Corporate Governance and Costs of Equity: Theory and Evidence *

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Abstract

We propose and test an alternative explanation for the existence of the positive governance-return relation in the 1990s and its disappearance in the 2000s: The governance-return relation is positive under good states of the economy and negative under bad states. Corporate governance mitigates investment distortions so that firms with strong governance have more valuable investment options during booms and more valuable divestiture options during busts than the ones with weak governance. Because investment options are riskier and divestiture options are less risky than assets in place, the expected returns of strongly governed firms are higher during booms but lower during busts than the weakly governed ones. Empirical evidence is consistent with our hypothesis.

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1 Introduction

Does corporate governance affect the costs of equity capital? Gompers, Ishii, and Metrick (2003) (GIM) show that firms with stronger corporate governance earn higher average returns in the 1990s. Core, Guay, and Rusticus (2006), however, find that this positive relation between governance and returns is reversed from 2000 to 2003. The recent paper by Bebchuk, Cohen, and Wang (2013) shows that the association between governance and return disappears for the post-2000 sample. In this paper, we show, both theoretically and empirically, that the governance-return relation is time-varying. In particular, strong governance leads to higher stock returns during economic upturns when firms have abundant growth options, but lower stock returns during downturns. Consequently, either a positive, negative, or no relation between governance and stock returns can exist during a particular sample period, depending on the overall economic condition during that period.

In the model, a manager is either an empire-builder or a shirker. In either case, the investment or divestiture decision is distorted: The former tends to over-invest and is reluctant to disinvest (Jensen, 1986); the latter avoids effortful decisions and reduces both investment and divestiture (Bertrand and Mullainathan, 2003). Stronger corporate governance makes suboptimal investment and divestiture behaviors more costly to the manager. The stronger the governance, the less distorted the investment (divestiture) decisions made by the manager. Therefore, the model predicts that, all else equal, a firm with stronger governance has more valuable investment and divestiture options and hence higher firm value, and vice versa.

The effect of corporate governance on stock return can be positive or negative, however, depending on economic conditions. Investment options allow a firm to expand when the profitability is sufficiently high. Thus, they are call options and are riskier than the underlying assets. On the contrary, divestiture options are put options and are less risky than the underlying assets because they allow the firm to cut losses when profits are too low. Because a firm's value consists of assets in place, investment options, and divestiture options, its beta is a value-weighted average of the betas of the aforementioned three components. Therefore, all else equal, higher value of investment options, relative to the total firm value, leads to higher beta and higher expected stock returns, but higher value of divestiture options leads to lower beta and lower expected stock returns. During periods with abundant investment options, defined as booms, a firm's value consists mainly of investment options and assets in place. A well governed firm has more valuable investment options and hence higher expected returns than poorly governed firms. On the contrary, during periods with scarce investment options but ample divestiture options, defined as busts, a firm's value consists mainly of divestiture options and assets in place. A well governed firm has more valuable divestiture options and hence lower expected returns. This intuition leads to our main hypothesis: corporate governance affects stock returns positively during booms and negatively during busts. In other words, the effect of corporate governance on the costs of equity capital is time-varying and is procyclical.

To empirically test the model's prediction, we use the governance index (G-Index) and entrenchment index (E-Index) as our main measures of governance strength, following Bebchuk, Cohen, and Wang (2013). We identify periods with high and low investment opportunities, i.e., booms and busts by our definition, based on the predicted industry-level Tobin's (average) Q (Tobin, 1969). Tobin's Q of each industry at each quarter is predicted using the lagged sales growth and return on assets of this industry and indicators of the aggregate economic conditions such as the lagged term and default premia in a 5-year rolling-window regression. A quarter is classified as a boom (bust) for industry j if the predicted Tobin's Q of industry j in this quarter is within the top (bottom) quintile of its sample distribution during 1975-2014, which is the longest series of the predicted Q's in our sample. We use both the Fama and French (1997) 10- and 48-industry definitions, abbreviated as FF10 and FF48, respectively, in the industry classification. Note that the terms "boom" and "bust" in our paper are used as succinct description of periods with abundant and scarce investment options, respectively, and are more related to the industry-level rather than aggregate economic conditions. Thus they have different economic meanings from those commonly adopted in the macroeconomic literature.

The empirical tests on the governance-return relation are conducted using both the characteristics and portfolio approaches. Under the characteristics approach, we regress firm-level stock returns on firm's governance strength, controlling for other characteristics. The results show that strongly governed firms outperform weakly governed ones by 0.80% per month (statistically significant at the 1% level) during FF48 industry-specific booms and underperform by 0.66% (statistically significant at the 5% level) during busts when governance strength is measured by E-index. Similar results are found using the G-Index as the governance measure, and/or the FF10 boom-bust classification.

With the portfolio approach, we form governance hedge portfolios by longing strongly governed firms whose industries are in booms and weakly governed firms whose industries are in busts and shorting weakly governed firms whose industries are in booms and strongly governed firms whose industries are in busts. Our model implies that the long positions of the hedge portfolio alway have greater market betas than the short positions. Notice that our governance hedge portfolio is different from that in GIM, which simply longs strongly governed firms and shorts weakly governed ones. The results show that the market beta of our hedge portfolios, either value- or equally-weighted, is significantly positive, with either G- or E-index as the governance measure and either FF10 or FF48 as the industry classification.

Since firms have a set of tools to discipline managers and G(E)-index only captures the effectiveness of some, we provide evidence that G- and E-indices are good proxies for the overall level of firm's governance strength. Our model predicts that independent of the business conditions, firms with overall stronger governance should have higher value, measured by Tobin's Q, than the ones with weaker governance, all else equal. We indeed find strong support for this prediction using G(E)-index as governance measure. This result validates these indices as measures of a firm's overall governance strength.

Our model predicts that the difference in option intensity between strongly and weakly governed firms is the underlying driving force of the procyclical governance-return relation. By option intensity, we refer to the fraction of firm value accounted for by real options. To verify this option mechanism, we test whether firms with strong governance have higher option intensity than those with weak governance. Ai and Kiku (2015) show theoretically and empirically that firms with higher option intensity have larger exposure to idiosyncratic volatility than firms with lower option intensity. Using a firm's exposure to idiosyncratic volatility as a proxy for its option intensity, we find supportive evidence for the option mechanism.

We also conduct several robustness checks. First, the aforementioned empirical tests are repeated for the pre- and post-2000 periods separately. It is argued by Bebchuk, Cohen, and Wang (2013) that the negative effect of weak governance on firm value was less known to investors during the 1990s and became a common knowledge during the 2000s. This argument is used to explain the positive governance-return relation during the 1990s and its disappearance afterwards. However, we find that the procyclical governance-return relation exists in both pre- and post-2000 periods although with lower statistical significance compared to the results in the full sample. Second, we extend the sample backward to 1985 assuming that the values of G- and E-indices are the same during 1985-1990. We find more significant results in this extended sample of 1985-2014. Finally, we show that the procylical governance-return relation is robust to alternative definitions of strong and weak governance.

Our paper is closely related to Dow, Gorton, and Krishnamurthy (2005), who study the effect of governance on bond pricing and term structure, Albuquerque and Wang (2008), who study the effect of country-level investor protection on equity risk premium and risk-free rate, and Lan, Wang, and Yang (2012), who study the effects of investor protection on firm's investment, insider ownership, and Tobin's q. Diverging from those studies, our paper builds on the studies of managerial agency problems (Bertrand and Mullainathan, 2003; Jensen, 1986, among others) and focuses on the effect of firm-level governance on the cross-sectional stock returns. Finally, the paper is related to the literature that studies the impact of corporate policies on cross-sectional stock returns (e.g., Berk, Green, and Naik, 1999; Carlson, Fisher, and Giammarino, 2004; Zhang, 2005) but with a focus on the distorted investment policies.

2 Model

This section presents a real options model to illustrate the impact of corporate governance on investment policies, firm value, and expected stock returns. Let m_t denote the stochastic discount factor, which follows

$$\frac{dm_t}{m_t} = -r_f\, dt - \gamma_x dB_{xt},$$

where r_f is the risk-free rate, γ_x is the price of the market risk, and dB_{xt} is a standard Brownian motion. For simplicity, we assume that the CAPM holds and that the price of the market risk is constant.

Consider a firm with assets in place that generate cash flow at the rate of y_t, which follows a Geometric Brownian motion

$$dy_t = \alpha_y y_t dt + \sigma_y y_t dB_{yt}, \tag{1}$$

where α_y is the constant drift, σ_y is the variance parameter, and dB_{yt} is a standard Brownian motion that positively correlates with dB_{xt}, i.e., $\text{corr}(dB_{yt}, dB_{xt}) \equiv \rho_{xy} > 0$. Without loss of generality, the firm is assumed to have an investment option to double its cash flow by making a fixed amount of investment I and a divestiture option to sell its assets at price λI with $\lambda < 1$, in recognition that sale price is usually lower than the purchase price for reasons provided in Shleifer and Vishny (1992). Therefore, the value of the firm, denoted as V_s, consists of the values of assets in place, investment option, and divestiture option, denoted as V_a, V_g, and V_d, respectively.

We assume that the manager decides on the investment policies of the firm and his incentive is not perfectly aligned with that of outside shareholders. Specifically, we assume that for one unit of investment made, the manager gains, per share of his ownership, additional G units of personal benefits *net* costs imposed by corporate governance. In the case of perfect governance where the manager has the same incentive as that of outside shareholders, the value of G is zero. In general, the value of G could be either positive or negative, depending on the specific type of agency problem that the firm has. A manager with a positive G is an empire-builder (Albuquerque and Wang, 2008; Jensen, 1986) and the one with a negative G for investment and positive G for divestiture enjoys quiet life (Bertrand and Mullainathan, 2003).[1] Both forms of agency problem are allowed in the model.[2] Stronger governance makes private benefits (or costs) of managers smaller and, all else equal, leads to lower absolute value of G. Therefore, the smaller the absolute value of G is, the stronger the firm's governance is.

Let $V(y_t)$ denote the value function of an asset that pays cash flow at rate $D(y_t)$, which is given by:

$$V(y_t) \equiv \mathbb{E}\left[\int_o^\tau \frac{m_t}{m_0} D(y_t)dt\right] ,$$

where τ is the stopping time.[3] For assets in place, the cash flow rate $D(y)$ is y_t and for investment and divestiture options, the cash flow rate is zero before the options are exercised. We first solve for the investment (divestiture) threshold that maximizes the value of the investment (divestiture) option to the manager. The option values to outside shareholders are then computed given those thresholds. Note that due to private benefits from investment, the effective cost of investment to the manager is $(1-G)I$, which leads to a suboptimal investment (divestiture) threshold. The solutions of the model are detailed in Proposition 1 and the proof is provided in Appendix A.

Proposition 1 *The value of the firm, denoted as V_s, is the sum of the values of assets in place, investment option, and divestiture option, which are given by, respectively,* $V_a = \frac{y}{\delta_y}$, $V_g = A_g y^{\beta_1}$, $V_d = A_d y^{\beta_2}$ *for* $y \in (y_d, y_g)$, *where* $\delta_y \equiv r_f + \gamma_x \rho_{xy} \sigma_y - \alpha_y$, y_d *and* y_g *are the opti-*

[1] Bertrand and Mullainathan (2003) find that after the takeover threats are lessened, both the destruction of old plants and the creation of new plants fall. We hence assume that managers seeking quiet life incur costs from both investment and divestiture.

[2] We do require G to be less than one to obtain reasonable solutions. If $G > 1$, the manager always wants to invest regardless of the value of y because the private benefit of investment is already larger than the cost.

