Does Corporate Governance Affect the Cost of Equity Capital? *

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Abstract

Using a dynamic asset pricing model with managerial empire-building incentives, this paper shows that the effect of corporate governance on the cost of equity capital is procyclical. In the model, managers seek private benefits and tend to over-invest. Corporate governance serves as a mechanism for shareholders to discipline managers and control overinvestment. Strongly governed firms deviate less from the optimal investment policies and have a higher value of growth options and higher value of disinvestment options than weakly governed firms. Growth options are riskier and disinvestment options are less risky than assets-in-place. A higher value of growth options, therefore, leads to higher stock returns and a higher value of disinvestment options leads to lower stock returns. The net effect of corporate governance on cross-sectional stock returns depends on the relative importance of growth options and disinvestment options to firm value. Because the value of growth options is larger than the value of disinvestment options during expansion and vice versa during contraction, the model predicts a procyclical relation between corporate governance and stock returns.

JEL Classification: G1; G32; D92; E32.

Keywords: Corporate governance, managerial empire building, stock returns, investment, business cycles.

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1 Introduction

Does corporate governance affect the cost of equity capital? Gompers, Ishii, and Metrick (2003) (GIM) show that firms with stronger corporate governance earn higher average returns from 1990 to 2000. Core, Guay, and Rusticus (2006), however, find that this positive relation between governance and returns is reversed from 2000 to 2003. To reconcile such seemingly conflicting evidence, this paper proposes an investment-based asset pricing model with managerial empire-building incentives. The model shows that the effect of corporate governance on stock returns is procyclical. In particular, strong governance leads to higher stock returns during expansion, but leads to lower stock returns during contraction.

In the model, a manager’s private benefits increase with firm size, which leads to the managerial empire-building incentives. Stronger corporate governance makes expropriating more costly to the manager. The stronger the governance, the less the manager expropriates and overinvests. The model predicts that, on average, a firm with stronger governance has higher market-to-book ratio, higher profitability, and fewer total assets. This is consistent with the evidence documented by GIM.

The paper’s most important insight is that the effect of corporate governance on stock returns depends on the aggregate economic conditions. Due to empire-building incentives, the manager invests more during expansion and disinvests less during contraction. The weaker the governance, the farther the firm’s investment policies deviate from the equity-value-maximizing choices and the less valuable both its growth options and disinvestment options are.

Growth 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, disinvestment options are put options and are less risky than the underlying assets because they give a firm options to scale down production when profits are too low. Because a firm’s value consists of assets-in-place, growth options, and disinvestment options, its beta is a value-
weighted average of the betas of the aforementioned three elements. Therefore, higher value of growth options, relative to the total firm value, leads to higher stock returns, but higher value of disinvestment options leads to lower stock returns, ceteris paribus.

When the effect of growth options dominates the effect of disinvestment options, strong governance leads to higher stock returns. When the effect of disinvestment options dominates the effect of growth options, however, strong governance leads to lower stock returns. The first scenario is more likely to occur during expansion, when the value of a firm consists mainly of its growth options and assets-in-place. The second scenario is more likely to occur during contraction, when a firm’s value consists mainly of its disinvestment options and assets-in-place. This intuition leads to the paper’s main conclusion: corporate governance affects stock return positively during expansion and negatively during contraction. In other words, the effect of corporate governance on the cost of equity capital is procyclical.

This paper uses a real options model to show analytically the qualitative effects of corporate governance on a firm’s investment policies, Tobin’s Q, and stock returns. To show that these effects are important quantitatively, I present a dynamic model with managerial empire-building incentives. The model is solved numerically and calibrated to match the market-to-book ratios of both democracy firms and dictatorship firms, the ratio of total assets of democracy firms to those of dictatorship firms, the investment-to-assets ratio, the cross-sectional volatility of stock returns, and the average ratio of private benefits to firm value. Based on the calibrated model, 1,000 simulated data panels, each with 5,000 firms, are generated to explore the model’s quantitative implications.

The empirical results, averaged across simulated panels, show that the impacts of corporate governance on investment policies, firm value, and cross-sectional stock returns are quantitatively important. Controlling for book-to-market, the average Tobin’s Q of democracy firms is 27% higher than that of dictatorship firms in the model, compared to the 34% that GIM observe. The investment-to-assets ratio of democracy firms is 7.96% lower (versus 6.21% in GIM) while the investment-to-sales ratio of democracy firms is 11.31% lower (versus
The effect of corporate governance on stock returns along business cycles is examined using both the portfolio approach and the Fama-MacBeth cross-sectional regression approach. The state of the economy is classified based on the growth rate of aggregate investments. Within each simulated data panel, the top 30% of months with the highest growth rates are classified as periods of expansion, while the bottom 30% of months with the lowest growth rates are classified as periods of contraction. On average, the returns of governance portfolio, which longs the value-weighted portfolio of democracy firms and shorts the value-weighted portfolio of dictatorship firms, is 0.75% per month ($t$-statistic = 3.22) during expansion and −0.32% per month ($t$-statistic = −1.90) during contraction.

Using the Fama-MacBeth cross-sectional regression approach, monthly returns of individual firms are regressed against the governance dummy, which equals one if the firm is a democracy firm and zero if a dictatorship firm, with the total assets and the sales-to-assets ratio used as the control variables. In the model, governance level, total assets, and the sales-to-assets ratio constitute the set of sufficient statistics for an individual firm. On average, the loading on the governance dummy is 0.26% ($t$-statistic = 1.99) during expansion while the loading is −0.10% ($t$-statistic = −1.16) during contraction. For robustness, the same tests are conducted using the growth rate of aggregate output; the results are qualitatively similar.

In general, the empirical studies using simulated data show that a simple model with managerial empire-building incentives can generate sizable differences in investment intensity and average Tobin’s $Q$ between democracy firms and dictatorship firms. The magnitude of these differences largely matches what is observed in the data. Moreover, the impact of governance on stock returns is shown to be procyclical. The magnitude of its variation along business cycles is significant.

This paper’s main contribution is that it provides a coherent theoretical explanation for both the positive governance effect on stock returns in the 1990s as documented by GIM and
the negative effect in the later period documented by Core, Guay, and Rusticus (2006). The literature has provided some explanations for the positive governance effect in the 1990s, including GIM and Cremers, Nair, and John (2009), among others. None of these studies, however, explains the negative governance effect during the 2000 to 2003 period. Giroud and Mueller (2008) argue that the effect of governance on returns only exists in concentrated industries. They show that the equal-weighted governance portfolio in concentrated industries still earns significantly positive return on average after year 2000. This study shows that the relation between governance and stock returns varies along business cycles. It is not surprising, therefore, that studies with different sample periods produce different results.

This paper is related to Dow, Gorton, and Krishnamurthy (2005), who study the effect of governance on bond pricing and term structure, and Albuquerque and Wang (2008), who study the effect of country-level investor protection on equity risk premium and risk free rate. In diverging from those studies, this paper focuses on the effect of within-country firm-level governance on the cross-sectional stock returns. More importantly, different from Albuquerque and Wang (2008) who show that equity risk premium is positively related to investor protection, this paper argues that the effect of corporate governance could be positive or negative, depending on the economic conditions.

Finally, the paper expands the literature that uses dynamic investment models to study corporate finance issues (e.g., Hennessy and Whited 2005; Hennessy and Whited 2007; Strebulaev 2007; DeMarzo, Fishman, He, and Wang 2009) and cross-sectional stock returns (e.g., Berk, Green, and Naik 1999; Carlson, Fisher, and Giammarino 2004; Zhang 2005). This study contributes to this literature by connecting agency conflicts with cross-sectional stock returns in a dynamic setting.

The remainder of this paper is organized as follows. Section 2 presents a simple real options model to provide intuition on the model’s main conclusions. Section 3 presents and calibrates a dynamic model to generate quantitative results. Section 4 concludes. Appendix A gives the proofs of Lemmas and Propositions and Appendix B provides computational details.
A Simple Real Options Model

This section presents a real options model, following Dixit and Pindyck (1994), to illustrate the impact of corporate governance on firm value, investment policies, and stock returns.

Assume that the Capital Asset Pricing Model (CAPM) holds in the economy and the market price of risk is a constant, defined as $\phi$. Consider a firm with $N$ units of capital and the cash flow $y_t$ generated by each unit of capital at time $t$ follows a Geometric Brownian motion

$$d y_t = \pi y_t d t + \sigma y_t d z_t ,$$

(1)

where $\pi$ is the constant drift, $\sigma$ is the variance parameter, and $d z_t$ is the increment of a standard Wiener process. In addition to assets-in-place, the firm has an option to increase its cash flow to $(N+1)y$ by making a fixed amount of investment $I$. Given that the CAPM holds, the risk-adjusted discount factor for the cash flows generated by the assets-in-place is given by

$$r_y = r_f + \phi \sigma \rho_{ym} ,$$

where $r_f$ is the constant risk-free rate and $\rho_{ym}$ is the coefficient of correlation between cash flow $y$ and the market portfolio, which is assumed to be a positive constant.$^1$

Assume that the firm’s manager receives private benefits that are proportional to the firm’s output, but at a cost that depends on the strength of the firm’s governance. The stronger the firm’s corporate governance, the larger the cost. Albuquerque and Wang (2008) show that if this cost is quadratic in the amount of the private benefits the manager receives, the private benefits that the manager optimally chooses, less the costs imposed by corporate governance, is a constant fraction $\eta$ (hereafter, the extraction ratio) of the firm’s output. Moreover, the stronger the firm’s governance, the smaller the $\eta$. $^2$

$^1$Merton (1990) provides the proof.

$^2$Detailed proof can be found in Albuquerque and Wang (2008). Note that the private benefits in Albuquerque and Wang (2008) reduce the cash flows to shareholders, while the private benefits here are assumed to be non-pecuniary. While the proof still goes through, the amount of private benefits the manager
of suboptimal investment decisions on firms’ stock returns, the manager’s private benefits are assumed to be non-pecuniary, and there is no outright appropriation of cash flows. The reduction in the firm’s value, therefore, comes entirely from the distorted investment policies. Finally, the manager is assumed to own $\alpha$ fraction of the firm.

The model also assumes that the manager and outside shareholders are subject to the same stochastic discount factor, which may not be true for several reasons as studied in Chen, Miao, and Wang (2010). This simplification is made here to emphasize the effects of the manager’s empire-building incentives, in isolation from other agency problems such as compensation with undiversifiable risk. The following proposition is shown to hold under this simple setup. The proof is relegated to Appendix A.

