434	0.782	0.702	-0.195	1

Table 9 displays the results of the regression of Industry-Adjusted ROA on G-index and three control variables. The coefficient on G-index is negative (-0.054), and all four of the control variables are at 1% significance level. Therefore, it can be concluded that the firms with stronger shareholder rights have better firm performance, is checked to be robust by changing the indicator of firm performance.

Table 9. Regression Results of ROA

Variables	G-index	Log (MVE)	Log (BME)	Log (oiap)	Numbers of Obs.	R ²	F-statistics
Coefficients	-0.011***	-0.054***	-0.065***	0.055***	811	0.551	253.2
Standard Errors	0.002	0.002	0.003	0.002			

5.4 Annual Regressions

The values for annual regression are shown in Table 10, which three out of four annual regressions are significant. Furthermore, each of the coefficients are negative. The data from year 2006 wasn't showed because there is only 15 data points left after data cleaning and data matching, which is not a sufficient sample to do regression. However, the significance of the percentage of 75% of all four observation years and the negative coefficients have convincing evidence to support the hypothesis, and the results for the regression model, that the firms with stronger shareholder rights have better firm performance, is checked to be robust by checking by separate periods.

Table 10. Results for annual regressions

Year	G-index
1998	-0.461** (0.177)
2000	-0.233 (0.241)
2002	-0.121* (0.061)
2004	-0.202* (0.081)

6. Conclusion

Whether protecting the boards from being removed will cause reduction in firm level has been debated for a period of time. Even more troubling is to quantify the qualitative data – Firm-level governance quality. This paper investigates in an empirical way on the causality between firm value and firm-level governance. The firm-level governance quality is quantified by using anti-takeover provisions. Out of more than 20 of them, this paper utilizes three of the most common anti-takeover provisions in order to create the governance index, which are classified boards, fair price, and poison

pill. The firm value is measured by Tobin's Q and return on assets in the part of Robustness Check. The data was found in platform WRDS, with database vendors of Compustat and ISS, ranged from 1998-2006, after data matching and data cleaning, with 1645 left. This paper conducts the empirical tests, along with the summary statistics and regression analysis of the regression model using Tobin's Q as the measurement of firm value, and the G-index as the key regressor. The results follow by two robustness checks which the first approach is to seek for another dependent variable to determine firm performance and check if the results are still significant, while the second approach is to verify this significant negative correlation by running a regression test annually for each test year of whether it is consistent over most of the time period. The results show evidence that there is causation between firm-level governance and firm value. The evidence indicates that poor governance significantly contributes to the reduction of firm value. However, there is still sample bias in this paper, not only because there are not any valid data found after year 2006, but also after data matching, the original 13999 data decreased to 1645. Eventually, only 4 observation years of data was measured, with a range of 6 years, for 1998, 2000, 2002 and 2004. Limitations are applied to this paper where the G-index is composed by only three factors, which are the classified board, fair price, and poison pill, out of more than 20 sorts of anti-takeover provisions, such as dual class, greenmail, lockups, and Pacman, etc, to amend the firm's charter or bylaw, though the three factors used in this paper can be classified as the most common anti-takeover provisions. Lastly, the data of the firm only comes from the United States. Future researches aim to make a thorough inquiry on firms from other countries, for example, China, although the data samples are harder to rummage. Hereafter, the range of the observation years of the data are expected to increase, aiding with higher authority of data access from data vendors, with at least a 30-year scope of possible ranges from 1990 to 2022.

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