[3] In general, the value of an asset could also depend on time t if its cash flow rate, investment cost, or price of risk is a function of t. In our model, those variables, hence the value of the assets in place and options, depend only on the value of y_t.

mal investment and divestiture thresholds given by

$$y_g = \frac{(1-G)\beta_1}{\beta_1 - 1}\delta_y I \quad and \quad y_d = \frac{(1-G)\beta_2}{\beta_2 - 1}\lambda\delta_y I\,,$$

A_g and A_d are positive constants given by

$$A_g = \left[\frac{(1-G)\beta_1}{\beta_1 - 1} - 1\right] I\,(y_g)^{-\beta_1} \quad and \quad A_d = \left[1 - \frac{(1-G)\beta_2}{\beta_2 - 1}\right] \lambda I\,(y_d)^{-\beta_2}\,,$$

and $\beta_1 > 1$ and $\beta_2 < 0$ are the two roots of the following quadratic equation

$$\beta^2 + \left[\frac{2(r_f - \delta_y)}{\sigma_y^2} - 1\right]\beta - \frac{2r_f}{\sigma_y^2} = 0.$$

The investment and divestiture thresholds are decreasing functions of G, while A_g, A_d, and Tobin's average Q *defined as V_s/I, decrease with the absolute value of G.*

Proposition 1 shows that the value of the firm decreases as its governance strength gets weaker, i..e, when the absolute value of G gets larger. The intuition is simple. Agency conflicts lead to distortion in investment decisions. The negative relation between G and investment (divestiture) thresholds $y_g(y_d)$ implies that managers with empire building incentives, i.e., $G > 0$, tend to initiate investments earlier and delay divestitures, while managers who prefer quiet life, i.e., $G < 0$ for investment options and $G > 0$ for divestiture options, tend to delay both investments and divestitures, compared to the first best case ($G = 0$). However, any deviation from the optimal investment timing, either over- or under-investment, reduces the values of investment/divestiture options and hence the Tobin's Q. And the larger the deviation, the lower the values of real options. The absolute value of G is negatively related to the level of governance strength and positively related to the deviation from optimal investment.

The expected excess return of an asset with value function V is given by

$$\mathbb{E}\left[\frac{dV_t}{V_t}\right]/dt - r_f = -\text{cov}\left(\frac{dm_t}{m_t}, \frac{dV_t}{V_t}\right)/dt. \tag{2}$$

The following proposition presents the expected returns on the assets in place, real options, and the firm as a whole, respectively.

Proposition 2 *Let r_a, r_g, and r_d denote the expected returns on assets in place, investment option, and divestiture option, respectively, which are given by $r_a = r_f + \gamma_x \rho_{xy} \sigma_y$, $r_g = r_f + \beta_1 \gamma_x \rho_{xy} \sigma_y$, and $r_d = r_f + \beta_2 \gamma_x \rho_{xy} \sigma_y$. The expected return on the firm, denoted as r_s, is given by*

$$r_s = r_f + \gamma_x \rho_{xy} \sigma_y \left[\left(\frac{V_a}{V_s}\right) + \left(\frac{V_g}{V_s}\right)\beta_1 + \left(\frac{V_d}{V_s}\right)\beta_2\right], \tag{3}$$

where $V_s = V_a + V_g + V_d$ is the value of the firm. Due to the fact that $\beta_1 > 1$ and $\beta_2 < 0$, we get $r_d < r_a < r_g$. Moreover, all else equal, the expected return on firm value, r_s, is positively related to the ratio of the value of investment option to total firm value, V_g/V_s, and negatively related to the ratio of the value of divestiture option to total firm value, V_d/V_s.

Proposition 2 shows that the investment option is riskier than assets in place, indicated by $\beta_1 > 1$, and the divestiture option is less risky than assets in place, indicated by $\beta_2 < 0$. As illustrated in Dixit and Pindyck (1994), the investment option is a call option and the divestiture option is a put option. The value of the investment option moves positively with economic fundamentals and is more sensitive to changes in economic fundamentals than the value of assets in place. On the contrary, the value of the divestiture option moves negatively with economic fundamentals. Therefore, the divestiture option serves as a hedge for adverse economic conditions and earns an expected return lower than the risk-free rate. As a weighted average of the expected returns on the assets in place and real options, the expected return of the firm is higher (lower) when a larger fraction of firm value is accounted for by the investment (disinvestment) options.

To derive the model's testable hypothesis, we consider two extreme cases. In the first case, the economic fundamentals are good and firms have large value of investment options but close-to-zero value of divestiture options. Such periods are defined as booms in our context. Equation (3) thus becomes

$$r_s = r_f + \gamma_x \rho_{xy} \sigma_y \left[\left(\frac{V_a}{V_s} \right) + \left(\frac{V_g}{V_s} \right) \beta_1 \right] = r_f + \gamma_x \rho_{xy} \sigma_y \left[1 + \left(\frac{V_g}{V_s} \right) (\beta_1 - 1) \right]. \tag{4}$$

Because the value of β_1 is larger than one, Proposition 1 implies that well governed firms have higher value of V_g/V_s and hence higher expected returns than poorly governed firms during booms.

In the second case, the economic fundamentals are poor and firms have strong incentive to reduce the scale of production. Consequently, the value of investment options is close to zero but the value of divestiture options is large. Such periods are defined as busts in our context. Equation (3) thus becomes

$$r_s = r_f + \gamma_x \rho_{xy} \sigma_y \left[\left(\frac{V_a}{V_s} \right) + \left(\frac{V_d}{V_s} \right) \beta_2 \right] = r_f + \gamma_x \rho_{xy} \sigma_y \left[1 + \left(\frac{V_d}{V_s} \right) (\beta_2 - 1) \right]. \tag{5}$$

Because the value of β_2 is less than zero, Proposition 1 implies that well governed firms have higher value of V_d/V_s and hence lower expected returns than poorly governed firms during busts. The above analysis indicates that well governed firms have higher expected returns during good times but lower expected returns during bad times, even though their market valuation is always higher than poorly governed firms. We thus formalize our main hypothesis below.

Hypothesis 1 *All else equal, firms with stronger governance have higher expected stock returns than those with weaker governance during periods with abundant investment options and scarce divestiture options, and vice versa.*

We provide a numerical example to illustrate how the governance-return and governance-Q relations depend on the economic conditions faced by firms. Suppose that the economy is populated with two groups of firms, well governed ones with $G = 0$ and poorly governed ones with a positive

G.[4] The value of the positive G is chosen to generate an average agency costs of 2.5% of firm value in the sample to match the empirical estimates in Barclay and Holderness (1989), Doidge (2004), and Nenova (2003), which ranges from 2% to 4%. The value of invest I is set at one so that Tobin's Q is in a reasonable range. The fire sale price λ is set at 0.6 to be consistent with anecdotal evidence in Shleifer and Vishny (1992) who document that the price discount can range from 30% to 85%. We follow Morellec (2004) to set the risk-free rate $r_f = 0.06$ and the volatility of returns on cash flows from assets in place $\sigma = 0.25$. The price of risk γ_x is set to generate 8% risk premium. To avoid bubbles, we pick $\alpha_y = 5\%$ to ensure that the risk-neutral cash flow growth rate ($= \alpha_y - \gamma_x \sigma_y \rho_{xy}$) is positive and less than the risk-free rate. [5]

Figure 1 presents the results from the numerical exercise. Panel A plots the average Tobin's Q's of strongly (solid line) and weakly (dotted line) governed firms against the business conditions faced by the firm, proxied by the cash flow rate y, while Panel B plots the differences in expected returns between firms with strong and weak governance against y. These plots illustrate the maim implications of the model. First, Tobin's Q's of both strongly and weakly governed firms increases as the business condition gets better, i.e., as y increases. Second, the average Q of strongly governed firms is higher than that of weakly governed ones regardless of the business conditions. Third, firms with strong governance have higher returns than firms with weak governance when the business condition is good, i.e., when y is high, however have lower returns when the business condition is bad. Note that the monotonic relation between the business condition faced by the firm and its Tobin's Q motivates us to use Tobin's Q as a proxy for business conditions in the empirical tests.

Our model setup is deliberately made simple to illustrate the intuition behind Hypothesis 1. We hereby discuss several potential extensions of the model and their impacts on the model predictions. First, the literature has shown that price of risk is countercyclical, while for simplicity we assume a constant price of the market risk γ_x. However, as long as the sign of γ_x does not change, Hypothesis

[4] Alternatively, we can calibrate the poorly governed firms with a negative G. The results are qualitatively and quantitatively similar. The reason is that governance strength depends only on the absolute value of G, the model prediction holds for either positive G, resulting in overinvestment, or negative G, resulting in underinvestment.

[5] Detailed explanation can be found in Dixit and Pindyck (1994).

1 still holds. From equations (4) and (5), we can see that the return differences between strongly and weakly governed firms are positive during good times and negative during bad times due to the fact that $\beta_1 > 1$ and $\beta_2 < 0$, respectively. The changes in the magnitude of γ_x only affect the magnitude of these return differences but not the sign. Second, our model has only one risk factor with constant price of risk and hence the CAPM holds. In Online Appendix A, we introduce a two-factor model, where two most studied aggregate risk shocks, total factor productivity (TFP) and investment-specific technological (IST) shocks, are considered. We show that Hypothesis 1 holds as long as those risk factors have positive risk premia or the effect of the risk factor with positive risk premium dominates that of the risk factor with negative risk premium.[6] Third, in Online Appendix C, we show that a simple two-period q-theory model delivers the same prediction as the real options model.[7] Fourth, to emphasize the investment distortion channel, we assume that agency problems do not affect the value of assets in place. In reality, agency problems could hurt the value of assets in place by, for example, excessive compensation, corporate perks, or even outright stealing from operating cash flows (La Porta et al., 2002). In many cases, these losses grow with the level of cash flows (Albuquerque and Wang, 2008; La Porta et al., 2002). Thus managers optimally choose to overinvest because larger enterprises give managers more private benefits. Online Appendix B shows that Hypothesis 1 also holds under this framework.

Our framework follows the classical real options models as in Dixit and Pindyck (1994), where investment (divestiture) options are risker (less risky) than assets in place. Motivated by the empirical finding that value firms which have less growth options earn greater average returns than growth firms which have more growth options, some papers (see, for example, Ai and Kiku, 2013 and Ai, Croce, and Li, 2013) argue that growth options are less risky than assets in place. However, without relying on this argument, some explain value premium, for example, by firm's

[6] Even though there is little ambiguity on the positivity of the TFP risk premium, there have been debates, theoretically and empirically, on the sign of the IST risk premium. This debate, however, is beyond the scope of our paper. If the risk premium of IST shocks is negative, it only bias us finding consistent evidence with Hypothesis 1.

[7] The equivalence between the real options model and the q-theory model of investments in a more general setting is established by Abel et al. (1996).

optimal choices of investment projects with heterogeneous risks (Berk, Green, and Naik, 1999) or by nonconvex adjustment costs and investment irreversibility (Cooper, 2006). Therefore, the existence of value premium does not necessarily mean that growth options are less risky than assets in place. Although what drives value premium is beyond the scope of our paper, we show below that our empirical findings tend to be more consistent with the real options models of Dixit and Pindyck (1994).

3 Empirical Analysis

3.1 Data

We use two indices to measure the strength of corporate governance: the governance index (G-Index) in Gompers, Ishii, and Metrick (2003), and the entrenchment index (E-Index) in Bebchuk, Cohen, and Ferrell (2009). Gompers, Ishii, and Metrick (2003) first introduce the G-Index by counting the number of the twenty-four provisions on investor rights and takeover protection that apply to each company.[8] Bebchuk, Cohen, and Ferrell (2009) identify six out of the twenty-four provisions that matter the most. They construct the E-Index as the number of these six provisions that apply to the firm and find that the E-Index is a more relevant measure of governance strength. We retrieve the G-Index directly from the database ISS/RiskMetrics and construct the E-Index following Bebchuk, Cohen, and Ferrell (2009).