**Proposition 1** The value of the firm $V$ consists of the value of assets-in-place

$$V_a(y_t) = \frac{Ny_t}{r_y - \pi},$$

and the value of the growth option

$$V_g(y_t) = A_1^\alpha(\eta) y_t^{\beta_1}.$$

The investment threshold selected by the manager is calculated as

$$y^* = \frac{\beta_1 I (r_y - \pi)}{(\beta_1 - 1)(1 + \eta/\alpha)}.$$

If we define the average Tobin’s $Q$ of the firm as

$$Q(y_t) = \frac{V_a(y_t) + V_g(y_t)}{V_a(y_t)},$$

obtains, which in Albuquerque and Wang (2008) decreases as the managerial ownership increases, depends only on the strength of governance in this case.
the expected return of the firm is

\[ r_s = r_y + \phi \sigma_{pgm}(\beta_1 - 1) \left[ 1 - \frac{1}{Q(y_t)} \right], \]  

(2)

where \( A^*_1(\eta) \) is a decreasing function of the governance level \( \eta \), and \( \beta_1 \) is a constant larger than one. In particular, firm value \( V \), investment threshold \( y^* \), average Tobin’s \( Q \), and expected return \( r_s \) are lower for firms with weaker governance, ceteris paribus.

The intuition behind Proposition 1 is as follows. The manager receives private benefits proportional to the firm’s cash flows. To materialize cash flows from the growth option sooner, the manager chooses to exercise the option at a lower threshold, which reduces the value of the growth option. As a result, the weaker the firm’s governance, the smaller the fraction of the firm value from the growth option and the smaller the average Tobin’s \( Q \).

The first term in Equation (2) reflects the risk in the cash flows that the firm’s assets-in-place generate. The second term in Equation (2) reflects the increases risk, indicated by the fact that \( \beta_1 \) is larger than one, due to the growth option.\(^3\) A growth option is a call option. It adds value to the firm only when economic conditions are good and is riskier than the underlying assets. The expected return is lower if a smaller fraction of the firm value comes from its growth option; that is, a smaller average Tobin’s \( Q \). The expected return, therefore, is lower for firms with weaker governance.

Next, consider that the same firm instead of having an option to expand, has an option to sell one unit of its installed capital at price \( I \), reducing the cash flow of the firm to \((N-1)y \). The proceeds are split among shareholders according to their share holdings.

**Proposition 2** The value of the firm \( V \) consists of the value of assets-in-place

\[ V_a(y_t) = \frac{N y_t}{r_y - \pi}, \]

\(^3\)The implicit assumption here is that the firm’s cash flow \( y \) is procyclical, which holds for most of the firms in the market.
and the value of the disinvestment option

\[ V_d(y_t) = A^*_2(\eta) \gamma_2. \]

The disinvestment threshold the manager selects is

\[ y^* = \frac{-\beta_2 I(r_y - \pi)}{(1 - \beta_2)(1 + \eta/\alpha)}. \]

If we define the average Tobin’s Q of the firm as

\[ Q(y_t) = \frac{V_a(y_t) + V_d(y_t)}{V_a(y_t)}, \]

the expected return of the firm is given by

\[ r_s = r_y + \phi \sigma \rho_{gm} (\beta_2 - 1) \left[ 1 - \frac{1}{Q(y_t)} \right], \tag{3} \]

where \( A^*_2(\eta) \) is a decreasing function of the governance level \( \eta \) and \( \beta_2 \) is a negative constant. In particular, firm value \( V \), the disinvestment threshold \( y^* \), and average Tobin’s Q are lower, and the expected return \( r_s \) are higher for firms with weaker governance, ceteris paribus.

The intuition behind Proposition 2 is similar to that for Proposition 1. A firm with weaker governance maintains an excess level of capital, indicated by the lower disinvestment threshold, and thus has a lower value of the disinvestment option and a lower average Tobin’s Q. The second term in Equation (3) is the risk deduction, indicated by the negative value of \( \beta_2 \), due to the disinvestment option. Disinvestment option is a put option. It adds value to the firm only when economic conditions are bad and is less risky than the underlying asset. If a firm has a smaller fraction of its value from the disinvestment option; that is, a lower average Tobin’s Q, its expected return is lower. The expected return, therefore, is higher for firms with weaker governance.
In summary, the real options model shows that a firm with strong governance always has a higher average Tobin’s $Q$ than a firm with weak governance. The expected return of a strongly governed firm, however, is higher only when growth options are important part of firm value and lower when disinvestment options are important part of firm value.

Although intuitive, the simple real options model cannot illustrate how important the effects of corporate governance on firm value and stock returns quantitatively. To investigate whether the agency problem of empire-building can generate economically significant reduction on firm value and Tobin’s $Q$ and significant time-series variation in the relation between corporate governance and stock returns, I propose a dynamic asset pricing model and provide quantitative results.

3 The Dynamic Model

The dynamic model is in discrete time and the timeline is as follows. At the beginning of date $t$, a representative firm $j$ employs capital stock $k_{jt}$ as the sole input in production and learns about the aggregate productivity shock $x_t$ and its firm-specific productivity shock $z_{jt}$. Corporate policies are made at the end of date $t$. Firm $j$ is an all-equity firm and no debt issuance is allowed. These assumptions are made in order to create the simplest possible model to illustrate the effects of sub-optimal invest decisions on stock returns. With debt and default, managerial empire-building incentives distort not only investment decisions, but also capital structure decisions, both of which affect the firm’s stock returns. Note that even without leverage, firm value may fall below zero with low productivity, which can be interpreted as firm’s exit from the product market. For simplicity, the calibration parameters are chosen to guarantee a positive firm value. Therefore, there are no entry and exit in the model.

Under the above assumptions, the only corporate decision that firm $j$’s manager makes is the investment decision. Positive cash flows after investment and other costs are distributed to shareholders, and negative cash flows are regarded as equity issuance. The strength of a
firm’s corporate governance, $\eta$, is assumed to remain unchanged over time. This seems to be a reasonable assumption based on the observations in GIM.

### 3.1 The Economic Environment

The production function of firm $j$ at date $t$ is given by

$$y_{jt} = e^{x_{t+1} + z_{jt}} k_{jt}^\nu,$$

where $y_{jt}$ is the output and $\nu$ is the capital-to-output ratio. The production exhibits decreasing returns to scale with respect to capital stock. The aggregate shock, $x_t$, has a stationary and monotone Markov transition function, $Q_x(x_{t+1}|x_t)$, and is given by:

$$x_{t+1} = \bar{x}(1 - \rho_x) + \rho_x x_t + \sigma_x \varepsilon^{x}_{t+1},$$

where $\bar{x}$ is the long-run average, $\rho_x$ is the level of persistence, and $\varepsilon^{x}_{t+1}$ is an i.i.d. standard normal variable. The aggregate shock is the unique source of systematic risk.

In the model, firm-specific productivity shock is the unique source of firm heterogeneity. The firm-specific shock, $z_{jt}$, is uncorrelated across firms and has a common stationary and monotone Markov transition function, $Q_z(z_{jt+1}|z_{jt})$, given by

$$z_{jt+1} = \rho_z z_{jt} + \sigma_z \varepsilon^{z}_{jt+1},$$

where $\rho_z$ is the autocorrelation coefficient and $\varepsilon^{z}_{jt+1}$ is an i.i.d. standard normal variable. $\varepsilon^{z}_{jt+1}$ and $\varepsilon^{x}_{it+1}$ are uncorrelated for any pair $(i, j)$ with $i \neq j$. Moreover, $\varepsilon^{x}_{t+1}$ is independent of $\varepsilon^{z}_{jt+1}$ for all $j$.

Following Zhang (2005), I parameterize the stochastic discount factor $M_{t+1}$ as follows:
\begin{align}
\log M_{t+1} &= \log \beta + \gamma_t (x_t - x_{t+1}) \\
\gamma_t &= \gamma_0 + \gamma_1 (x_t - \bar{x}),
\end{align}

where $1 > \beta > 0$, $\gamma_0 > 0$, and $\gamma_1 < 0$ are constant parameters. The dynamics of $\gamma_t$ delivers a time-varying price of risk, which differs from the real options model discussed previously.

The capital accumulation follows

\begin{equation}
k_{jt+1} = i_{jt} + (1 - \delta)k_{jt},
\end{equation}

where $\delta$ is the rate of capital depreciation. Investments incur quadratic adjustment costs, defined as

\begin{equation}
\Phi_{jt}(i, k) = \frac{a}{2} \left( \frac{i_{jt}}{k_{jt}} \right)^2 k_{jt},
\end{equation}

where $a$ is a positive constant. In the remainder of this paper, I will solve a representative firm’s optimization problem. To simplify notations, I drop the index $j$ when it does not cause confusion.

### 3.2 Optimal Managerial Decisions

In the first-best scenario, the manager maximizes the shareholders’ value by investing optimally. The firm’s cash flow at date $t$ is given by

\begin{equation}
\pi_t = y_t - i_t - \Phi(i_t, k_t).
\end{equation}

The firm value under this first-best scenario can be calculated through the iteration of the following Bellman equation:

\begin{equation}
V^{FB}(k_t, x_t, z_t) = \max_{\{i_t, k_{t+1}\}} \left\{ \pi_t + \mathbb{E}_t[M_{t+1}V^{FB}(k_{t+1}, x_{t+1}, z_{t+1})] \right\},
\end{equation}
subject to the capital accumulation of Equation (9). The following Lemma describes the manager’s investment decision.

**Lemma 1** The first-best investment $i^{FB}_t$ is given as

$$1 + a \left( \frac{i^{FB}_t}{k_t} \right) = \mathbb{E}_t \left[ M_{t+1} \left\{ y_{k,t+1} - \Phi_{k,t+1} + q_{t+1} (1 - \delta) \right\} \right],$$

where $q_{t+1}$ is the shadow price of the capital at time $t + 1$ and $y_{k,t+1}$ and $\Phi_{k,t+1}$ are the first order derivative of sales $y_{t+1}$ and investment adjustment cost $\Phi_{t+1}$ w.r.t. $k_{t+1}$, respectively.

The intuition for Lemma 1 is straightforward. The left side of Equation (13) is the marginal cost of one more unit of investment, with the second term being the marginal investment adjustment cost. The right side of Equation (13) is the marginal benefit of one more unit of investment made at time $t$. The first term is the marginal increase in profits; the second term is the marginal reduction in investment adjustment costs; and the last term is the value of the undepreciated capital at time $t + 1$. At the first-best investment level, the marginal cost equals the marginal benefit.

Next, I analyze the firm’s investment policy in the presence of private benefits. As noted, the entrenched manager owns $\alpha$ fraction of the firm and extracts non-pecuniary private benefits. Specifically, the monetary equivalent of the manager’s private benefits is $\eta$ per unit of output. The per-share monetary-equivalent cash flow to the manager is given by:

$$\pi^m_t = \pi_t + \eta y_t / \alpha,$$  

where the second term in Equation (14) refers to the private benefits.

Assume that the manager makes investment decisions. The maximization problem the manager faces can be written as

$$V^m(k_t, x_t, z_t) = \max_{\{i_t, k_{t+1}\}} \left\{ \pi^m_t + \mathbb{E}_t [M_{t+1} V^m(k_{t+1}, x_{t+1}, z_{t+1})] \right\}.$$
subject to the capital accumulation constraint of Equation (9). $V^m$ refers to the value of the firm to the manager. The firm value is given by

$$V(k_t, x_t, z_t | k_{t+1}^{SB}) = \pi_t^* + \mathbb{E}_t[M_{t+1}V(k_{t+1}^{SB}, x_{t+1}, z_{t+1} | k_{t+2}^{SB})],$$

(16)

where $k^{SB}$ is the capital level chosen by the manager and “SB” stands for “second-best”. As assumed in the real options model, the manager and outside shareholders are subject to the same stochastic discount factor. The following Lemma describes the investment decision the manager makes.

**Lemma 2** The investment the manager chooses, $i_t^{SB}$, satisfies the following equality:

$$1 + a \left( \frac{i_t^{SB}}{k_t} \right) = \mathbb{E}_t \left[ M_{t+1} \left\{ \left( 1 + \frac{\eta}{\alpha} \right) y_{k,t+1} - \Phi_{k,t+1} + q_{t+1}(1 - \delta) \right\} \right],$$

(17)

where $y_{k,t+1}$ and $\Phi_{k,t+1}$ follow the same definitions as presented in Lemma 1. The shadow price, $q_{t+1}$, is the value of one unit of capital to the manager at time $t+1$, but not to outside shareholders.

Compared to Equation (13), the marginal profit at $t+1$ has an extra term: the marginal private benefits, $\eta y_{k,t+1}/\alpha$. The weaker the corporate governance, the larger the marginal private benefit of investment. Because the firm has an infinite horizon and is forward-looking, it is not straightforward whether under weaker governance, the manager will invest more due to larger marginal private benefits. The total marginal benefits, that is, the right side of Equation (17), also depend on the firm’s future asset levels and the future shadow price of capital. Both of these values vary with the level of corporate governance and the investment decision. More importantly, as the firm invests more today and has a higher asset level in the future, the shadow price of capital decreases due to the decreasing returns to scale, leading to less incentives to invest. Appendix A shows analytically that the private benefit effect dominates other effects, and that firms with stronger governance have higher
investment-to-assets ratios than firms with weaker governance, \textit{ceteris paribus}.

\textbf{Proposition 3} The investment-to-assets ratio decreases with the strength of corporate governance, \textit{ceteris paribus}.

Next, I solve the model numerically and use simulated data to illustrate the quantitative effects of corporate governance on a firm’s investments, Tobin’s Q, and stock returns.

\subsection{3.3 Calibration and Quantitative Results}

I solve the model numerically using the value function iteration method. Details are provided in Appendix B. I calibrate 13 parameters ($\nu, \beta, \gamma_0, \gamma_1, \rho_x, \sigma_x, \rho_z, \sigma_z, \delta, \bar{x}, a, \alpha, \eta$) in monthly frequency as follows. The capital share $\nu$ is set at 70\%, close to the estimates in Hennessy and Whited (2007). I follow Zhang (2005) and choose $\beta = 0.994$, $\gamma_0 = 50$, $\gamma_1 = -1,000$ to generate the mean and volatility of the real interest rate of 2.2\% and 2.9\% per annum, respectively, and the average Sharpe ratio of 0.41. All of these values are close to the empirical estimates in Campbell and Cochrane (1999) and Campbell, Lo, and MacKinlay (1997). The values of $\rho_x$ and $\sigma_x$ are set at 0.983 and 0.0023, taken from Cooley and Prescott (1995). Following Li, Livdan, and Zhang (2009), I choose $\rho_z = 0.97$ and $\sigma_z = 0.10$, which delivers an average cross-sectional volatility of individual stock returns of 28.26\% annually, close to the 25\% reported by Campbell, Lettau, Malkiel, and Xu (2001) and the 32\% reported by Vuolteenaho (2001). The depreciation rate $\delta$ is set at 1\% to match the 12\% annual rate estimated by Cooper and Haltiwanger (2006). The long-run average level of the aggregate productivity $\bar{x}$ is a pure scaling factor. Its value is chosen so that no firm exits at the calibrated parameter values and the firm’s capital lies well within the range of the grid points.

For the governance level, I calibrate ten categories of firms, following GIM, and assign an index $G$ with a value from one to ten to each category. Each category has 500 firms such that there are 5,000 firms in each simulated data panel. Firms with $G$ equal to one are
democracy firms and firms with $G$ equal to ten are dictatorship firms. Core, Holthausen, and Larker (1999) show that the mean and median of CEO stock ownership are 1.5% and 0.1%, respectively. I thus fix the managerial ownership $\alpha$ at 1% for every firm. The adjustment cost parameter $\alpha$ is chosen to be 15 so that the average market-to-book ratio of the democracy firms is 1.98, the same as what John and Litov (2010) document. The extraction ratios of the ten categories of firms are uniformly distributed between zero and $\eta^*$, with zero for democracy firms and $\eta^*$ for dictatorship firms. I set the value of $\eta^*$ at 0.25% to deliver an average market-to-book ratio of 1.52 for dictatorship firms, close to the 1.53 documented by John and Litov (2010).

Panels A in Table 1 presents the parameters of the calibrated model. I simulate the model using the value function and optimal investment policy to create 1,000 artificial data panels, each with 5,000 firms and 10,600 months of observations. To ensure that the simulated economy has reached the steady state, only the last 480 months in each panel is used for empirical tests. Panel B in Table 1 compares simulated moments with real moments for the market-to-book ratios (that is, $E_t/k_t$), the investment-to-assets ratios (that is, $i_t/k_t$), the total assets (that is, $k_t$) scaled by the average total assets of the democracy firms, and the private-benefits-to-firm-value ratio (that is, $(V^m - V)/V$). The market-to-book ratios of both the democracy firms and the dictatorship firms, as well as the average total assets of the dictatorship firms scaled by that of the democracy firms in real data are taken from John and Litov (2010).

I also compare the model implied magnitude of private benefits with the empirical estimates. In the model, managers values the stock on average 16.6% more than outside shareholders, with the premium being 33.8% for managers of dictatorship firms. Using structural estimation, Albuquerque and Schroth (2010) show that private benefits represent 10% of the total block value for the block holders, smaller than what the model implies. Their study, however, only considers block holders with ownership greater than 10%, while the manager in my model owns only 1% of the firm. Due to the incentive alignment effect, lower owner-
ship leads to a higher incentive of appropriation and larger private benefits. The magnitude of the private benefits in the model, therefore, seems to be within the reasonable range.

In general, all the moments are matched reasonably well, and on average, dictatorship firms have lower market-to-book ratio and larger amount of capital. I next investigate the quantitative effects of corporate governance on Tobin’s Q, investments, and stock returns using the calibrated model.

### 3.3.1 Governance and Firm Value

GIM, among others, document the positive relation between corporate governance and firm value, proxied by Tobin’s Q. I apply their approach on the simulated data and estimate the following cross-sectional regression

\[
Q_{jt} = a_t + b_{1t} G_{jt} + b_{2t} \log(BA_{jt}) + e_{jt},
\]

where \(Q_{jt}\) is the Tobin’s Q of firm \(j\) at year \(t\), measured as the market value of assets divided by the book value of assets, that is, \(\frac{E_{jt}}{k_{jt}}\); \(G_{jt}\) is the governance dummy, which equals one for the democracy firms and zero for the dictatorship firms; and \(\log(BA_{jt})\) is the log of the book value of assets, used as the control variable.\(^4\) Using the Fama and MacBeth (1973) approach, I run the cross-sectional regressions annually. The regression coefficients are reported as the time-series averages and \(t\)-statistics are calculated using the time-series standard errors.

Panel A in Table 2 compares the cross-simulation averages of the coefficients and the corresponding \(t\)-statistics with those reported in Table VIII of GIM. Consistent with what GIM document, the simulated data shows a positive and significant coefficient on the governance dummy, which captures the difference in the market-to-book ratios of democracy firms and dictatorship firms. The magnitude of this coefficient is 0.27 (\(t\)-statistic = 7.23),

---

\(^4\)GIM include a dummy variable for Delaware firms, a dummy for S&P 500 firms, and the log of firm age as control variables, in addition to the log of the book value of assets. However, there are no counterparts in the model for the first two variables. As for firm age, all firms have the same age because there are no entry and exit in the model.
while the empirical value from GIM is 0.34 \((t\text{-statistic} = 8.38)\). The simulated distribution for the coefficient of the governance dummy is plotted in Figure 1 Panel A. The simulated distribution allows us to calculate the \(p\)-value of a certain empirical variable by counting the number of simulations with the value of this variable higher than the empirical value. The \(p\)-values for the coefficient of the governance dummy is 23.2\%, indicating that the coefficient from the real data is well within the simulated distribution. The calibrated model is able to generates, therefore, the positive relation between corporate governance and the Tobin’s \(Q\). More importantly, the magnitude of the governance’s effect on Tobin’s \(Q\) is largely consistent with what is observed in the real data.

### 3.3.2 Corporate Governance and Capital Expenditure

GIM document a negative relation between corporate governance and industry adjusted capital expenditure (CAPEX, proxy for investments), scaled by either total assets or sales. I follow their approach and estimate the following regression equation

\[
INV_{jt} = a_t + b_1 tG_{jt} + b_2 t \log BTM_{jt} + e_{jt},
\]

where \(INV_{jt}\) is firm \(j\)’s investments at year \(t\) scaled by either total assets (that is, \(i_{jt}/k_{jt}\)) or sales (that is, \(i_{jt}/y_{jt}\)) and net of the sample mean. The log of the book-to-market ratio (that is, \(\log BTM_{jt}\)) is used as the control variable. Equation (18) is estimated in the Fama-MacBeth fashion. The coefficient on the governance dummy reported in Panel B of Table 2 is the time-series average. The \(t\)-statistic is calculated using the time-series standard error.

For comparison, Table 2 also includes the regression results reported in GIM under the column labeled Data. The simulated data shows the same negative relation between governance and investment rate. In the model, dictatorship firms invest 7.99\% \((t\text{-statistic} = 6.33)\) more, if investments are scaled by assets, and 11.05\% \((t\text{-statistic} = 5.01)\) more, if investments are scaled by sales, than democracy firms. The corresponding estimates from
the real data are 6.21% \( (t\text{-statistic} = 4.06) \) and 5.23% \( (t\text{-statistic} = 3.71) \), documented by GIM. In general, the model generates a larger difference in investment rates (measured by either \( i_{jt}/k_{jt} \) or \( i_{jt}/y_{jt} \)) between the democracy firms and the dictatorship firms than what is observed in the real data. This discrepancy between simulated data and real data may be partially explained by the fact that CAPEX is used in GIM as the proxy for investments, which does not take into account acquisitions. Because dictatorship firms on average make more acquisitions (see Table XI in GIM), the actual difference in investments, which include both CAPEX and acquisitions, made by dictatorship firms and by democracy firms is larger than the difference in CAPEX.