Our sample includes all the companies for which corporate governance information is available from ISS/RiskMetrics. Because ISS/RiskMetrics does not publish the data for each year before 2007, we follow Gompers, Ishii, and Metrick (2003) and Bebchuk, Cohen, and Ferrell (2009) to assume that the corporate governance measures of the covered companies remain unchanged between two consecutive releases. After 2007, ISS publishes the data annually. However, ISS changed the survey method so that many provisions used to construct the G-Index are no longer collected

[8] Detailed descriptions on the twenty-four provisions can be found in Appendix 1 in Gompers, Ishii, and Metrick (2003).

but the E-Index provisions are still available. To get a sample as large as possible while at the same time maintain certain level of accuracy, we extend our sample after the last available G-index to the end of 2014, given that G-index is fairly stable. For the period 2007-2014, we construct E-Index following Bebchuk, Cohen, and Ferrell (2009) based on the ISS data. Therefore, our main sample is from September 1990 to December 2014 and covers the RiskMetrics methodology period (from September 1990 to December 2006) and the ISS methodology period (from January 2007 to December 2014).

Following Gompers, Ishii, and Metrick (2003) and Bebchuk, Cohen, and Ferrell (2009), we define strongly governed firms as the ones with G(E)-Indices smaller than or equal to five (zero) and weakly governed firms as those with G(E)-Indices greater than or equal to fourteen (five) for the sample before 2007. The distribution of E-Index exhibits noticeable change after 2007 due to the change of the survey methodology by ISS.[9] For example, there will be no strongly governed firms during 2010-2012 based on the original definition. We therefore make the following changes in E-index based governance measure after 2007 to keep the fraction of firms classified as strongly (weakly) governed roughly the same as the fraction before 2007: During 2007 to 2009 and 2013 to 2014, strongly governed firms are those with E-Indices equal to zero and weak-governance firms are those with E-Indices greater than or equal to five; and during 2010 and 2012, strong-governance firms have E-Indices equal to one and weak-governance firms have E-Indices greater than or equal to five. The definition based on G-index is kept the same throughout the whole sample due to its stable distribution.

To have a more systematic approach in constructing governance measure, we adopt an alternative definition: Each year, firms are ranked by their most recent G(E)-indices. Firms whose index values fall into the top (bottom) quintile of the index distribution in that year are classified as weakly (strongly) governed firms, respectively. We use this governance measure as a robustness check.

[9] More information about the ISS/RiskMetrics governance provisions data and the distribution of G- and E-indices can be found in Online Appendix.

Finally, the sample from ISS/RiskMetrics is matched with monthly stock return data from the Center for Research in Security Prices (CRSP) and financial data from COMPUSTAT in annual and quarterly frequencies.[10] Table 1 provides the summary statistics of the G- and E-indices and other variables used in the empirical tests. Specifically, Panel C of Table 1 reports the cross sectional distribution of the difference between a firm's maximal and minimal G- and E-indices during the whole sample period. Among firms, the median difference is 1, the 25th percentile is 0, and the 75th percentile is 2 for both indices. Panel C shows that a firm's G- and E-indices do not change much over time and when they do change, the change is fairly small.

3.2 Classification of the Business Conditions

The model predicts that the governance-return relation depends on the investment opportunities that firms have, which is commonly proxies by Tobin's average Q (Tobin, 1969) in the literature (see Goyal, Lehn, and Racic, 2002, for example). It is defined as the ratio between the market value and replacement value of a firm's assets. Abel (1983) shows that the optimal rate of investment depends on the marginal Q and Hayashi (1982) presents conditions under which the average and marginal Q's are equal. Given that marginal Q is not observable, average Q becomes widely used to measure firm's investment opportunities. To be concise, we omit the word "average" and use Tobin's Q to refer to Tobin's average Q hereafter.

Moreover, past studies (see Harford, 2005, for example) show that a firm's investment decisions are mostly affected by the industry-specific technological/regulatory shocks, instead of the aggregate economic conditions, although they are positively correlated. Hoberg and Phillips (2010) find that industry-specific business cycles, although correlated, do not perfectly synchronize with each other. Figures 2(a), 2(b) and 2(c) plot the time series of Tobin's Q of the aggregate stock market, and industry-level Tobin's Q's for the FF10 and FF48 Industries, respectively. Consistent with previous evidence, the graphs show that although Tobin's Q's of different industries exhibit similar cyclical

[10] We make sure that the stock returns are matched with the financial and governance datasets that are released in the most recent past.

movements, they do not reach peaks and troughs in the same quarters. In some extreme cases, the periods when some industry experiences peak are the periods of trough for other industries. For example, the end of 1990s was a boom period for the IT industries however was a bust period for the consumer non-durables industry. Therefore, to accurately capture the investment opportunities faced by firms, we use the *predicted* FF10 and FF48 industry-level Tobin's Q's, instead of the Tobin's Q of the aggregate market, to proxy for business conditions.

The reason that the *predicted*, not realized, industry-level Q's are used to classify business conditions is because the procyclical governance-return relation in Hypothesis 1 only applies to expected stock returns. Therefore, the information used by investors to form expectation on the business conditions and firm's governance strength in period t has to be available before period t. To form ex-ante expectation about the business conditions of industry j in quarter t, we run the following rolling-window regression using the data from quarter $t-20$ to quarter $t-1$:

$$Q_{js} = b_{0t} + b_{1t}ROA_{j,s-1} + b_{2t}SGR_{j,s-1} + b_{3t}DEF_{s-1} + b_{4t}TERM_{s-1} + e_{js} \quad (6)$$

where Q_{js} is Tobin's Q of industry j computed as the ratio of the market value to the book value of total assets in this industry in quarter s,[11] $ROA_{j,s-1}$ is the return on asset of the industry defined as the total earnings before extraordinary items over total book assets of the industry in quarter $s-1$, $SGR_{j,s-1}$ is the sales growth rate of the industry from quarter $s-2$ to quarter $s-1$, DEF_{s-1} is the default premium in quarter $s-1$ which is the yield spread between Baa and Aaa bonds, and $TERM_{s-1}$ is the yield spread between ten-year and one-year Treasury bonds (i.e., term premium) in quarter $s-1$. The first two regressors in regression (6) proxy for industry-specific growth opportunities (Acharya, Almeida, and Campello, 2007; Hoberg and Phillips, 2010) while the last two capture the market-wide economic conditions (Petkova and Zhang, 2005). The predicted Tobin's Q of industry j in quarter t is hence defined as $\hat{b}_{0t} + \hat{b}_{1t}ROA_{j,t-1} + \hat{b}_{2t}SG_{j,t-1} +$

[11] The market value of assets in industry j is defined as the end of quarter total market capitalization of all the stocks in this industry, plus the total value of these firms' liabilities obtained from the balance sheet. The book value of assets in industry j is simply the sum of these firms' book assets.

$\hat{b}_{3t}DEF_{t-1} + \hat{b}_{4t}TERM_{t-1}$. Regression (6) is repeated for each quarter and for each industry. In general, regression (6) does a good job in predicting next period's industry-specific Q's.[12] We then classify quarter t as a boom (bust) for the firms in industry j if the predicted Q of this industry in quarter t is in the top (bottom) quintile of the sample distribution of industry j's predicted Q's for the period of 1975-2014.[13] A quarter is classified as normal if it is neither a boom nor a bust.

In addition to better capturing the investment opportunities faced by firms, the industry-specific boom-bust classification improves the power of the empirical tests by generating more busts in our sample period. For example, based on the predicted aggregate Tobin's Q, there are only five bust quarters in our sample, all clustered during 2008 - 2014. Tests based on the bust periods will have extremely low statistical power. On the contrary, the distributions of industry-specific booms and busts are much more dispersed. For example, there are bust quarters in every year of our sample under the FF48 boom-bust classification. Generally, the finer the business cycle classification is, the more evenly distributed the industry-specific booms and busts are.[14]

3.3 Empirical Results

Our main empirical methodology is the characteristic approach in Brennan, Chordia, and Subrahmanyam (1998) and Gompers, Ishii, and Metrick (2003), which explains a firm's stock return with its characteristics, including its governance strength in our case. In addition, we provide a test on the dependence of firm's beta on governance strength using the portfolio approach. Since our model is the CAPM in essence, the test on beta would be the direct test of Hypothesis 1. However, Lin and Zhang (2013) show that due to the difficulty in measuring beta and the risk factor(s), the characteristics approach generates more significant results. They demonstrate that the beta-return

[12] The average R-squared of the prediction regressions is 0.47 (0.45) under FF10 (FF48) industry classification, and the corresponding average correlation between the realized and predicted Q's is 0.68 (0.63). The statistics of the prediction regression can be found in Table A.2 of the Online Appendix.

[13] The quarterly financial data is available starting in the fiscal year 1970 and our sample spans through 2014. We use the data of the past five years to predict Tobin's Q. Therefore, the longest series of the predicted Tobin's Q is from 1975 to 2014 in our sample.

[14] The distribution of the boom/bust classification can be found in Table A.3 of the Online Appendix.

and characteristics-return relations are the two sides of the same coin. A firm's return can be either expressed as its beta times the aggregate risk factor(s) or equivalently, as a function of its characteristics. If a firm's beta depends on its governance strength, the characteristics regression of equation (7) below must show similar dependence on its governance strength.

The characteristics approach — Following Brennan, Chordia, and Subrahmanyam (1998) and Gompers, Ishii, and Metrick (2003), we explain a firm's stock return with its characteristics but allow the dependence on governance strength to be time-varying. The specification of the regression is given by

$$R_{it} = a + \gamma_t + \left(b_{BM}\mathbb{I}_{it}^{BM} + b_{NM}\mathbb{I}_{it}^{NM} + b_{BT}\mathbb{I}_{it}^{BT}\right) \times SG_{it} + cX_{i,t-1} + e_{it}, \tag{7}$$

where for firm i in month t, R_{it} is the industry-median adjusted stock return that removes the industry-specific effects,[15,16] γ_t is the time fixed effect, SG_{it} is the governance indicator that equals one for strongly governed firms and zero for weakly governed ones, $\mathbb{I}_t^{BM}$, $\mathbb{I}_t^{NM}$, and $\mathbb{I}_t^{BT}$ are indicators that equal one if month t is in a boom, normal, or bust quarter, respectively, and equal zero otherwise,[17] X_{it-1} is a vector of lagged firm characteristics, and e_{it} is the error term. The firm characteristics X_{it} include the book-to-market ratio (B/M), firm size ($Size$), share price ($Price$), monthly trading volume in the New York Stock Exchange ($NYDVOL$), monthly trading volume in NASDAQ Stock Market ($NADVOL$), dividend yield (YLD), S&P 500 inclusion ($SP500$), NASDAQ inclusion ($NASDAQ$), compounded gross returns for month $t-3$ to $t-2$ (RET23), for months $t-6$ to $t-4$ (RET46), and for months $t-12$ to $t-7$ (RET712), past five-year sales growth ($SGROWTH$), and the percentage of institutional ownership ($INST$).[18] The clustered OLS method is conducted with the error terms clustered in time because stock returns exhibit

[15] The industry classification used in computing adjusted stock returns is the same as the one used in the corresponding boom-bust classification to be self-consistent.
[16] Using industry value- or equally-weighted mean-adjusted returns as the dependent variable in equation (7) leads to qualitatively similar results.
[17] These boom-normal-bust indicators of month t are determined by information known before time t.
[18] Detailed descriptions on the control variables can be found in Appendix Two in Gompers, Ishii, and Metrick (2003).

little persistence in time but strong co-movement in the cross section (Petersen, 2009). The coefficients of interest are b_{BM} and b_{BT}, which correspond to the monthly return difference in percentage between strongly and weakly governed firms during booms and during busts, respectively, controlling for other firm characteristics. For robustness, we also conduct regression (7) without the control variables X_{it}. Hypothesis 1 states that $b_{BM} > 0$ and $b_{BT} < 0$.

Table 2 presents the coefficients of regression (7) with and without controls. Columns (1)-(4) and (5)-(8) report results using G- and E-Indices as the governance measure, respectively. Under each measure, results based on both FF10 and FF48 industry-specific boom-bust classifications are reported. With the G-Index as the governance measure and with controls, the return differences between the strongly and weakly governed firms, i.e., the estimates of b_{BM} in percentage, are 0.58% (FF10) and 0.40% (FF48) per month during booms, both being significant at the 5% level. The monthly return difference in percentage during busts, i.e., the estimates of b_{BT} in percentage, are −0.74% and −0.57% with 5% and 10% significance level under the FF10 and FF48 boom-bust classifications, respectively. The results with the E-Index as the governance measure are statistically more significant. The estimates of b_{BM} are 0.92 and 0.80, being significant at the 1% level, under the FF10 and FF48 boom-bust classifications, respectively. The corresponding estimates of b_{BT} are −0.90 and −0.66, significant at the 1% and 5% levels, respectively. The estimates of b_{BM} and b_{BT} without control variables are qualitatively and quantitatively similar, except that the estimates of b_{BT} are not statistically significant under the FF48 boom-bust classifications.

Overall, our results strongly support the hypothesis that the governance-return is positive during booms and negative during busts. As expected, greater statistical significance is obtained when the E-Index is used given its greater relevance to governance strength as argued by Bebchuk, Cohen, and Ferrell (2009).

The portfolio approach — We test whether the betas of strongly governed firms are greater than those of weakly governed ones during booms and smaller during busts on average. Because the measure of beta for individual firm is very noisy, we follow the literature to focus on the betas of the governance hedge portfolios. Our governance hedge portfolio longs strongly governed firms whose industries are in good states and weakly governed firms whose industries are in bad states and shorts weakly governed firms whose industries are in good states and strongly governed firms whose industries are in bad states.[19] If Hypothesis 1 holds, firms in the long position of our hedge portfolios always have larger betas than the ones in the short position, indicating that the beta of the governance portfolio is positive.

Based on the governance measures, G- or E-index, and industry classifications, FF10 or FF48, used in the portfolio formation, we construct four hedge portfolios and test the positivity of the betas of the G- and E-portfolios based on the CAPM:

$$R_{gt} = \alpha_g + \beta_g \, RMRF_t + \epsilon_{gt} \,, \tag{8}$$

where R_{gt} is the value- or equally-weighted return on the governance hedge portfolio, RMRF_t is the value-weighted excess return on the market portfolio, and the subscript g labels one of the four hedge portfolios. While constructing equally-weighted returns on the governance hedge portfolios, we follow Fama and French (2008) and exclude micro-cap firms, which are defined as stocks with market capitalization below the 20th NYSE percentile, so that the equally-weighted portfolio returns are not dominated by stocks that are tiny, not just small.

There are two reasons why we choose the CAPM as the asset pricing model to test Hypothesis 1. First, our baseline model is a one-factor model, which makes the CAPM the most natural choice. Second, another commonly used asset pricing model is the Fama and French (1993) three-factor model, which contains two other risk factors in addition to the market risk factor: the size factor and the value factor. Albeit popular in the literature, the nature of the aggregate risks behind the size and value factors is not clear. Since whether and how the aggregate risks affect the investment opportunities of firms are critical for the predictions of our model to hold, we decide to focus on

[19] We thank one of the referees for suggesting this method to construct the governance hedge portfolios.

the market risk in our empirical tests.

Panels A and B of Table 3 present the estimated market betas of the value- and equally-weighted governance hedge portfolios, respectively: G-portfolios constructed based on the FF10 and FF48 industry classifications in columns (1) and (2) and the corresponding E-portfolios in columns (3) and (4), respectively. Consistent with Hypothesis 1, the market betas of the value-weighted hedge portfolios under these four specifications are 0.47, 0.18, 0.49, and 0.36, all positive and significant at the 1% level. Moreover, none of the CAPM alphas are significantly different from zero. Results of equally-weighted portfolios in Panel B are quantitatively and qualitatively similar. We do not intend to argue that the CAPM holds in general, which is beyond the scope of this paper.[20] However, the insignificance of the CAPM alpha indicates that the return differences between strongly and weakly governed firms can be largely explained by their differences in market beta, which is consistent with the risk-based explanation of our model. Therefore, the results under the portfolio approach confirm the finding under the characteristics approach. Both approaches provide strong support for Hypothesis 1.

4 Discussion

4.1 Governance and Stock Valuation

Firms have a set of tools to discipline managers and our measures of governance only capture the effectiveness of some. One specific concern is that the G(E)-Index is an inaccurate measure of governance strength during busts, which are periods with harsh business condition that itself can serve as an external governance mechanism. If weak business condition disciplines high G(E)-Index firms (poorly governed firms by our definition) more than it does for low G(E)-Index firms, the

[20] Whether the CAPM holds in the data seems to depend on the sample period and the methodology used in the tests. For example, Fama and French (1993), among others, show that the CAPM cannot explain various of asset pricing anomalies, most famously the value premium. However, this failure of the CAPM seems to be specific to the post-1963 sample and the standard OLS methodology. Ang and Chen (2007) and Bai et al. (2015) show that the CAPM holds in the post-1926 sample and, if time-variation of beta is allowed, also holds in the post-1963 sample .

effective governance of the former can be stronger than that of the latter during busts. In that case, negative governance-return relation will be found during busts even though the true governance-return relation is positive regardless of the business conditions. We show next that our results are not driven by the aforementioned mechanism.

In this subsection, we examine the governance-Q relation by estimating the same regression used by Gompers, Ishii, and Metrick (2003), augmented to allow the governance effect to vary with the business conditions:

$$Q_{it} = a + \gamma_t + \left(b^Q_{BM} \mathbb{I}^{BM}_{it} + b^Q_{NM} \mathbb{I}^{NM}_{it} + b^Q_{BT} \mathbb{I}^{BT}_{it} \right) \times SG_{it} + c\, Z_{i,t-1} + e_{it}, \qquad (9)$$

where Q_{it} is the industry-median adjusted Tobin's Q ratio of firm i in quarter t, γ_t is the time fixed effect, and Z_{it-1} is the set of control variables, including firm size as the log of the book value of assets, firm age as the log of firm years as of December of that year, a dummy variable indicating whether the company is incorporated in the state of Delaware, and a dummy variable indicating whether the stock is included in the S&P 500 index. The error term e_{it} is clustered in quarters. For robustness, regression (9) is also estimated without the control variables Z_{it}.

If the effective governance level of high G(E)-Index firms indeed becomes higher than that of low G(E)-Index firms during busts, we should observe that the Q ratio of the former is higher than that of the latter, i.e., $b^Q_{BT} < 0$. If, on the contrary, our governance measures are good proxies for firms' overall governance strength under all economic conditions, we would observe that b^Q_{BM}, b^Q_{NM}, and b^Q_{BT} are all positive. Table 4 reports the estimated coefficients of regression (9). With or without control variables Z_{it-1}, the estimated b^Q's are all positive and, in 22 out of 24 cases, are statistically significant at either 1% or 5% level. Therefore, Tobin's Q of firms with lower G(E)-Index is higher than those with higher G(E)-Index during booms, busts, and normal times. This result provides evidence that the G- and E-Indices are good measures of a firm's overall governance strength along the business cycles.

Moreover, results in Table 4 indicate that options value accounts for a larger fraction of firm value for firms with strong governance than the ones with weak governance under any business condition because Tobin's Q is also a commonly used measure for growth opportunities. This evidence provides support for our argument that the difference in real options value between strongly and weakly governed firms is the driving force behind the time-varying governance-return relation. Next, we provide further evidence on this mechanism.

4.2 Further Identification of The Real Options Mechanism

Our model predicts that a strongly governed firm derives a larger fraction of its value from investment/divestiture options, denoted as option intensity for conciseness, than an otherwise identical weakly governed firm. In this subsection, we provide further evidence on this options mechanism using firm's exposure to idiosyncratic volatility in Ai and Kiku (2015) as an alternative measure for option intensity.[21]

Ai and Kiku (2015) show that option-intensive firms have larger exposure to idiosyncratic volatility. We follow the same method of Ai and Kiku (2015) and construct the measure of the exposure to idiosyncratic volatility as the coefficient (β_{it}^{ID}) of the regression of stock returns on idiosyncratic volatility at each year end using monthly data over the previous three years.[22]

We then exam whether strongly governed firms have larger idiosyncratic volatility exposure than weakly governed ones, controlling for firm characteristics, via the following regression:

$$\beta_{it}^{ID} = a + b\,SG_{it} + c\,X_{i,t-1} + \epsilon_{it} \tag{10}$$

where SG_{it} is the governance indicator that equals one for strongly governed firms and zero for weakly governed ones and X_{it-1} is a set of control variables including size, book-to-market ratio, sales growth growth rate, and an indicator for S&P 500 inclusion.[23] Since our model predicts

[21] We thank one of the referees for suggesting the exposure to idiosyncratic volatility as a measure of growth opportunities.
[22] Details on the construction of β_{it}^{ID} can be found in Section E of the Online Appendix.
[23] The definitions of these control variables are the same as for regression (7).

that the strongly governed firms have higher option intensity than the weakly governed ones, we expect that strongly governed firms have higher idiosyncratic volatility exposure, that is, $b > 0$. For robustness, regression (10) is also estimated without control variables X_{it-1}.

Columns (1)-(4) and (5)-(8) of Table 5 presents the estimated coefficients of regression (10) using G- and E-indices as the governance measure, respectively. Results based on the idiosyncratic volatilities constructed using the FF10 industry classifications are presented in columns under "FF10" and those using the FF48 classifications in columns under "FF48". The estimated b's are positive under all specifications, being statistically significant at either 1% or 5% level in 6 out of 8 cases. In sum, the results show that strongly governed firms have larger idiosyncratic volatility exposures than weakly governed ones, consistent with our model prediction that strong governance leads to higher option intensity.

5 Robustness

5.1 Results for the Pre- and Post-2000 Periods

Bebchuk, Cohen, and Wang (2013) argue that the positive and negative governance-return relation observed in Gompers, Ishii, and Metrick (2003) and Core, Guay, and Rusticus (2006), respectively, are driven by the over-valuation of poorly governed firms during 1990-1999 and the subsequent market correction after investors fully recognized the negative effects of poor governance on firm value in the 2000s. We re-run our tests using both the characteristics and portfolio approaches for the pre- and post- 2000 (included) periods to see whether the procyclical governance-return relation holds in these subperiods.

The test results for the pre- and post-2000 samples are shown in Panels A and B of Table 6, respectively. Under the characteristics approach, the signs of b_{BM} and b_{BT} are positive and negative, respectively, for both pre- and post-2000 periods, consistent with Hypothesis 1. This result holds under all four specifications, i.e., either G- or E-index as the governance measure and either FF10 or FF48 industry classification. For example, the four estimates of b_{BM} in the pre-2000 sample are 0.61, 0.75, 1.29, and 1.23 and the corresponding estimates of b_{BT} are -0.89, -0.69, -0.66, and -0.41. Even though only 4 of 8 estimated b_{BM}'s and 3 of 8 estimated b_{BT}'s are statistically significant, the magnitude of these estimates (interpreted as monthly return differences between strongly and weakly governed firms in percentage) is quite large. The reduced statistical significance of the coefficients, compared to those in Table 2, is not surprising given that the sample size is halved in the current setting.