Panels B and C in Figure 1 present the simulated distributions for the coefficients of the governance dummy using total assets and sales to scale capital expenditure, respectively. In both panels, the empirical coefficient estimate of the governance dummy falls in the right tail of the simulated distribution with the \( p \)-value being 26% and 20.4%, respectively. The simulated data, therefore, supports the model’s prediction that democracy firms invest more than the dictatorship firms on average and the magnitude of the difference is largely consistent with what is observed in the real data.

### 3.4 Corporate Governance and Stock Returns

Two empirical strategies are implemented to examine the relation between corporate governance and stock returns along business cycles: the portfolio approach and the Fama-MacBeth cross-sectional regression approach. Before presenting the details of the empirical tests, we first need to define the periods of expansion and the periods of contraction properly. To be consistent with the theory, periods of expansion are periods when firms have abundant investment opportunities and the economy is growing. On the contrary, periods of contraction are periods when firms have abundant disinvestment options and the economy is shrinking. Based on this interpretation, the following two indicators seem appropriate: aggregate investment growth rate (that is, \( g^I_t \)) and aggregate output growth.
rate (that is, $g_t^Y$), measured as

\[
    g_t^I = \frac{\sum_{j=1}^{N} i_{jt}}{\sum_{j=1}^{N} i_{jt-1}},
    \quad g_t^Y = \frac{\sum_{j=1}^{N} y_{jt}}{\sum_{j=1}^{N} y_{jt-1}},
\]

where $i_{jt}$ is the investment made by firm $j$ in month $t$ and $y_{jt}$ is its output in month $t$. Investment growth rate is a direct measure of changes in investment opportunities, presumably the ideal indicator for our purpose here. Output growth rate is analogous to the GDP growth rate, which is commonly used in empirical studies to date business cycles (e.g., Hamilton 1989). For robustness reason, empirical exercises in this section are implemented using both indicators.

Note that the aggregate productivity shock (that is, $x_t$), which is known in the simulated data, is not an appropriate indicator to classify expansion and contraction. The productivity shock tells us the current state of the economy relative to its long-run mean, but cannot tell us where the economy is heading. For example, with the same level of productivity, the economy is equally likely to be either at the beginning of an expansion or at the end of the expansion. The impact of corporate governance on stock returns, however, are totally opposite in these two stages of the economy, as predicted by the model.

**Portfolio approach.** – The portfolio approach studies the stock returns of the governance portfolio, which longs the value-weighted portfolio of democracy firms and shorts the value-weighted portfolio of dictatorship firms. In addition to investigating the average returns of the governance portfolio along business cycles, I follow the literature and estimate the following risk-factor model

\[
    R_t = \alpha + X_t \beta,
\]

where, for month $t$, $R_t$ is the return of the governance portfolio and $X_t$ is the vector of risk factors. The intercept and the vector of risk factor loadings are $\alpha$ and $\beta$, respectively. The
vector of risk factors varies with the specific asset pricing model. For the Capital Asset Pricing Model (CAPM), \( X_t \) consists of the market factor \((MKT_t)\), measured as the value-weighted market return minus the risk-free rate in month \( t \). For the Fama-French (FF) three-factor model, \( X_t \) includes the size factor \((SMB_t)\) and the value factor \((HML_t)\), in addition to \( MKT_t \). For the Carhart four-factor model, \( X_t \) includes the momentum factor \((UMD_t)\) in addition to the FF three factors.\(^5\)

Table 3 presents the averages of \( \alpha \) and \( \beta \) across 1,000 simulated panels. The cross-simulation \( t \)-statistics are reported in parentheses beneath the corresponding coefficients. Panels A, B, and C present the results using the full sample, the periods of expansion only, and the periods of contraction only, respectively. Month \( t \) is classified as “expansion” if \( g_t \) is among the top 30% investment growth rates of all months in the same panel while month \( t \) is classified as “contraction” if \( g_t \) is among the bottom 30% investment growth rates of all months in the same panel.

The first data column of each panel in Table 3 reports the average returns of the governance portfolio. For the full sample, the democracy firms earn on average 0.12\% \((t\text{-statistic } = 3.94)\) higher return per month than the dictatorship firms. The democracy firms earn on average 0.75\% \((t\text{-statistic } = 3.22)\) higher return per month during periods of expansion and 0.32\% \((t\text{-statistic } = 1.90)\) lower return per month during periods of contraction, than the dictatorship firms do. The simulated distributions of the average returns of the governance portfolio in the full sample, during periods of expansion, and during periods of contraction are plotted in Panels A, B, and C of Figure 2, respectively. The simulated results show that the effect of corporate governance on stock returns is procyclical, and that the magnitude of this effect is economically significant.

In addition to the procyclical effect of governance on stock returns, several other patterns are observed in the simulated data and are worth mentioning. First, across all data peri-

\(^5\)The details on the construction of the \( SMB_t, HML_t, \) and \( UMD_t \) are available on the website of Kenneth French.
ods, the effect of corporate governance on stock returns is on average positive, albeit with a much smaller magnitude than the effect during expansion. This finding shows that the agency problem of empire-building is more severe during expansion than during contraction. One possible explanation is that the bad economic situation during contraction serves as an additional monitoring mechanism. Managers deviate less from the optimal disinvestment policy to avoid exit.

Second, the risk factor loadings of $RMRF_t$, $SMB_t$, and $HML_t$ are significantly different from zero in the simulated data. The model used in this paper is a one-factor model with only one aggregate risk: the aggregate productivity shock. In theory, the market factor should be the only risk factor that determines asset returns. The non-zero loadings of the FF risk factors are due to the following misspecification errors of the factor regression model. First, the factor loadings are functions of a firm’s state variables (i.e., capital level and productivity shock), which varies across time. In the factor regression approach, however, the loadings of the risk factors are fixed for the entire sample period. Second, in a model with a non-linear production function and non-linear investment adjustment costs (as in this paper), the relation between stock returns and risk factors is also non-linear, but is assumed to be linear in the factor regression approach. Due to the aforementioned two misspecifications, the loadings on the FF risk factors in the risk factor regressions are significantly non-zero.

Third, GIM document that the intercepts in the risk factor regressions are significantly different from zero, while all the intercepts in the simulated data are not significantly different from zero. Admittedly, the model presented here is a much simplified version of the real world. There is only one aggregate risk factor and one agency problem, empire-building, in the model. The existence of non-zero intercepts in the GIM study could be due to omitted risk factors or other agency problems unrelated to anti-takeover, which is the measure of governance that GIM use.

The same empirical exercise is repeated using output growth rate as the indicator for business cycles and the results are reported in Table 4. Panels A, B, and C present the
results using the full sample, the periods of expansion only, and the periods of contraction only, respectively. Month $t$ is classified as “expansion” if $g_t^Y$ is among the top 30% output growth rates of all months in the same panel; month $t$ is classified as “contraction” if $g_t^Y$ is among the bottom 30% output growth rates of all months in the same panel.

The results shown in Table 4 are similar with those using investment growth rate as the indicator for business cycles but with smaller magnitude: the democracy firms earn on average 0.40% ($t$-statistic = 6.71) higher returns per month during periods of expansion, but earn 0.15% ($t$-statistic = 2.37) lower returns per month during periods of contraction compared to the dictatorship firms. The simulated distributions of the average returns of the governance portfolio in the full sample, during periods of expansion, and during periods of contraction are plotted in Panels A, B, and C of Figure 3, respectively.

In summary, the results from the portfolio approach strongly support the prediction that the relation between governance strength and stock returns is positive during expansion and negative during contraction, using either investment growth rate or output growth rate as the business cycle indicator.

**Fama-MacBeth approach.** – The Fama-MacBeth approach studies the effect of corporate governance on stock returns, while controlling for other firm characteristics. For each month $t$, the following cross-sectional return regression is estimated

$$r_{jt} = \alpha_t + \beta_t G_{jt} + \gamma_t Z_{jt}' + e_{jt},$$

where, for firm $j$, $r_{jt}$ is the stock return, $Z_{jt}$ is a vector of firm characteristics, and $G_{jt}$ is the governance dummy that equals one if firm $j$ is a democracy firm and equals zero if firm $j$ is a dictatorship firm. The coefficient $\beta_t$, therefore, represents the cross-sectional average of stock returns between the democracy firms and the dictatorship firms in month $t$. For firm characteristics $Z_t$, I choose total assets (that is, $k_t$) and sales-to-assets ratio (that is, $e^{x_t+z_t}k_t^a/k_t$). In the model, every aspect of a firm, including its stock returns, is determined
by its state variables \((k_t, x_t, z_t)\) and its governance quality \(\eta\). Therefore, \(k_t, e^{x_t+z_t} k_t^\alpha / k_t\), and the governance dummy fully describe the firm’s characteristics, given the aggregate productivity shock \(x_t\). For each panel, the mean of the monthly estimates of the coefficients are used to quantify the effects of corporate governance and firm characteristics on stock returns. The corresponding \(t\)-statistics are calculated based on the associated time-series standard errors.

Table 5 presents the cross-simulation average of the coefficients and the associated \(t\)-statistics (in parentheses) in the Fama-MacBeth regression. Panel A reports the results using the full sample. Similar with what the portfolio approach shows, the effect of corporate governance on stock returns is overall positive, averaging across different states of the economy. The magnitude of the effect, however, is marginal, controlling for other firm characteristics. The coefficient of the governance dummy is 0.04 \((t\)-statistic = 2.57\), indicating a positive 0.04\% return difference per month between the democracy firms and the dictatorship firms.

Panel B in Table 5 reports the results of the Fama-MacBeth regression for the subsamples of expansion and contraction, using \(g^I\) as the business cycle indicator. Controlling for total assets and the sales-to-assets ratio, governance strength still has a significantly positive effect on stock returns during periods of expansion. The coefficient of the governance dummy is 0.26 \((t\)-statistic = 1.99\), indicating a positive 0.26\% return difference per month between the democracy firms and the dictatorship firms. During periods of recession, governance strength has a negative effect on stock returns. The coefficient of the governance dummy is -0.10 \((t\)-statistic = -1.16\), indicating a negative 0.10\% return difference per month between the democracy firms and the dictatorship firms. Figure 4 illustrates the simulated sample statistics of the governance dummy coefficient. Panels A, B, and C plot the simulated distributions of this coefficient in the full sample, during periods of expansion, and during periods of contraction, respectively. Overall, the effect of governance on stock returns is procyclical and the variation between expansion and contraction is 0.36\% per month, controlling for other firm characteristics.