The results under the portfolio approach are also supportive of Hypothesis 1. The market betas of the value- and equally-weighted governance hedge portfolios are all positive and, in 14 out of 16 cases, are statistically significant. Moreover, the CAPM alphas are insignificantly different from zero under all specifications. On the contrary, GIM show that the CAPM alpha of their governance portfolio is significantly positive for the pre-2000 period. The difference between our finding and GIM's lies on how the governance hedge portfolios are constructed.[24] Recall that our governance hedge portfolio longs strongly governed firms whose industries are in good states and weakly governed firms whose industries are in bad states and shorts weakly governed firms whose industries are in good states and strongly governed firms whose industries are in bad states. The governance portfolio in GIM simply longs strongly governed firms and shorts the weakly governed ones. Notably, the CAPM alphas disappear once we allow the long-short positions of the hedge portfolios to change with the states of the economy in the way consistent with Hypothesis 1.

In sum, our results indicate that during the pre-2000 period when overvaluation of strongly governed firms is more likely, those firms underperform weakly governed firms during industry-specific busts; and during the post-2000 period when investors are fully aware of the effects of corporate governance on firm value, strongly governed firms continue to outperform weakly governed ones during industry-specific booms. Therefore, the procyclical governance-return relation holds in both pre- and post-2000 periods, although with weaker statistical significance, which is likely due

[24] We replicate the findings in GIM using our data and the results are qualitatively and quantitatively similar.

to the reduced sample size.

5.2 Extended Sample

Due to the availability of G(E)-index, our sample only covers the period of September 1990 to December 2014. In such a short sample period, there may not be enough boom or bust periods, which reduces the power of our empirical tests. As a robustness check, we extend our sample backwards for five years and assume that the values of G(E)-index between January 1985 and August 1990 are the same as those published in September 1990.[25] Since the values of G(E)-index are fairly persistent in the RiskMetrics methodology period (1990-2006), measurement errors of this extension is hopefully negligible. We then repeat the empirical tests for the extended period of 1985-2014. We find that the procyclical governance-return relation is even stronger in terms of statistical significance in the extended sample than the benchmark case in Tables 2 and 3, probably due to the enlarged sample size.

Panel A of Table 7 presents the results under the characteristics and portfolio approaches. For conciseness, we only report the coefficients b^{BM} and b^{BT} of regression (7) with the coefficients of control variables omitted. Under the characteristics approach, the return differences between strongly and weakly governed firms are positive during good times and negative during bad times, all of which are statistically significant. Under the portfolio approach, the market betas of both value- and equally-weighted governance hedge portfolio is significantly positive and the CAPM alpha is insignificantly from zero in all specifications. Therefore, the results in the extended sample are even stronger statistically than the benchmark case in Tables 2 and 3.

[25] As discussed by GIM, most of the takeover defenses and restrictions of shareholder rights were installed as a response to the rise of junk bond financed takeovers in the mid 1980s. Therefore, extending the data backwards beyond 1985 are not appropriate. Technically speaking, all firms are strongly governed before the mid 1980s because fewer firms have adopted the takeover provisions used in the construction of G- and E-indices by that time.

5.3 Alternative Strong/Weak Governance Definition

As mentioned in Section 3.1, the distribution of E-Index exhibits noticeable change after 2007 due to the change of the survey methodology by ISS. In the benchmark analysis, we adopt different cutoff points of E-index in the definition of strong and weak governance for pre- and post-2007 samples. In this subsection, we use a more systematic approach in defining governance strength. Each year, we rank firms by their most recent G(E)-indices. Firms whose index values fall into the top (bottom) quintile of the index distribution in that year are classified as weakly (strongly) governed firms, respectively. We repeat our analysis under the new definition of strong/weak governance and report the results in Panel B of Table 7. For conciseness, we only report the estimated b^{BM} and b^{BT} of regression (7) with the coefficients of control variables omitted. Results under the characteristics approach show that the return differences between strongly and weakly governed firms are positive ($b^{BM} > 0$) during booms and negative ($b^{BT} < 0$) during busts, all of which are highly significant. The CAPM betas of both value- and equally-weighted governance portfolios are significantly positive under all specifications and none of the CAPM alphas are significantly different from zero. Therefore, our benchmark results are robust to the governance strength definition.

6 Conclusion

Our paper provides an alternative explanation for the previously documented appearance and disappearance of the governance-return relation during various periods from 1990 to 2007 in Gompers, Ishii, and Metrick (2003), Core, Guay, and Rusticus (2006), and Bebchuk, Cohen, and Wang (2013). Based on the assumption that corporate governance alleviates investment distortions by managers, our real options model predicts that firms with stronger governance, all else equal, have higher values of investment and divestiture options and higher Tobin's Q. More important, those firms have higher (lower) expected returns when growth opportunities are abundant (scarce) compared to firms with weaker governance. We test our model predictions using the G- and E-Indices as the governance measure. Periods with high and low investment opportunities are classified based on the predicted industry-specific Tobin's Q ratios. Consistent with the model predictions, we find that strongly governed firms have higher valuation and higher option intensity, reflected by the higher Tobin's Q and higher sensitivity to idiosyncratic volatility, than the weakly governed ones. At the same time, strongly governed firms earn higher returns under good economic conditions but lower returns under adverse conditions. Our findings hence suggest that corporate governance does affect the costs of equity financing, however, the direction of this effect is time-varying.

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Appendices

A Proof of Proposition 1

Let $V(y_t)$ denote the value function of an asset that pays cash flow at rate $D(y_t)$, which is given by:

$$V(y_t) \equiv \mathbb{E}\left[\int_o^\tau \frac{m_t}{m_0} D(y_t)dt\right]$$

where τ is the stopping time. For all $t < \tau$, $V(y_t)$ satisfies the following Bellman equation

$$m_t D(y_t) + \mathscr{D}[m_t V(y_t)] = 0 \tag{A.1}$$

where

$$\mathscr{D}[m_t V(y_t)] = \lim_{\Delta \to 0} \frac{1}{\Delta} \mathbb{E}\left[m_{t+\Delta} V(y_{t+\Delta}) - m_t V(y_t)\right].$$

Apply Ito's formula, Equation (A.1) can be written as

$$D(y) - r_f V(y) + (r_f - \delta_y) y V_y + \frac{1}{2} V_{yy} \sigma_y^2 y^2 = 0, \tag{A.2}$$

where δ_y is so-called convenience/dividend yield, defined as $\delta_y \equiv r_f + \gamma_x \rho_{xy} \sigma_y - \alpha_y$, and V_y and V_{yy} are the first- and second-order derivatives of V w.r.t. y, respectively. To pin down the value function $V(y)$, boundary conditions and the optimal stopping times are needed in addition to equation (A.2). The values of assets in place, investment options and divestiture options, for either the manager or outside shareholders, all satisfy equation (A.2) and their differences lie on the cash flow rate, boundary conditions and the optimal stopping times.

First we solve for the value function of assets in place, denoted as $V_a(y_t)$. The cash flow rate of assets in place is y_t and the stopping time $\tau = \infty$. It can be easily verified that $V_a = \frac{y_t}{\delta_y}$. Next we solve for the values of growth and divestiture options, whose cash flow rates are zero before the options are exercised and the optimal stopping times are the timings of investments and divestiture that maximize the option values. Define $V_g(y)$ and $V_d(y)$ as the values of growth and divestiture options for outside shareholders, respectively, and $V_g^m(y)$ and $V_d^m(y)$ as the corresponding values for the manager. The aforementioned option values satisfy:

$$\frac{1}{2}\sigma_y^2 y^2 V_{yy} + (r_f - \delta_y) y V_y - r_f V = 0\,, \tag{A.3}$$

where V refers to V_g, V_d, V_g^m, or V_d^m. It can be easily verified that the general solution of equation (A.3) is Ay^β, where A and β are constants that depend on the parameters in the equation. Substituting the general solution into equation (A.3) results in the following quadratic equation of β:

$$\Theta(\beta) \equiv \beta^2 + \left[\frac{2(r_f - \delta_y)}{\sigma_y^2} - 1\right]\beta - \frac{2r_f}{\sigma_y^2} = 0\,. \tag{A.4}$$

It can be easily shown that $\Theta(\beta = 1) = -2\delta_f/\sigma_y^2 < 0$ and $\Theta(\beta = 0) = -2r_f/\sigma_y^2 < 0$, implying that the two roots of $\Theta(\beta)$ satisfy: $\beta_1 > 1$ and $\beta_2 < 0$.

Let's first solve for the value of the growth option to the manager, denoted as $V_g^m(y) = A_g^m y^\beta$. Because the growth option is worthless when the cash flow is zero, V_g^m must satisfy the following boundary condition:

$$V_g^m(0) = 0, \tag{A.5}$$

which implies that the β in the solution of V_g^m takes the value of the positive root β_1. Moreover, the value of the option to the manager equals the present value of all the future cash flows from the installed investment (i.e., the assets in place) minus the investment cost, given by $\Omega_g^m(y) = y/\delta_y - (1-G)I$, at the time when the option is exercised.[A.1] This leads to the second boundary condition:

$$V_g^m(y_g) = \Omega_g^m(y_g), \tag{A.6}$$

[A.1] For simplicity, we assume that this new investment is irreversible. If the investment is reversible, $\Omega_g^m(y)$ will have an additional term equal to the value of the option to disinvest the installed capital in the future when the economy is bad enough. In that case, the model has no analytical solution. Because the value of divestiture options is negligible at the investment threshold, the assumption of irreversible investment has little quantitative impact on the solution and can give us an analytical solution and a clear economic intuition.

where y_g is the investment threshold. Firm exercises the investment option if $y \geq y_g$ and wait otherwise. Because the manager of the firm chooses the timing of exercising the option to maximize V_g^m, Dixit and Pindyck (1994) show that if y_g is the optimal investment threshold, V_g^m satisfies the following smooth-pasting condition:

$$\left.\frac{dV_g^m}{dy}\right|_{y=y_g} = \left.\frac{d\Omega_g^m}{dy}\right|_{y=y_g}. \tag{A.7}$$

Solving equations (A.6) and (A.7) gives:

$$\begin{aligned} y_g &= (1-G)\theta_1 I\delta_y\,, \text{ where } \theta_1 \equiv \frac{\beta_1}{\beta_1 - 1} > 1, \\ V_g^m(y) &= A_g^m y^{\beta_1} (1-G)I(\theta_1 - 1)(y_g)^{-\beta_1} y^{\beta_1}\,. \end{aligned} \tag{A.8}$$

Next, we solve for the value of the growth option for outside shareholders, defined as $V_g(y) = A_g y^\beta$. It satisfies the following boundary conditions: $V_g(0) = 0$ and $V_g(y_g) = \Omega_g(y_g)$, where $\Omega_g(y) = y/\delta_y - I$. Notice that the value of the option for outside shareholders is different from that for the manager when the option is exercised because the cost of investment to these these agents are different. Moreover, because the investment threshold y_g does not maximize the value of the growth option to outside shareholders, V_g does not satisfy the smooth-pasting condition at $y = y_g$. The boundary conditions above lead to:

$$V_g(y) = A_g y^{\beta_1} = I[(1-G)\theta_1 - 1]\,(y_g)^{-\beta_1}\, y^{\beta_1}, \tag{A.9}$$

We assume that G cannot be too large to ensure that the option has positive value to outside shareholders, i.e., $(1-G) > 1/\theta_1$ and thus $V_d > 0$.