Panel C in Table 5 presents the Fama-MacBeth regression results, using \(g^Y\) as the business
cycle indicator. Consistent with what is shown in Panel B, the effect of governance strength on stock returns is procyclical, but with a smaller variation along business cycles. During periods of expansion, the coefficient of the governance dummy is 0.12 ($t$-statistic = 2.08), indicating a positive 0.12% return difference per month between the democracy firms and the dictatorship firms. The coefficient of the governance dummy is −0.06 ($t$-statistic = −1.27) during periods of contraction, indicating a negative 0.06% return difference per month between democracy firms and dictatorship firms. Figure 5 illustrates the simulated sample statistics of the governance dummy coefficient. Panels A, B, and C plot its simulated distributions in the full sample, during periods of expansion, and during periods of contraction, respectively. Overall, the effect of governance on stock returns is procyclical and the variation between expansion and contraction is 0.18% per month, controlling for other firm characteristics.

To summarize, both the portfolio approach and the Fama-MacBeth regression approach provide strong support to the prediction of the model that the relation between corporate governance and stock returns is procyclical and the time-series variation of this effect is economically significant.

4 Conclusion

The paper provides a theoretical explanation for the documented link between corporate governance and firm size, market-to-book ratio, and cross-sectional stock returns. I show that firms with weak governance overinvest due to rent-extraction by managers. Consequently, such firms tend to be larger and have lower market-to-book ratios.

Most importantly, this paper proposes that the effect of corporate governance on stock returns is procyclical due to overinvestment. Firms with weaker governance have lower values of both growth options and disinvestment options due to their suboptimal investment policies. Because growth options are riskier and disinvestment options are less risky than assets-in-place, the net effect of corporate governance on stock returns is positive during ex-
pansion and negative during contraction. In other words, the effect of corporate governance on stock returns is procyclical.

The simulated data shows that in a model with one aggregate risk factor and empire-building as the only agency problem, average stock returns of the governance portfolio vary from $-4\%$ per annum during contraction to $9\%$ per annum during expansion along business cycles. The results suggest that empirical studies on the relation between corporate governance and cross-sectional stock returns using different data samples may generate opposite results.
References


Appendix

A Proofs

Proof of Proposition 1: Given that the CAPM holds in the model, the risk adjusted discount rate for the assets whose cash flow follows the Brownian motion described in Equation (1), is given by

\[ r_y = r_f + \phi \sigma \rho_{gm}, \]

where both the risk free rate \( r_f \) and the price of risk \( \phi \) are assumed to be constant. If the current cash flow is \( y_t \), the value of the assets at time \( t \) is given by \( y_t / \mu \), where

\[ \mu = r_y - \pi. \]

After the investment is made, the newly installed capital generates cash flow \( y_t \) to the firm’s outside shareholders at time \( t \). For the manager, it generate additional \( \eta y_t \) private benefits. Because the manager and outside shareholders are assumed to face the same discount factor, the value of the newly installed capital is

\[ V^s(y_t) = \frac{y_t}{\mu} \]

for the outside shareholders and is

\[ V^m(y_t) = (1 + \eta/\alpha) \frac{y_t}{\mu} \]

for the manager per share of firm ownership. Note that once the investment option is exercised and materialized into assets-in-place, firms with different governance strengths have the same beta, because there is are more growth options and the riskiness of the firm is the riskiness of the assets. The impact of governance on beta derives from its impact on
the timing of exercising the investment option, as is shown next. Going forward, the time subscript $t$ is omitted to simplify notations.

The value of the investment option per share is defined as $F^m(y)$ for the manager and $F^s(y)$ for outside shareholders. The manager will exercise the option optimally to maximize her option value, which is not the first-best decision for outside shareholders. Because the cash flow generated from the asset to the manager, once the investment is made, is a linear multiplication $(1 + \eta/\alpha)$ of the cash flow to outside shareholders, both $F^s(y)$ and $F^m(y)$ satisfy the same ordinary differential equation (ODE) with homogeneity of degree one:

$$
\frac{1}{2} \sigma^2 y^2 F''(y) + (r_f - \mu) y F'(y) - r_f F(y) = 0.
$$

The difference in the option value to the manager and to outside shareholders results from the difference in boundary conditions. The general solution of the above ODE is

$$
F(y) = A_1 y^{\beta_1} + A_2 y^{\beta_2},
$$

where $A_1$ and $A_2$ are constants determined by the boundary conditions and $\beta_1 > 1$ and $\beta_2 < 0$ are the two roots of the quadratic function

$$
\frac{1}{2} \sigma^2 \beta (\beta - 1) + (r_f - \mu) \beta - r = 0.
$$

Next, define $y^*$ as the exercise price. The value of the investment option to the manager before investment cost $I$ at $y^*$ is given by

$$
V^m(y^*) = (1 + \eta/\alpha) \frac{y^*}{\mu}, \quad (A1)
$$

where $\eta$ is larger than zero, indicating that the investment brings larger value to the manager than it does to outside shareholders. To determine the value of $A_1^m$, $A_2^m$, and the price $y^*$ at
which the option is exercised, we need three boundary conditions:

\[ F^m(y = 0) = 0 \]  \hspace{1cm} (A2)

\[ F^m(y^*) = V^m(y^*) - I \]  \hspace{1cm} (A3)

\[ F_y^m(y^*) = V_y^m(y^*) , \]  \hspace{1cm} (A4)

where \( F_y^m \) and \( V_y^m \) are the first-order derivatives of \( F^m \) and \( V^m \) with respect to \( y \), respectively. Equation (A3) is the value-matching condition, which requires that the value of the option equals the net value obtained by exercising it. Equation (A4) is the smooth pasting condition, which is satisfied when the manager chooses \( y^* \) to maximize her option value. With these three boundary conditions, we can solve for \( A_1^m, A_2^m, \) and \( y^* \):

\[ y^* = \frac{\beta_1 \mu I}{(1 + \eta/\alpha) (\beta_1 - 1)} \]  \hspace{1cm} (A5)

\[ A_1^m = \left( \frac{I}{\beta_1 - 1} \right)^{1-\beta_1} \left( \frac{1 + \eta/\alpha}{\mu \beta_1} \right)^{\beta_1} \]  \hspace{1cm} (A6)

\[ A_2^m = 0 . \]  \hspace{1cm} (A7)

It is clear that \( y^* \) is a decreasing function of \( \eta \), indicating that the entrenched manager tends to exercise the investment option earlier than the first best decision where \( \eta \) is zero.

Knowing the exercising price \( y^* \), we can solve the option value for outside shareholders. Because the manager does not exercise the option to maximize outside shareholders’ value, the smooth pasting condition is not satisfied here. The boundary conditions for outside shareholders are

\[ F^s(y = 0) = 0 \]  \hspace{1cm} (A8)

\[ F^s(y^*) = V^s(y^*) - I , \]  \hspace{1cm} (A9)
where the per share present value of future cash flows $V^*(y^*)$ is given by

$$V^*(y^*) = \frac{y^*}{\mu}.$$  

because the manager does not share her private benefits with the outside shareholders. Substitute the value of $y^*$ that we get from solving the manager’s maximization problem, we get

$$A_1^s(\eta) = \left( \frac{\beta_1 I}{\beta_1 - 1} \right)^{1-\beta_1} \left( \frac{1}{1 + \eta/\alpha} - \frac{\beta_1 - 1}{\beta_1} \right) [\mu(1 + \eta/\alpha)]^{-\beta_1}$$  

$$A_2^s = 0.$$  

To ensure a sensible solution to the model, I assume that the private benefits from managing a larger firm is small enough so that

$$\frac{1}{1 + \eta/\alpha} - \frac{\beta_1 - 1}{\beta_1} > 0$$

and the firm’s value to outside shareholders is positive. The firm’s value, which consists of the value of assets-in-place and the value of the expansion option, can be written as

$$V(y) = \frac{Ny}{\mu} + A_1^s(\eta) y^{\beta_1}.$$  

The correlation of the firm’s expected return and the return of the market portfolio multiplied
by the standard deviation of the firm’s expected return is given by

\[
\text{corr} \left( \frac{dm}{m}, \frac{dV}{V} \right) \text{ std} \left( \frac{dV}{V} \right) = \text{corr} \left( \frac{dm}{m}, \frac{V_y y}{V} \sigma dz \right) \text{ std} \left( \frac{V_y y}{V} \sigma dz \right)
\]

\[
= \frac{V_y y}{V} \sigma \text{corr} \left( \frac{dm}{m}, \frac{dy}{y} \right)
\]

\[
= \frac{V_y y}{V} \sigma \rho_{ym}
\]

\[
= \left[ 1 + (\beta_1 - 1) \frac{F^s}{V} \right] \sigma \rho_{ym}, \tag{A12}
\]

where

\[
\frac{F^s}{V} = \frac{A_1^s(\eta) y^{\beta_1}}{\frac{N_y}{\mu} + A_1^s(\eta) y^{\beta_1}}
\]

\[
= \frac{1}{\frac{N_y^{1-\beta_1}}{A_1^s(\eta) \mu} + 1}. \tag{A13}
\]

Outside shareholders’ expected return can be written as

\[
r_s = r_f + \phi \sigma \rho_{ym} \left[ 1 + (\beta_1 - 1) \frac{F^s}{V} \right]. \tag{A14}
\]

From Equation (A10), it is clear that \( A_1^s \) is a decreasing function of \( \eta \). Both \( \frac{F^s}{V} \) and the expected stock return, therefore, are decreasing functions of \( \eta \). That is, firms with stronger governance have higher expected stock returns in the presence of growth options. Moreover, Equation (A11) indicates that the firm value \( V \) is a decreasing function of \( \eta \).

**Proof of Proposition 2:** To simplify notations, I still use \( F(y) \) as the value of this exit option. Again, because the manager has different objectives than outside shareholders, the value of the exit option to the manager, denoted by \( F^m(y) \), differs from the value to outside shareholders, denoted by \( F^s(y) \). The ODE that defines \( F(y) \) is the same as the ODE that
defines the expansion option and has the following general solution

\[ F(y) = A_1 y^{\beta_1} + A_2 y^{\beta_2}. \]

The boundary conditions are now different, however. For the manager, these conditions are

\[
\begin{align*}
F^m(y \to \infty) &= 0 \\
F^m(y^*) &= I - V^m(y^*) \\
F^m_y(y^*) &= -V^m_y(y^*).
\end{align*}
\]

For outside shareholders, the boundary conditions are:

\[
\begin{align*}
F^s(y \to \infty) &= 0 \\
F^s(y^*) &= I - V^s(y^*). \\
\end{align*}
\]

Following the same procedure, we can get

\[
\begin{align*}
y^* &= \frac{-\beta_2 I \mu}{\eta} \left( \frac{1}{1 + \eta/\alpha} \right) \\
A^m_1 &= 0 \\
A^m_2 &= \left( \frac{I}{1 - \beta_2} \right)^{1-\beta_2} \left( \frac{-\beta_2 I \mu}{1 + \eta/\alpha} \right)^{-\beta_1} \\
A^s_1 &= 0 \\
A^s_2(\eta) &= \left[ \frac{-\beta_2 I \mu}{(1 - \beta_2)(1 + \eta/\alpha)} \right]^{1-\beta_2} \left[ \left( \frac{1 - \beta_2}{-\beta_2} \right) (1 + \eta/\alpha) - 1 \right].
\end{align*}
\]

With the same argument, we can show that the exercise price \( y^* \) is lower when \( \eta \) is larger. The more entrenched manager, therefore, would wait longer to divest. The value of the firm to outside shareholders is given by

\[
V(y) = \frac{Ny}{\mu} + A^s_2(\eta) y^{\beta_2}, \quad \text{(A15)}
\]

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and the expected stock return is

\[ r_s = r_f + \phi \sigma \rho y_m \left[ 1 - (1 - \beta_2) \frac{F^s}{V} \right] \]

\[ = r_f + \phi \sigma \rho y_m \left[ 1 - (1 - \beta_2) \frac{1}{1 + \frac{N_y}{\mu A_2^s(\eta)}} \right] \quad \text{(A16)} \]

Because \( \beta_2 \) is negative, stock return \( r_s \) increases with \( \eta \) if \( A_2^s(\eta) \) is a decreasing function of \( \eta \). The first derivative of \( A_2^s(\eta) \) w.r.t. \( \eta \) is given by

\[ \frac{\partial A_2^s(\eta)}{\partial \eta} = \left[ \frac{-\beta_2 \mu I}{(1 - \beta_2)(1 + \eta/\alpha)} \right]^{1-\beta_2} (1 + \eta/\alpha)^{\beta_2-2} [1 - (1 - \beta_2)(1 + \eta/\alpha)] < 0 \]

where the inequality is due to the fact that \( \beta_2 < 0 \) and \( \eta \geq 0 \). In the presence of disinvestment options, therefore, firms with stronger governance have lower expected stock returns than firms with weaker governance.

If we define a firm’s Tobin’s Q as the ratio of its market value to the value of its assets-in-place, that is,

\[ Q = \frac{N_y}{\mu} + A_2^s(\eta) y^{\beta_2} = \frac{1}{1 - \frac{F^s}{V}} \]

where \( F^s \) is the value of the growth option or disinvestment option. From the above analysis, we know that the value of the options decreases as the governance weakens, leading to a smaller Tobin’s Q. \( \text{Q.E.D.} \)

**Proof of Lemma 1 and Lemma 2:** As shown in Section 3, the first best investment is the solution to the following maximization problem:

\[ V^{FB}(k_t, x_t, z_t) = \max_{\{i_t, k_{t+1}\}} \left\{ y_t - i_t - \Phi(i_t, k_t) + \mathbb{E}_t[M_{t+1}V^{FB}(k_{t+1}, x_{t+1}, z_{t+1})] \right\} , \]

subject to

\[ k_{t+1} = (1 - \delta)k_t + i_t . \]
The first order conditions are:

\[ i_t : \quad 1 + a \left( \frac{i_t}{k_t} \right) = q_t \]
\[ k_{t+1} : \quad q_t = \mathbb{E}_t \left[ M_{t+1} V_{k,t+1}^{FB} \right], \]

where \( q_t \) is the shadow price of the capital at time \( t \) and \( V_{k,t+1}^{FB} \) is the first order derivative of firm value \( V^{FB} \) w.r.t. capital \( k_{t+1} \). Under the Envelop Theorem, \( V_{k,t+1}^{FB} \) can be written as

\[ V_{k,t+1}^{FB} = y_{k,t+1} - \Phi_{k,t+1} + q_{t+1}(1 - \delta) \]
\[ = \nu \frac{y_{t+1}}{k_{t+1}} + \frac{a}{2} \left( \frac{i_{t+1}}{k_{t+1}} \right)^2 + \left( 1 + a \frac{i_{t+1}}{k_{t+1}} \right)(1 - \delta). \]

Substituting the above equation into the first order conditions leads to equation (13):

\[ 1 + a \left( \frac{i_t}{k_t} \right) = \mathbb{E}_t \left[ M_{t+1} \left\{ y_{k,t+1} - \Phi_{k,t+1} + q_{t+1}(1 - \delta) \right\} \right], \]

or equivalently,

\[ 1 + a \left( \frac{i_t}{k_t} \right) = \mathbb{E}_t \left[ M_{t+1} \left\{ \nu \frac{y_{t+1}}{k_{t+1}} + \frac{a}{2} \left( \frac{i_{t+1}}{k_{t+1}} \right)^2 + \left( 1 + a \frac{i_{t+1}}{k_{t+1}} \right)(1 - \delta) \right\} \right]. \]

Following the same procedure, it is straightforward to show that with imperfect governance, that is, a nonzero \( \eta \), the manager’s investment choice satisfies:

\[ 1 + a \left( \frac{i^*_{t}}{k_t} \right) = \mathbb{E}_t \left[ M_{t+1} \left\{ (1 + \eta/\alpha)y_{k,t+1} - \Phi_{k,t+1} + q_{t+1}(1 - \delta) \right\} \right], \]

or equivalently,

\[ 1 + a \left( \frac{i^*_{t}}{k_t} \right) = \mathbb{E}_t \left[ M_{t+1} \left\{ \nu(1 + \eta/\alpha) \frac{y_{t+1}}{k_{t+1}} + \frac{a}{2} \left( \frac{i^*_{t+1}}{k_{t+1}} \right)^2 + \left( 1 + a \frac{i^*_{t+1}}{k_{t+1}} \right)(1 - \delta) \right\} \right]. \] (A17)

Q.E.D.
Proof of Proposition 3: First, I prove that the investment level decreases with the strength of corporate governance, that is, $\partial \left( i_t^{SB} / k_t \right) / \partial \eta$. I define the investment-to-assets ratio and the sales-to-assets ratio as

$$h_t = \frac{i_t^{SB}}{k_t} \quad \text{and} \quad g_t = \frac{y_t}{k_t},$$

respectively, and differentiate both sides of equation (A17) w.r.t. $\eta$ and get

$$a \frac{\partial h_t}{\partial \eta} = E_t \left[ M_{t+1} \left\{ \nu g_{t+1}/\alpha + \nu(1 + \eta/\alpha) \frac{\partial g_{t+1}}{\partial \eta} + a h_{t+1} \left( \frac{\partial h_{t+1}}{\partial \eta} \right) + a(1 - \delta) \left( \frac{\partial h_{t+1}}{\partial \eta} \right) \right\} \right]$$

(A18)

If we substitute the following equality,

$$\frac{\partial g_{t+1}}{\partial \eta} = \frac{\partial g_{t+1}}{\partial k_{t+1}} \frac{\partial k_{t+1}}{\partial \eta} k_t = -(1 - \nu) g_{t+1} \frac{k_t}{k_{t+1}} \frac{\partial h_t}{\partial \eta},$$

into Equation (A18) and combine terms, we get

$$\left\{ a + E_t \left[ M_{t+1} \nu(1 - \nu)(1 + \eta/\alpha) g_{t+1} \left( \frac{k_t}{k_{t+1}} \right) \frac{\partial h_t}{\partial \eta} \right] \right\} \left( \frac{\partial h_t}{\partial \eta} \right) = E_t \left[ M_{t+1} \left\{ \nu g_{t+1}/\alpha + a [h_{t+1} + (1 - \delta)] \left( \frac{\partial h_{t+1}}{\partial \eta} \right) \right\} \right].$$

We can then write $\partial h_t / \partial \eta$ in the following recursive way

$$\frac{\partial h_t}{\partial \eta} = E_t \left[ A_{t+1} + B_{t+1} \left( \frac{\partial h_{t+1}}{\partial \eta} \right) \right],$$

where

$$A_{t+1} = \left\{ a + E_t \left[ M_{t+1} \nu(1 - \nu)(1 + \eta/\alpha) g_{t+1} \left( \frac{k_t}{k_{t+1}} \right) \right] \right\} \geq 0$$

$$B_{t+1} = \left\{ a + E_t \left[ M_{t+1} a [h_{t+1} + (1 - \delta)] \left( \frac{k_t}{k_{t+1}} \right) \right] \right\} \geq 0.$$
It is then straightforward to get

\[ \frac{\partial h_t}{\partial \eta} \]

\[ = \mathbb{E}_t \left[ A_{t+1} + B_{t+1} \mathbb{E}_{t+1} \left[ A_{t+2} + B_{t+2} \left( \frac{\partial h_{t+2}}{\partial \eta} \right) \right] \right] \]

\[ = \mathbb{E}_t \left[ A_{t+1} + B_{t+1} A_{t+2} + B_{t+1} B_{t+2} A_{t+3} + \cdots \right] \]

\[ \geq 0. \]

Given the level of capital \( k_t \) and the productivity shocks \( x_t \) and \( z_t \), therefore, the manager invests more if the firm’s corporate governance is weaker.

Q.E.D.

B Numerical Solution

The model is solved numerically using the value function iteration method. The optimal firm value to the manager does not depend on the firm’s value to outside shareholders and can be solved independently. This is because the model is calibrated so that no exit occurs. The optimization problem the manager faces in Equation (15) is solved first using the value function iteration method. Based on the resulting investment policies from the solution of Equation (15), the firm value to the outside shareholders is solved recursively based on Equation (16). Both the firm value to the manager and that to outside shareholders are solved on the grids of a three-dimension discrete state space, \((k, x, z)\).

There are \( nk \) grid points located in the range of \([k_{min}, k_{max}]\) for \( k \). The grid points are generated recursively using the procedure in McGrattan (1999) so that more grid points locate where the value function has most of its curvature. Use \( nkp \) \((nkp >> nk)\) grid points uniformly between \([k_{min}, k_{max}]\) as the choices of next period capital. The optimal next period capital is chosen using the method of global grid point search. Productivity shocks \( x \) and \( z \) are discretized, following Rouwenhorst (1995), into two sets of discrete values, \( x \in X \equiv \{x_1, \ldots, x_{nx}\} \) and \( z \in Z \equiv \{z_1, \ldots, z_{nz}\}, \) respectively.
Finally, the procedure is repeated for ten times, each having a different strength of corporate governance.
Table 1 Parameter Values and Unconditional Moments

This table presents the parameter values used to solve and simulate the dynamic model and reports unconditional sample moments generated from the simulated data and from the real data. The simulated moments are the averages from 1000 artificial panels, each with 5,000 firms and 480 monthly observations. The real moment of the investment-to-assets ratio is taken from Cooper and Haltiwanger (2006). The real data moments of the market-to-book ratio, measured as $E_t/k_t$ and total assets, measured as $k_t$, are taken from John and Litov (2010). The average of total assets for the democracy firms is normalized at 1. The cross-sectional volatility of stock returns is taken from Campbell, Lettau, Malkiel, and Xu (2001) and Vuolteenaho (2001), while the ratio of private benefits to firm value, measured as $(V^m - V)/V$, is taken from Albuquerque and Schroth (2010). All the sample moments are in annual frequency. Panel A presents the parameters of the calibrated model and Panel B reports both the simulated and the real data moments.