The value of the divestiture option to the manager and outside shareholders, i..e, V_d^m and V_d, respectively, can be solved in a similar fashion. The boundary and smooth-pasting conditions satisfied by $V_d^m(y)$ are: $V_d^m(\infty) = 0$, $V_d^m(y_d) = \Omega_d^m(y_d)$, and $\left.\frac{dV_d^m}{dy}\right|_{y=y_d} = \left.\frac{d\Omega_d^m}{dy}\right|_{y=y_d}$, where $\Omega_d^m(y) =$

$\lambda(1-G)I - y/\delta_y$ and y_d is optimal threshold of divestiture. The firm exercises the divestiture option when $y \leq y_d$ and wait otherwise. The conditions satisfied by $V_d(y)$ are: $V_d(\infty) = 0$ and $V_d(y_d) = \Omega_d(y_d)$, where $\Omega_d = \lambda I - y/\delta_y$. The first boundary condition satisfied by V_d^m and V_d imply that the divestiture option is worthless when cash flow y goes to infinity. Thus, the β in the solutions of V_d^m and V_g take the value of the negative root $\beta_2 < 0$. Following the same procedure that V_g^m and V_g are solved, we get

$$y_d = (1-G)\lambda I\delta_y\theta_2, \text{ where } \theta_2 \equiv \frac{\beta_2}{\beta_2 - 1} \in (0,1), \tag{A.10}$$

$$V_d(y) = A_d\, y^{\beta_2} = \lambda I\left[1 - \theta_2(1-G)\right]\left(\frac{y}{y_d}\right)^{\beta_2}. \tag{A.11}$$

We assume that G cannot be too negative to ensure that the divestiture option has positive value to outside shareholders, i.e., $(1-G) < 1/\theta_2$ and thus $V_g > 0$.

First we show that both V_g and V_d attain their maximals at $G = 0$ and decrease with the deviation of G from zero, i.e., the absolute value of G. As we mentioned before, the deviation of G to the left of zero indicates the manager's preference for overinvestment while the deviation to the right indicates the preference for underinvestment. The magnitude of this deviation measures the governance strength of the firm. The values of the investment and divestiture options are largest when the governance strength is strongest, i.e., $G = 0$, resulting in zero agency distortion in investment decisions. Rewrite A_g and A_d as $A_g = I(\theta_1 I\delta_y)^{-\beta_1}[(1-G)\theta_1 - 1](1-G)^{-\beta_1}$ and $A_d = \lambda I(\lambda I\delta_y\theta_2)^{-\beta_2}[1-(1-G)\theta_2](1-G)^{-\beta_2}$. We show that the first and second derivatives of A_g (A_d) w.r.t. G is zero and negative, respectively, at $G = 0$:

$$\left.\frac{\partial A_g}{\partial G}\right|_{G=0} = \left. I(\theta_1 I\delta_y)^{-\beta_1}\beta_1 G(1-G)^{-\beta_1-1}\right|_{G=0} = 0,$$

$$\left.\frac{\partial^2 A_g}{\partial G^2}\right|_{G=0} = \left. -I(\theta_1 I\delta_y)^{-\beta_1}\beta_1(1+G\beta_2)(1-G)^{-\beta_1-2}\right|_{G=0} = -I(\theta_1 I\delta_y)^{-\beta_1}\beta_1 < 0,$$

$$\left.\frac{\partial A_d}{\partial G}\right|_{G=0} = \left. \lambda I(\lambda I\delta_y\theta_2)^{-\beta_2}\beta_2 G(1-G)^{-\beta_2-1}\right|_{G=0} = 0,$$

$$\left.\frac{\partial^2 A_d}{\partial G^2}\right|_{G=0} = \lambda I(\lambda I\delta_y\theta_2)^{-\beta_2}\beta_2(1+G\beta_2)(1-G)^{-\beta_1-2}\Big|_{G=0} = \lambda I(\lambda I\delta_y\theta_2)^{-\beta_2}\beta_2 < 0.$$

Therefore, both V_g and V_d attain their maximals at $G = 0$ and decrease with the deviation of G from zero.

Finally, define the Tobin's Q ratio of the firm as the ratio of its market value to the replacement cost of the same assets, i.e., $Q = \frac{V_s}{I}$. We have shown that both V_g and V_d obtain maximal values when $G = 0$. Therefore, Tobin's Q decreases with the absolute value of G, which measures the deviation of G from zero and is negatively related to the strength of corporate governance. This finishes our proof of Proposition 1.

B Proof of Proposition 2

The expected excess return of an asset with value function V is given by

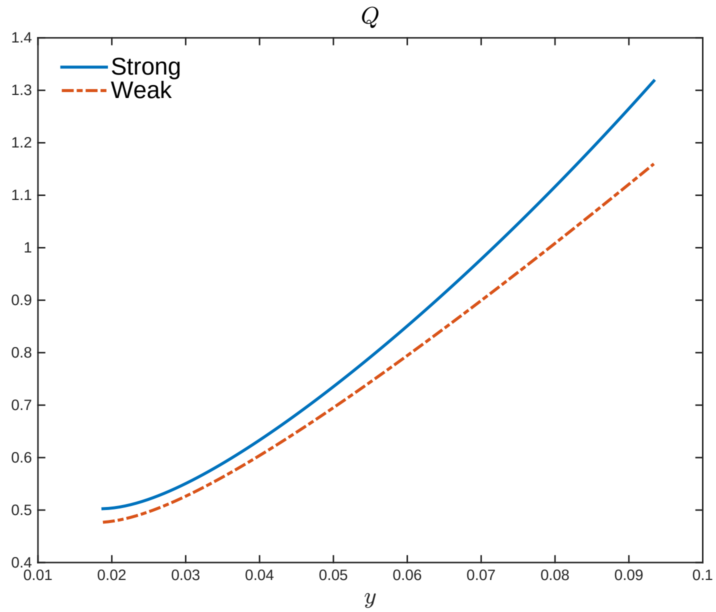
$$\mathbb{E}\left[\frac{dV}{V}\right]/dt - r_f = -\text{cov}\left(\frac{dm}{m}, \frac{dV}{V}\right)/dt.$$

Based on Ito's Lemma, we have $\frac{dV_a}{V_a} = \frac{dy}{y}$, $\frac{dV_g}{V_g} = \beta_1\frac{dy}{y} + \beta_1(\beta_1 - 1)\sigma_y^2 dt$, and $\frac{dV_d}{V_d} = \beta_2\frac{dy}{y} + \beta_2(\beta_2 - 1)\sigma_y^2 dt$.

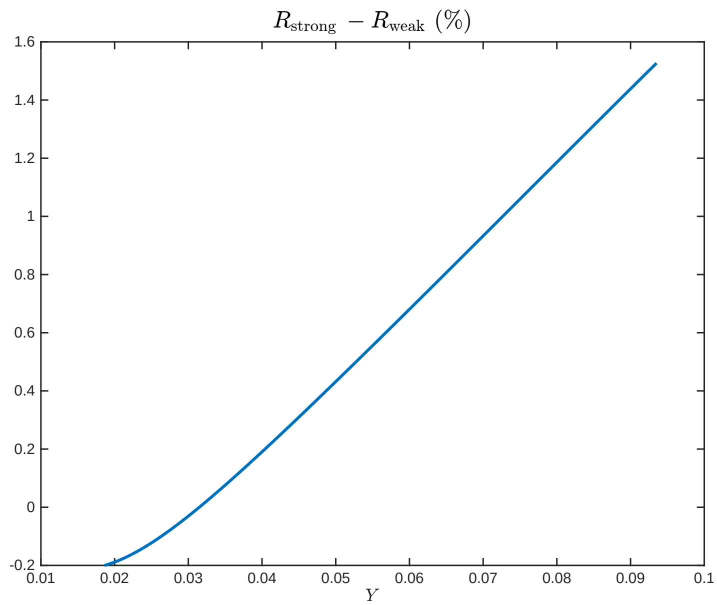
Based on $\text{cov}\left(dB_{xt}, dB_{yt}\right) = \rho_{xy}dt$ and ignoring the higher-order terms of dt, it is easy to show that $r_a = r_f + \gamma_x\rho_{xy}\sigma_y$, $r_g = r_f + \beta_1\gamma_x\rho_{xy}\sigma_y$, and $r_d = r_f + \beta_2\gamma_x\rho_{xy}\sigma_y$. Since $V_s = V_a + V_g + V_d$ and $\frac{dV_s}{V_s} = \frac{dV_a}{V_a}\frac{V_a}{V_s} + \frac{dV_g}{V_g}\frac{V_g}{V_s} + \frac{dV_d}{V_d}\frac{V_d}{V_s}$, it follows that

$$r_s = r_f + \gamma_x\rho_{xy}\sigma_y\left[\left(\frac{V_a}{V_s}\right) + \left(\frac{V_g}{V_s}\right)\beta_1 + \left(\frac{V_d}{V_s}\right)\beta_2\right], \tag{A.12}$$

Because $\beta_1 > 1$ and $\beta_2 < 0$, equation (A.12) implies that the firm's expected stock return increases with V_g/V_s but decreases with V_d/V_s.



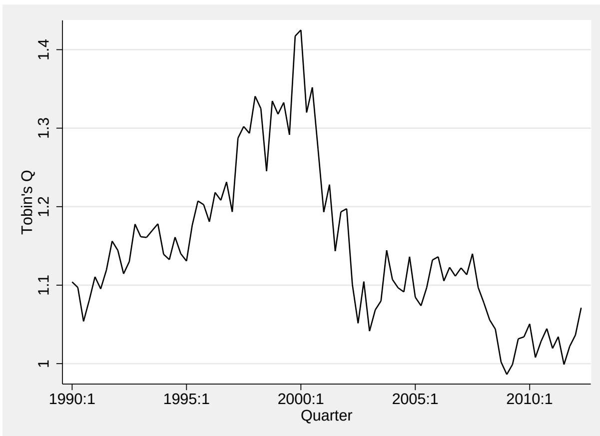
(a) Tobin's Q



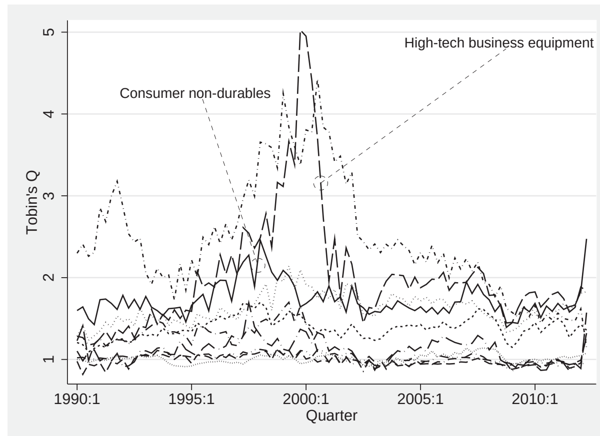
(b) Difference in Expected Return

Figure 1 Numerical Example

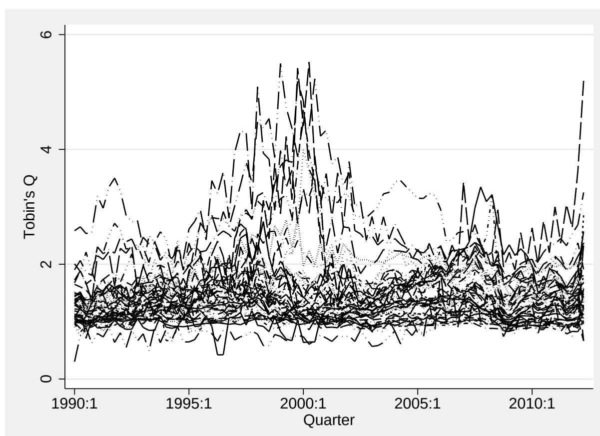
This figure presents the results of a numerical example based on the simple real options model. Panel (a) plots the return differences between firms with strong and weak governance w.r.t. the cash flow rate y. Panel (b) plots the Tobin's Q's of both strongly and weakly governed firms w.r.t. the cash flow rate y.