<table>
<thead>
<tr>
<th>Notation</th>
<th>Parameter Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A: Parameters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\gamma$</td>
<td>0.70</td>
<td>Capital share in production</td>
</tr>
<tr>
<td>$\delta$</td>
<td>0.01</td>
<td>Monthly rate of capital depreciation</td>
</tr>
<tr>
<td>$\bar{x}$</td>
<td>−3.2627</td>
<td>Long-run average of the aggregate productivity</td>
</tr>
<tr>
<td>$\rho_x$</td>
<td>0.95(^{1/3})</td>
<td>Persistence coefficient of aggregate productivity</td>
</tr>
<tr>
<td>$\sigma_x$</td>
<td>0.007/3</td>
<td>Conditional volatility of aggregate productivity</td>
</tr>
<tr>
<td>$\beta$</td>
<td>0.994</td>
<td>Time-preference coefficient</td>
</tr>
<tr>
<td>$\gamma_0$</td>
<td>50</td>
<td>Constant price of risk parameter</td>
</tr>
<tr>
<td>$\gamma_1$</td>
<td>−1000</td>
<td>Time-varying price of risk parameter</td>
</tr>
<tr>
<td>$\rho_z$</td>
<td>0.96</td>
<td>Persistence coefficient of firm-specific productivity</td>
</tr>
<tr>
<td>$\sigma_z$</td>
<td>0.10</td>
<td>Conditional volatility of firm-specific productivity</td>
</tr>
<tr>
<td>$\alpha$</td>
<td>1%</td>
<td>Managerial ownership</td>
</tr>
<tr>
<td>$\eta^*$</td>
<td>0.25%</td>
<td>Extraction ratio of dictatorship firms</td>
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Panel B: Simulated and Real Moments

<table>
<thead>
<tr>
<th></th>
<th>Data</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment-to-assets ratio</td>
<td>0.12</td>
<td>0.11</td>
</tr>
<tr>
<td>Volatility of stock returns</td>
<td>25% ~ 32%</td>
<td>28.26%</td>
</tr>
<tr>
<td>Private-benefits-to-firm-value</td>
<td>10%</td>
<td>16.8%</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Democracy</th>
<th>Dictatorship</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Data</td>
</tr>
<tr>
<td>Market-to-book ratio</td>
<td>1.98</td>
</tr>
<tr>
<td>Normalized total assets</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 2 Tobin’s Q and CAPEX Regressions

The averages, across 1,000 simulated data panels, of the coefficients and their associated t-statistics (in parentheses) of the governance dummy in three regressions are presented in Panels A, B, and C, respectively. Each simulated panel contains 5,000 firms and 480 monthly observations. Results in Panel A are from the annual cross-sectional regression of \( Q_{jt} = a_t + b_{t1} G_{jt} + b_{t2} \log(BA_{jt}) + e_{jt} \), where \( Q_{jt} \) is the Tobin’s Q, measured as \( \frac{E_{jt}}{k_{jt}} \), \( G_{jt} \) is the governance dummy that that equals one if \( j \) is a democracy firm and equals zero if \( j \) is a dictatorship firm, and \( BA_{jt} \) is the book value of assets, measured as \( k_{jt} \). Results in Panel B are from the annual cross-sectional regression of \( \left(\frac{CAPEX}{Assets}\right)_{jt+1} = a_t + b_{t1} G_{jt} + b_{t2} BM_{jt} + e_{jt+1} \), where \( \left(\frac{CAPEX}{Assets}\right)_{jt+1} \) is firm \( j \)’s capital expenditure scaled by total assets in year \( t + 1 \), measured as \( \frac{k_{jt+2} - (1 - \delta)k_{jt+1}}{k_{jt+1}} \), and \( BM_{jt} \) is the book-to-market-equity ratio in year \( t \), measured as \( \frac{k_{jt}}{E_{jt}} \). Results in Panel C are from the annual cross-sectional regression of \( \left(\frac{CAPEX}{Sales}\right)_{jt+1} = a_t + b_{t1} G_{jt} + b_{t2} BM_{jt} + e_{jt+1} \), where \( \left(\frac{CAPEX}{Sales}\right)_{jt+1} \) is firm \( j \)’s capital expenditure scaled by sales in year \( t + 1 \), measured as

\[
\frac{k_{jt+2} - (1 - \delta)k_{jt+1}}{y_{jt+1}}
\]

For comparison purpose, the table also reports the corresponding coefficients and t-statistics from Table VIII in GIM.

<table>
<thead>
<tr>
<th>Governance Dummy</th>
<th>Panel A: Q</th>
<th></th>
<th>Panel B: CAPEX/Assets</th>
<th></th>
<th>Panel C: CAPEX/Sales</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Data</td>
<td>Model</td>
<td>Data</td>
<td>Model</td>
<td>Data</td>
<td>Model</td>
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<tr>
<td></td>
<td>0.34</td>
<td>0.27</td>
<td>-6.21</td>
<td>-7.99</td>
<td>-5.23</td>
<td>-11.05</td>
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<tr>
<td></td>
<td>(8.38)</td>
<td>(7.23)</td>
<td>(-4.06)</td>
<td>(-6.35)</td>
<td>(-3.71)</td>
<td>(-5.01)</td>
</tr>
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</table>
Table 3 Factor Regressions for Governance Portfolio: Investment Growth Rate as the Indicator for Business Cycles

This table presents the cross-simulation averages of the coefficients and the associated $t$-statistics (in parentheses) from the risk-factor model regression: $R_t = \alpha + X_t \beta + \epsilon_t$, where, for month $t$, $R_t$ is return of the governance portfolio, $\alpha$ is the intercept, $X_t$ is the matrix of risk factors, and $\beta$ is the coefficient vector. With no risk factors, $\alpha$ is the average return of the governance portfolio for the specific sample period. The risk factor in the CAPM model is the market factor ($MKT_t$). The Fama-French three-factor model includes two additional factors: size ($SMB_t$) and value ($HML_t$) factors. The Carhart four-factor model includes the momentum factor ($UMD_t$) in addition to the FF three factors. Panels A, B, and C presents the regression results using the full sample, the subsample of expansion, and the subsample of contraction, respectively. Month $t$ is classified as “expansion” if its investment growth rate is among the top 30% ranking in its associated panel and is classified as “contraction” if its investment growth rate of the month is in the bottom 30% ranking.

<table>
<thead>
<tr>
<th></th>
<th>Average Return</th>
<th>CAPM</th>
<th>Fama-French</th>
<th>Carhart</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Panel A: Full Sample</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$</td>
<td>0.12</td>
<td>0.01</td>
<td>−0.00</td>
<td>−0.00</td>
</tr>
<tr>
<td></td>
<td>(3.94)</td>
<td>(0.63)</td>
<td>(−1.56)</td>
<td>(−1.49)</td>
</tr>
<tr>
<td>$MKT$</td>
<td>0.16</td>
<td>0.04</td>
<td>(2.25)</td>
<td>(2.26)</td>
</tr>
<tr>
<td></td>
<td>(5.44)</td>
<td>(5.98)</td>
<td>(8.34)</td>
<td></td>
</tr>
<tr>
<td>$SMB$</td>
<td>0.79</td>
<td>0.79</td>
<td>(8.25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.58)</td>
<td>(8.77)</td>
<td>(9.52)</td>
<td></td>
</tr>
<tr>
<td>$HML$</td>
<td>−0.50</td>
<td>−0.50</td>
<td>(−4.84)</td>
<td>(−4.77)</td>
</tr>
<tr>
<td></td>
<td>(−5.40)</td>
<td>(−5.49)</td>
<td>(−6.10)</td>
<td></td>
</tr>
<tr>
<td>$UMD$</td>
<td>−0.03</td>
<td>0.03</td>
<td>(−0.47)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(−0.39)</td>
<td>(−0.42)</td>
<td>(−0.56)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Panel B: Expansion</td>
<td></td>
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</tr>
<tr>
<td>$\alpha$</td>
<td>0.75</td>
<td>−0.05</td>
<td>−0.03</td>
<td>−0.03</td>
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<td></td>
<td>(3.22)</td>
<td>(−0.69)</td>
<td>(−2.06)</td>
<td>(−1.90)</td>
</tr>
<tr>
<td>$MKT$</td>
<td>0.17</td>
<td>0.03</td>
<td>(2.00)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(7.38)</td>
<td>(7.38)</td>
<td>(9.36)</td>
<td></td>
</tr>
<tr>
<td>$SMB$</td>
<td>0.84</td>
<td>0.84</td>
<td>(9.23)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(9.58)</td>
<td>(9.58)</td>
<td>(10.10)</td>
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</tr>
<tr>
<td>$HML$</td>
<td>−0.56</td>
<td>−0.56</td>
<td>(−5.72)</td>
<td>(−5.67)</td>
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<tr>
<td></td>
<td>(−5.71)</td>
<td>(−5.71)</td>
<td>(−6.46)</td>
<td></td>
</tr>
<tr>
<td>$UMD$</td>
<td>−0.03</td>
<td>0.03</td>
<td>(−0.47)</td>
<td></td>
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<tr>
<td></td>
<td>(−0.39)</td>
<td>(−0.42)</td>
<td>(−0.56)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Panel C: Contraction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$</td>
<td>−0.32</td>
<td>0.07</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>(−1.90)</td>
<td>(1.33)</td>
<td>(1.62)</td>
<td>(1.49)</td>
</tr>
<tr>
<td>$MKT$</td>
<td>0.16</td>
<td>0.03</td>
<td>(2.12)</td>
<td>(2.10)</td>
</tr>
<tr>
<td></td>
<td>(6.70)</td>
<td>(6.70)</td>
<td>(9.58)</td>
<td>(9.47)</td>
</tr>
<tr>
<td>$SMB$</td>
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<td>0.88</td>
<td>(9.58)</td>
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<tr>
<td></td>
<td>(9.58)</td>
<td>(9.58)</td>
<td>(10.10)</td>
<td></td>
</tr>
<tr>
<td>$HML$</td>
<td>−0.53</td>
<td>−0.53</td>
<td>(−5.46)</td>
<td>(−5.33)</td>
</tr>
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<td></td>
<td>(−5.46)</td>
<td>(−5.46)</td>
<td>(−6.20)</td>
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<td>−0.02</td>
<td>0.02</td>
<td>(−0.35)</td>
<td></td>
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<tr>
<td></td>
<td>(−0.35)</td>
<td>(−0.35)</td>
<td>(−0.46)</td>
<td></td>
</tr>
</tbody>
</table>

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Table 4 Factor Regressions for Governance Portfolio: Output Growth Rate as the Indicator for Business Cycles

This table presents the cross-simulation averages of the coefficients and the associated t-statistics (in parentheses) from the risk-factor model regression: \( R_t = \alpha + X_t\beta + \epsilon_t \), where for month \( t \), \( R_t \) is return of the governance portfolio, \( \alpha \) is the intercept, \( X_t \) is the matrix of risk factors, and \( \beta \) is the coefficient vector. With no risk factors, \( \alpha \) is the average return of the governance portfolio for the specific sample period. The risk factor in the CAPM model is the market factor (\( MKT_t \)). The Fama-French three-factor model includes two additional factors: size (\( SMB_t \)) and value (\( HML_t \)) factors. The Carhart four-factor model includes the momentum factor (\( UMD_t \)), in addition to the FF three factors. Panels A, B, and C present the regression results using the full sample, the subsample of expansion, and the subsample of contraction, respectively. Month \( t \) is classified as “expansion” if its output growth rate is among the top 30% ranking in its associated panel and is classified as “contraction” if its output growth rate of this month is in the bottom 30% ranking.