(a) Aggregate Q



(b) Fama and French 10-Industry Q



(c) Fama and French (1997) 48-Industry Q

Figure 2 : Aggregate and Industry-Specific Tobin's Q

This figure illustrates the dynamics of business conditions. In Panel (a), Q is calculated using all COMPUSTAT/CRSP firms; In Panels (b) and (c), Q is calculated for each industry, while industries are classified following Fama and French (1997) 10- and 48-industry classifications, respectively.

Table 1 : Summary Statistics

This table reports summary statistics of the variables used in the analysis. The variables in Panel A are used in the analysis of stock return of monthly frequency. NASDUM is a dummy variable that equals one if the stock is listed on NASDAQ and zero otherwise; SP500 is a dummy variable that equals one if the stock is included in S&P 500 index and zero otherwise; LNBM is the logarithm of the ratio of book value of common equity of previous fiscal year to market value of common equity at the end of previous calendar year; SIZE is market capitalization in millions of dollars at the end of month $t-2$; PRICE is the stock price at the end of month $t-2$; INST is the percentage of shares held by institutional investors at the end of the previous quarter; NYDVOL is dollar volume of trading in month $t-2$ for stocks that trade on NYSE or AMEX (NYDVOL equals zero if the stock trades on other exchanges); NADVOL is dollar volume of trading in month $t-2$ for stocks that trade on NASDAQ (NADVOL equals zero if the stock trades on other exchanges); YLD is the ratio of dividends in the previous fiscal year on market capitalization at the previous calendar year-end; RET23, RET46, and RET712 are compounded gross returns for months $t-3$ through $t-2$, $t-6$ through $t-4$, and $t-12$ through $t-7$, respectively; and SGROWTH is the five-year sales growth rate. Variables in Panel B are used in the analysis of Tobin's Q of quarterly frequency. Q is market value of assets divided by book value of assets; LNBV is the logarithm of the book value of assets; LNAGE is the logarithm of number of years for which the stock of the company is recorded in CRSP; and DEL is a dummy variable that equals one if the company is incorporated in the State of Delaware and zero otherwise. Panel C reports the distribution of firm-level variations in G(E)-index, defined as the difference between the maximum and minimum values of G(E)-index ($\max_t\{G(E)_{it}\} - \min_t\{G(E)_{it}\}$) of individual firms during the sample period. For each variable, we report its mean, standard deviation (Std. Dev.), the first quartile (25th Percentile), median (50th Percentile), and the third quartile (75th Percentile).

	Panel A: Variables for Stock Return Analysis				
	Mean	Std. Dev.	25th Percentile	50th Percentile	75th Percentile
Stock return (%)	1.25	12.54	−4.82	0.81	6.74
NASDUM	0.32	0.47	0	0	1
SP500	0.24	0.42	0	0	0
LNBM	−0.71	0.81	−1.18	−0.64	−0.18
SIZE	7.06	1.73	5.93	6.93	8.04
PRICE	3.19	0.95	2.72	3.25	3.71
INST (%)	56.99	23.25	39.51	57.33	76.53
NYDVOL	12.29	8.66	0.00	16.58	19.01
NADVOL	5.88	8.65	0.00	0.00	16.58
Yld (%)	1.68	3.05	0.00	0.90	2.36
RET23 (%)	4.61	0.18	4.54	4.62	4.70
RET46 (%)	4.62	0.22	4.53	4.63	4.73
RET712 (%)	4.63	0.30	4.50	4.65	4.79
SGROWTH (%)	255.09	644.56	121.76	161.35	239.72
	Panel B: Variables for Analysis of Tobin's Q				
	Mean	Std. Dev.	25th Percentile	50th Percentile	75th Percentile
Q	1.87	1.87	1.06	1.36	2.02
LNBV	7.10	1.78	5.81	6.94	8.13
LNAGE	2.77	0.81	2.20	2.83	3.33
DEL	0.64	0.48	0	1	1
	Panel C: Variation of Governance Indices over Time				
	Mean	Std. Dev.	25th Percentile	50th Percentile	75th Percentile
$\max_t\{G_{it}\} - \min_t\{G_{it}\}$	1.14	1.40	0	1	2
$\max_t\{E_{it}\} - \min_t\{E_{it}\}$	1.06	1.14	0	1	2

Table 2 : Governance and Stock Return – Characteristic Approach

This table presents the estimated coefficients of the clustered OLS regression $R_{it} = a + \gamma_t + \left(b_{BM}\mathbb{I}_{it}^{BM} + b_{NM}\mathbb{I}_{it}^{NM} + b_{BT}\mathbb{I}_{it}^{BT}\right) \times SG_{it} + cX_{i,t-1} + e_{it}$ using the sample of 1990-2014. For firm i in month t, the dependent variable R_{it} is the industry-median adjusted stock return, γ_t is the time fixed effect, $\mathbb{I}_{it}^{BM}$, $\mathbb{I}_{it}^{NM}$, and $\mathbb{I}_{it}^{BT}$ are dummy variables that indicate whether an industry-quarter is in boom, normal, or bust condition, SG (strong governance) is a dummy variable that equals one (zero) if the firm's governance is strong (weak). X_{it-1} is the set of control variables: NASDUM is a dummy variable that equals one if the stock is listed on NASDAQ and zero otherwise; SP500 is a dummy variable that equals one if the stock is included in S&P 500 index and zero otherwise; LNBM is the logarithm of the ratio of book value of common equity of previous fiscal year to market value of common equity at the end of previous calendar year; SIZE is market capitalization in millions of dollars at the end of month $t-2$; PRICE is the stock price at the end of month $t-2$; INST is the percentage of shares held by institutional investors at the end of the previous quarter; NYDVOL is dollar volume of trading in month $t-2$ for stocks that trade on NYSE or AMEX (NYDVOL equals zero if the stock trades on other exchanges); NADVOL is dollar volume of trading in month $t-2$ for stocks that trade on NASDAQ (NADVOL equals zero if the stock trades on other exchanges); YLD is the ratio of dividends in the previous fiscal year on market capitalization at the previous calendar year-end; RET23, RET46, and RET712 are compounded gross returns for months $t-3$ through $t-2$, $t-6$ through $t-4$, and $t-12$ through $t-7$, respectively. In all regressions, monthly fixed effects are included and variances of error terms are clustered on monthly level. Standard deviations are presented in parentheses. Superscripts ***, **, and *indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	G-Index				E-Index			
	(1) FF10	(2) FF10	(3) FF48	(4) FF48	(5) FF10	(6) FF10	(7) FF48	(8) FF48
SG×$\mathbb{I}^{BM}$	0.88***	0.58**	0.60***	0.40**	0.91***	0.92***	0.76***	0.80***
	(0.28)	(0.23)	(0.23)	(0.20)	(0.29)	(0.25)	(0.26)	(0.25)
SG×$\mathbb{I}^{BT}$	−0.76**	−0.74**	−0.08	−0.57*	−1.00***	−0.90***	−0.40	−0.66**
	(0.34)	(0.35)	(0.36)	(0.32)	(0.26)	(0.30)	(0.26)	(0.27)
SG×$\mathbb{I}^{NM}$	0.06	−0.03	0.12	−0.01	0.09	0.24	0.04	0.16
	(0.15)	(0.15)	(0.16)	(0.14)	(0.14)	(0.17)	(0.16)	(0.17)
NASDUM		0.88		0.68		−1.19		−1.02
		(1.37)		(1.36)		(1.52)		(1.41)
SP500		0.05		0.19		−0.19		−0.13
		(0.18)		(0.18)		(0.15)		(0.15)
LNBM		0.28		0.24		0.08		0.08
		(0.18)		(0.18)		(0.18)		(0.18)
SIZE		−0.24*		−0.25*		−0.17		−0.18
		(0.14)		(0.14)		(0.13)		(0.12)
PRICE		−0.08		−0.13		−0.08		−0.10
		(0.13)		(0.13)		(0.12)		(0.12)
INST		0.00		0.00		0.00		0.00
		(0.00)		(0.00)		(0.00)		(0.00)
NYDVOL		0.22*		0.19*		0.14		0.14
		(0.12)		(0.12)		(0.10)		(0.10)
NADVOL		0.19		0.17		0.21*		0.20*
		(0.14)		(0.13)		(0.13)		(0.12)
YLD		0.03		0.03*		0.04		0.04
		(0.02)		(0.02)		(0.03)		(0.02)
RET23		−2.01*		−2.10*		−1.73		−1.62
		(1.20)		(1.21)		(1.16)		(1.14)
RET46		0.16		0.13		−1.42		−1.36
		(0.68)		(0.67)		(1.11)		(1.08)
RET712		0.62		0.46		0.26		0.21
		(0.48)		(0.48)		(0.49)		(0.48)
SGROWTH		0.00		0.00		0.00*		0.00
		(0.00)		(0.00)		(0.00)		(0.00)
Constant	0.95***	4.42	0.97***	6.40	0.93***	12.68	0.94***	12.31
	(0.09)	(7.67)	(0.09)	(7.65)	(0.06)	(10.14)	(0.06)	(9.98)
R^2	0.03	0.04	0.02	0.03	0.03	0.03	0.03	0.03
Obs.	52,581	40,072	52,581	40,072	62,541	48,522	62,541	48,522

Table 3 : Governance and Stock Return – Portfolio Approach

This table presents the results of the CAPM regression $R_{gt} = \alpha_g + \beta_g R_{MKT,t} + e_{gt}$, where R_{gt} is the value-weighted or equally-weighted return to the governance hedge portfolio that longs strong-(weak-)governance stocks in boom (bust) periods and shorts weak-(strong-)governance stocks in bust (boom) periods, and $R_{MKT,t}$ is the excess return to the market portfolio. In Panel A, the analysis is based on the value-weighted portfolios and in Panel B the analysis is based on the equally-weighted portfolios. When we construct the equally-weighted portfolios, we remove the micro-cap stocks as in Fama and French (2008). Results in columns (1) and (3) and columns (2) and (4) are based on the FF10 and FF48 boom-bust classifications, respectively. Standard deviations are reported in parentheses. Superscripts ***, **, and *indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. Returns are in monthly frequency and are reported in percentage.