<table>
<thead>
<tr>
<th></th>
<th>Average Return</th>
<th>CAPM</th>
<th>Fama-French</th>
<th>Carhart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A: Full Sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \alpha )</td>
<td>0.12</td>
<td>0.01</td>
<td>-0.00</td>
<td>-0.00</td>
</tr>
<tr>
<td></td>
<td>(3.74)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( MKT )</td>
<td>0.16</td>
<td>0.04</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5.30)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( SMB )</td>
<td>0.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.57)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>( HML )</td>
<td>-0.50</td>
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<td>-0.50</td>
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<tr>
<td></td>
<td>(-4.79)</td>
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<td>(-4.73)</td>
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</tr>
<tr>
<td>( UMD )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Panel B: Expansion |                |      |             |         |
| \( \alpha \)       | 0.40           | 0.03 | -0.01       | -0.01   |
|                      | (6.71)         |      |             |         |
| \( MKT \)           | 0.16           | 0.05 | 0.05        |         |
|                      | (9.47)         |      |             |         |
| \( SMB \)           | 0.67           |      |             |         |
|                      | (5.15)         |      |             |         |
| \( HML \)           | -0.59          |      | -0.59       |         |
|                      | (-4.63)        |      | (-4.60)     |         |
| \( UMD \)           |                |      |             |         |

| Panel C: Contraction|                |      |             |         |
| \( \alpha \)       | -0.15          | 0.03 | -0.00       | -0.00   |
|                      | (-2.37)        |      |             |         |
| \( MKT \)           | 0.16           | 0.03 | 0.03        |         |
|                      | (5.47)         |      |             |         |
| \( SMB \)           | 0.88           |      |             |         |
|                      | (7.99)         |      |             |         |
| \( HML \)           | -0.46          |      | -0.46       |         |
|                      | (-4.10)        |      | (-4.13)     |         |
| \( UMD \)           |                |      |             |         |
Table 5  Fama-MacBeth Return Regression

This table presents the averages, across 1,000 simulated data panels, of the coefficients and their corresponding t-statistics (in parentheses) from the monthly Fama-MacBeth regression:

\[ r_{jt} = \alpha_t + \beta_t G_{jt} + \gamma_1 t T A_{jt} + \gamma_2 t \left( \frac{Sales}{TA} \right)_{jt} + e_{jt}, \]

where, for firm \( j \) in month \( t \), \( r_{jt} \) is the return, \( G_{jt} \) is the governance dummy that equals one if \( j \) is a democracy firm and equals zero if \( j \) is a dictatorship firm, \( T A_{jt} \) is the total assets (measured as \( k_t \)), and \( \left( \frac{Sales}{TA} \right)_{jt} \) (measured as \( \frac{y_{kt}}{k_{jt}} \)) is the sales-to-assets ratio. Each simulated panel contains 5,000 firms and 480 months. Panel A presents the regression results using the full sample, while Panels B and C present the regression results for the subsamples of expansion and contraction, respectively. For Panel B, month \( t \) is classified as “expansion” if its investment growth rate is among the top 30% ranking in its associated panel and is classified as “contraction” if its investment growth rate of this month is in the bottom 30% ranking. For Panel C, months of expansion and contraction are similarly classified, but output growth rate is used as the indicator for business cycles instead of the investment growth rate.

<table>
<thead>
<tr>
<th></th>
<th>Panel A</th>
<th>Panel B</th>
<th>Panel C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full Sample</td>
<td>Expansion</td>
<td>Contraction</td>
</tr>
<tr>
<td>( G )</td>
<td>0.04</td>
<td>0.26</td>
<td>-0.10</td>
</tr>
<tr>
<td></td>
<td>(2.57)</td>
<td>(1.99)</td>
<td>(-1.16)</td>
</tr>
<tr>
<td>( TA )</td>
<td>-0.04</td>
<td>-0.23</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>(-1.78)</td>
<td>(-1.51)</td>
<td>(1.03)</td>
</tr>
<tr>
<td>( Sales )</td>
<td>-0.57</td>
<td>-6.97</td>
<td>3.96</td>
</tr>
<tr>
<td></td>
<td>(-2.48)</td>
<td>(-3.84)</td>
<td>(2.30)</td>
</tr>
</tbody>
</table>
Figure 1 Simulated Distributions of the Slopes for the Governance Dummy in Q and CAPEx Regressions

Panel A presents the simulated distribution of the slope for the governance dummy in the annual cross-sectional regression: $Q_{jt} = a_t + b_1 t G_{jt} + b_2 t \log(BA_{jt}) + e_{jt}$, where $Q_{jt}$ is the Tobin’s Q, measured as $\frac{E_{jt}}{k_{jt}}$, $G_{jt}$ is the governance dummy that equals one if $j$ is a democracy firm and equals zero if $j$ is a dictatorship firm, and $BA_{jt}$ is the book value of assets, measured as $k_{jt}$. Panel B presents the simulated distribution of the slope for the governance dummy in the annual cross-sectional regression: $\left(\frac{\text{CAPEX/Assets}}{\text{Assets}}\right)_{jt+1} = a_t + b_1 t G_{jt} + b_2 t BM_{jt} + e_{jt+1}$, where $\left(\frac{\text{CAPEX/Assets}}{\text{Assets}}\right)_{jt+1}$ is firm $j$’s capital expenditure scaled by total assets in year $t+1$, measured as $\frac{k_{jt+2} - (1-\delta)k_{jt+1}}{k_{jt+1}}$, and $BM_{jt}$ is the book-to-market-equity ratio in year $t$, measured as $\frac{k_{jt}}{E_{jt}}$. Panel C presents the simulated distribution of the slope for the governance dummy in the annual cross-sectional regression: $\left(\frac{\text{CAPEX/Sales}}{\text{Sales}}\right)_{jt+1} = a_t + b_1 t G_{jt} + b_2 t BM_{jt} + e_{jt+1}$, where $\left(\frac{\text{CAPEX/Sales}}{\text{Sales}}\right)_{jt+1}$ is firm $j$’s capital expenditure scaled by sales in year $t+1$, measured as $\frac{k_{jt+2} - (1-\delta)k_{jt+1}}{y_{jt+1}}$. The simulated distributions are based on 1,000 artificial data panels, each with 5,000 firms and 480 months. The empirical estimates from GIM are also reported in each panel.
Figure 2  Simulated Distribution for the Average Returns of the Governance Portfolio: Investment Growth Rate as the Indicator for Business Cycles

Panel A presents the simulated distribution for the average return of the governance portfolio, which longs the value-weighted portfolio of democracy firms and shorts the value-weighted portfolio of dictatorship firms, during the full sample period. Panel B presents the simulated distribution for the average return of the governance portfolio for periods of expansion only. Panel C presents the simulated distribution for the average return of the governance portfolio for periods of contraction only. The distributions are based on 1,000 artificial data panels, each with 5,000 firms and 480 months. The across-simulation means and t-statistics of the average returns are also reported in the panels. Month $t$ is classified as “expansion” if its investment growth rate is among the top 30% ranking in its associated panel and is classified as “contraction” if its investment growth rate of this month is in the bottom 30% ranking.
Panel A presents the simulated distribution for the average return of the governance portfolio, which longs the value-weighted portfolio of democracy firms and shorts the value-weighted portfolio of dictatorship firms, during the full sample period. Panel B presents the simulated distribution for the average return of the governance portfolio for periods of expansion only. Panel C presents the simulated distribution for the average return of the governance portfolio for periods of contraction only. The distributions are based on 1,000 artificial data panels, each with 5,000 firms and 480 months. The across-simulation means and t-statistics of the average returns are also reported in the panels. Month $t$ is classified as “expansion” if its output growth rate is among the top 30% ranking in its associated panel and is classified as “contraction” if its output growth rate of this month is in the bottom 30% ranking.
This table presents the simulated distributions for the slope of the governance dummy in the monthly Fama-MacBeth regression:

\[ r_{jt} = \alpha_t + \beta_t G_{jt} + \gamma_1 t TA_{jt} + \gamma_2 t \left( \frac{Sales}{TA} \right)_{jt} + e_{jt}, \]

where, for firm \( j \) in month \( t \), \( r_{jt} \) is the return, \( G_{jt} \) is the governance dummy that equals one if \( j \) is a democracy firm and equals zero if \( j \) is a dictatorship firm, \( TA_{jt} \) is the total assets (measured as \( k_t \)), and \( \left( \frac{Sales}{TA} \right)_{jt} \) (measured as \( \frac{k_t}{k_{jt}} \)) is the sales-to-assets ratio. The distributions are based on 1,000 artificial data panels, each with 5,000 firms and 480 months. Panels A, B, and C present the simulated distribution of the time-series average of the slope across all months in each artificial panel, across months of expansion only in each artificial panel, and across months of contraction only in each artificial data panel, respectively. The across-simulation means and t-statistics of the slope are also reported in the panels. Month \( t \) is classified as “expansion” if its investment growth rate is among the top 30% ranking in its associated panel and is classified as “contraction” if its investment growth rate of this month is in the bottom 30% ranking.
This table presents the simulated distributions for the slope of the governance dummy in the monthly Fama-MacBeth regression:

\[ r_{jt} = \alpha_t + \beta_t G_{jt} + \gamma_{1t} T A_{jt} + \gamma_{2t} \left( \frac{Sales}{TA} \right)_{jt} + e_{jt}, \]

where, for firm \( j \) in month \( t \), \( r_{jt} \) is the return, \( G_{jt} \) is the governance dummy that equals one if \( j \) is a democracy firm and equals zero if \( j \) is a dictatorship firm, \( T A_{jt} \) is the total assets (measured as \( k_t \)), and \( \left( \frac{Sales}{TA} \right)_{jt} \) (measured as \( \frac{y_{jt}}{k_{jt}} \)) is the sales-to-assets ratio. The distributions are based on 1,000 artificial data panels, each with 5,000 firms and 480 months. Panels A, B, and C present the simulated distribution of the time-series average of the slope across all months in each artificial panel, across months of expansion only in each artificial panel, and across months of contraction only in each artificial data panel, respectively. The across-simulation means and t-statistics of the slope are also reported in the panels. Month \( t \) is classified as “expansion” if its output growth rate is among the top 30% ranking in its associated panel and is classified as “contraction” if its output growth rate of this month is in the bottom 30% ranking.