	Panel A: Value-Weighted Portfolios			
	G-Index		E-Index	
	(1) FF10	(2) FF48	(3) FF10	(4) FF48
β	0.47***	0.18***	0.49***	0.36***
	(0.07)	(0.06)	(0.09)	(0.07)
α	−0.04	−0.05	0.13	0.21
	(0.32)	(0.29)	(0.40)	(0.32)
R-squared	0.13	0.03	0.11	0.09
Observations	262	262	262	262

	Panel B: Equally-Weighted Portfolios			
	G-Index		E-Index	
	(1) FF10	(2) FF48	(3) FF10	(4) FF48
β	0.44***	0.13**	0.54***	0.24***
	(0.06)	(0.05)	(0.08)	(0.06)
α	0.01	0.11	−0.12	0.05
	(0.28)	(0.23)	(0.35)	(0.27)
R-squared	0.16	0.02	0.15	0.06
Observations	262	262	262	262

Table 4 : Governance and Valuation

This table presents the estimated coefficients of the clustered OLS regression $Q_{it} = a + \gamma_t + (b_{BM}\mathbb{I}_{it}^{BM} + b_{NM}\mathbb{I}_{it}^{NM} + b_{BT}\mathbb{I}_{it}^{BT}) \times SG_{it} + cZ_{i,t-1} + e_{it}$ for the period of 1990-2014. For firm i in quarter t, Q_{it} is the industry-median adjusted Tobin's Q ratio, SG (strong governance) is a dummy variable that equals one (zero) if the firm's governance is strong (weak), γ_t is the time fixed effect, $\mathbb{I}_{it}^{BM}$, $\mathbb{I}_{it}^{NM}$, and $\mathbb{I}_{it}^{BT}$ are dummy variables that indicate whether an industry-quarter is in boom, normal, or bust condition, and Z_{it-1} is the set of control variables, including firm size as the logarithm of the book value of assets (LNBV), firm age as the logarithm of firm years as of December of that year (LNAGE) in CRSP, a dummy variable indicating whether the company is incorporated in the state of Delaware (DEL), and a dummy variable indicating whether the stock is included in the S&P 500 index (SP500). The error term e_{it} is clustered in quarters. Results in columns (1) and (3) and columns (2) and (4) are based on the FF10 and FF48 boom-bust classifications, respectively. Standard deviations are presented in parentheses and returns are in percentage. Superscripts ***, **, and *indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	G-Index				E-Index			
	(1) FF10	(2) FF10	(3) FF48	(4) FF48	(5) FF10	(6) FF10	(7) FF48	(8) FF48
SG×$\mathbb{I}^{BM}$	0.60***	0.48***	0.55***	0.43***	0.70***	0.62***	0.69***	0.62***
	(0.13)	(0.12)	(0.13)	(0.12)	(0.13)	(0.12)	(0.14)	(0.13)
SG×$\mathbb{I}^{BT}$	0.27**	0.04	0.39***	0.16	0.53***	0.36**	0.54***	0.39***
	(0.10)	(0.11)	(0.12)	(0.11)	(0.18)	(0.17)	(0.15)	(0.14)
SG×$\mathbb{I}^{NM}$	0.37***	0.31***	0.37***	0.30***	0.40***	0.40***	0.36***	0.36***
	(0.08)	(0.08)	(0.08)	(0.09)	(0.08)	(0.08)	(0.07)	(0.07)
LNBV		−0.20***		−0.20***		−0.18***		−0.17***
		(0.04)		(0.04)		(0.03)		(0.03)
LNAGE		−0.23***		−0.23***		−0.29***		−0.28***
		(0.07)		(0.07)		(0.06)		(0.06)
DEL		0.10		0.11		−0.02		−0.01
		(0.09)		(0.08)		(0.08)		(0.08)
SP500		0.76***		0.73***		0.68***		0.63***
		(0.12)		(0.12)		(0.09)		(0.09)
Constant	0.17***	2.13***	0.16***	2.09***	0.22***	2.26***	0.20***	2.16***
	(0.04)	(0.27)	(0.04)	(0.27)	(0.03)	(0.24)	(0.03)	(0.23)
R^2	0.04	0.09	0.03	0.09	0.04	0.10	0.04	0.10
Obs.	21,806	21,806	21,806	21,806	25,380	25,380	25,380	25,380

Table 5 : Governance and Exposure to Idiosyncratic Volatility

This table presents the results of the regression of the exposure to idiosyncratic volatility on governance measures. The exposure to idiosyncratic volatility is measured by the beta coefficient (multiplied by 100) of the regression of the logarithm of the gross stock returns on idiosyncratic volatility using the past 36-month wealth of data and is updated annually for the year-end. The idiosyncratic volatility is constructed following Ai and Kiku (2015). SG is a dummy variable that equals one if the firm has strong governance and equals zero if the firm has weak governance, SP500 is a dummy variable that indicates whether the stock is included in S&P 500 index, LNBM is the logarithm of the ratio of book value and market value of firm assets, SIZE is the logarithm of book value of firm assets, and SGROWTH is the sale growth. Columns (1), (2), (5), and (6) are based on FF10 industries and columns (2), (4), (7), and (8) are based on FF48 industries. Standard deviations are presented in the parentheses. Superscripts ***, **, and *indicate statistical significance at 0.01, 0.05, and 0.10, respectively.

	G-Index				E-Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FF10	FF10	FF48	FF48	FF10	FF10	FF48	FF48
SG	0.27**	0.19	0.25**	0.14	0.35***	0.30**	0.39***	0.32**
	(0.12)	(0.14)	(0.13)	(0.14)	(0.11)	(0.13)	(0.11)	(0.13)
SP500		−0.37*		−0.43**		−0.44**		−0.50***
		(0.19)		(0.20)		(0.18)		(0.18)
LNBM		0.06		0.06		−0.02		−0.03
		(0.10)		(0.10)		(0.09)		(0.09)
SIZE		−0.08		−0.07		−0.09*		−0.09*
		(0.06)		(0.06)		(0.05)		(0.05)
SGROWTH		−0.00***		−0.00***		−0.00*		−0.00
		(0.00)		(0.00)		(0.00)		(0.00)
Constant	0.07	0.90**	0.10	0.85**	−0.02	0.74**	−0.04	0.72**
	(0.10)	(0.36)	(0.10)	(0.36)	(0.08)	(0.35)	(0.08)	(0.35)
R^2	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
Obs.	4,439	3,464	4,439	3,464	5,203	4,132	5,203	4,132

Table 6 : Governance and Stock Return – Pre- and Post-2000 Periods

This table presents the estimated coefficients of the same regressions in Table 2 and Table 3 in subsample periods 1990-1999 (in Panel A) and 2000-2014 (in Panel B), respectively. For brevity, only the estimated coefficients of $SG \times \mathbb{I}^{BM}$ and $SG \times \mathbb{I}^{BT}$ are reported and the coefficients of other variables and controls are omitted. The results for the characteristic approach are reported in block *a* and the results for the portfolio approach are reported in blocks *b* (for value-weighted portfolios) and *c* (for equally-weighted portfolios) of each panel. Results in columns (1) and (3) and columns (2) and (4) are based on FF10 and FF48 boom-bust classifications, respectively. Standard deviations are presented in parentheses and returns are in percentage. Superscripts ***, **, and *indicate statistical significance at 0.01, 0.05, and 0.10, respectively.

	Panel A: 1990 – 1999			
	G-Index		E-Index	
	(1) FF10	(2) FF48	(3) FF10	(4) FF48
a. Characteristic Approach				
SG×$\mathbb{I}^{BM}$	0.61	0.75**	1.29***	1.23***
	(0.39)	(0.36)	(0.35)	(0.40)
SG×$\mathbb{I}^{BT}$	−0.89***	−0.69***	−0.66*	−0.41
	(0.31)	(0.26)	(0.34)	(0.31)
b. Value-Weighted Portfolio Approach				
β	0.55***	0.47***	0.59***	0.51***
	(0.12)	(0.10)	(0.14)	(0.12)
α	0.26	0.26	0.68	0.62
	(0.45)	(0.41)	(0.54)	(0.47)
c. Equally-Weighted Portfolio Approach				
β	0.51***	0.38***	0.65***	0.52***
	(0.11)	(0.09)	(0.12)	(0.09)
α	−0.08	−0.15	−0.01	0.17
	(0.43)	(0.35)	(0.45)	(0.36)
	Panel B: 2000 – 2014			
	G-Index		E-Index	
	(1) FF10	(2) FF48	(3) FF10	(4) FF48
a. Characteristic Approach				
SG×$\mathbb{I}^{BM}$	0.61**	0.18	0.42	0.22
	(0.28)	(0.23)	(0.36)	(0.31)
SG×$\mathbb{I}^{BT}$	−0.23	−0.13	−1.40	−0.87
	(1.02)	(0.82)	(1.19)	(0.87)
b. Value-Weighted Portfolio Approach				
β	0.42***	0.03	0.41***	0.27***
	(0.10)	(0.08)	(0.13)	(0.09)
α	−0.31	−0.51	−0.46	−0.22
	(0.46)	(0.40)	(0.58)	(0.44)
c. Equally-Weighted Portfolio Approach				
β	0.41***	0.02	0.46***	0.10
	(0.08)	(0.06)	(0.12)	(0.08)
α	0.03	0.09	−0.32	−0.26
	(0.37)	(0.31)	(0.54)	(0.37)

Table 7 : Governance and Stock Return – Robustness Checks

This table presents robustness checks on the relation between corporate governance and stock return. Panel A presents the estimated coefficients of the same regressions in Table 2 and Table 3 in periods 1985-2014, with backward extension of G-index and E-index from 1990 to 1985. Panel B presents the results based on an alternative definition of strong/weak governance. Specifically, in Panel B, a firm is said to have strong (weak) governance if its G-index/E-index is smaller (greater) than or equal to the 20th (80th) percentile of the index among the firms in the period. For brevity, only the estimated coefficients of $SG \times \mathbb{I}^{BM}$ and $SG \times \mathbb{I}^{BT}$ are reported and the coefficients of other variables and controls are omitted. The results for the characteristic approach are reported in block *a* and the results for the portfolio approach are respectively reported in blocks *b* (for value-weighted portfolios) and *c* (for equally-weighted portfolios) of each panel. Results in columns (1) and (3) and columns (2) and (4) are based on the FF10 and FF48 boom-bust classifications, respectively. Standard deviations are presented in parentheses and returns are in percentage. Superscripts ***, **, and *indicate statistical significance at 0.01, 0.05, and 0.10, respectively.

	Panel A: Extended Sample of 1985-2014			
	G-Index		E-Index	
	(1) FF10	(2) FF48	(3) FF10	(4) FF48
a. Characteristic Approach				
$SG\times\mathbb{I}^{BM}$	0.57***	0.31*	0.78***	0.65***
	(0.22)	(0.18)	(0.23)	(0.23)
$SG\times\mathbb{I}^{BT}$	−0.85***	−0.59***	−0.87***	−0.64***
	(0.24)	(0.22)	(0.23)	(0.21)
b. Value-Weighted Portfolio Approach				
β	0.37***	0.16***	0.43***	0.31***
	(0.06)	(0.05)	(0.07)	(0.06)
α	0.06	0.01	0.08	0.21
	(0.27)	(0.24)	(0.32)	(0.27)
c. Equally-Weighted Portfolio Approach				
β	0.40***	0.17***	0.45***	0.27***
	(0.05)	(0.04)	(0.07)	(0.05)
α	−0.01	0.07	−0.10	0.12
	(0.24)	(0.20)	(0.29)	(0.23)
	Panel B: Alternative Strong/Weak Definition			
	G-Index		E-Index	
	(1) FF10	(2) FF48	(3) FF10	(4) FF48
a. Characteristic Approach				
$SG\times\mathbb{I}^{BM}$	0.42***	0.21**	0.52***	0.32***
	(0.14)	(0.10)	(0.11)	(0.08)
$SG\times\mathbb{I}^{BT}$	−0.63***	−0.44***	−0.66***	−0.55***
	(0.22)	(0.17)	(0.21)	(0.13)
b. Value-Weighted Portfolio Approach				
β	0.15***	0.09***	0.29***	0.18***
	(0.04)	(0.03)	(0.04)	(0.03)
α	0.02	−0.00	0.00	0.12
	(0.17)	(0.14)	(0.17)	(0.15)
c. Equally-Weighted Portfolio Approach				
β	0.21***	0.10***	0.22***	0.11***
	(0.03)	(0.02)	(0.03)	(0.02)
α	−0.02	0.09	−0.03	0.05
	(0.12)	(0.10)	(0.12)	(0.08)