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"A Simple Corporate Governance Asset Pricing Model: Some Theory and Evidence"

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Abstract

This paper extends the classic risk-return tradeoff of asset pricing to a risk-effort tradeoff, by assuming that managerial effort is necessary to generate cash flows. Corporate governance standards influence the manager's return to effort, her exposure to corporate risk, and the dilution of shareholder value. In capital market equilibrium, this tradeoff has implications for the firm's cash flows and stock returns, and this in turn affects the endogenous choice of governance standards. Laxer governance standards decrease the stock's β, and in equilibrium systematic and idiosyncratic stock return risk are both negatively correlated with governance laxity. Various empirical tests with U.S. data using the corporate governance index of Gompers, Ishii, and Metrick (2003) are consistent with our predictions.

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A Simple Corporate Governance Asset Pricing Model: Some Theory and Evidence*

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This paper extends the classic risk-return tradeoff of asset pricing to a risk-effort tradeoff, by assuming that managerial effort is necessary to generate cash flows. Corporate governance standards influence the manager's return to effort, her exposure to corporate risk, and the dilution of shareholder value. In capital market equilibrium, this tradeoff has implications for the firm's cash flows and stock returns, and this in turn affects the endogenous choice of governance standards. Laxer governance standards decrease the stock's β, and in equilibrium systematic and idiosyncratic stock return risk are both negatively correlated with governance laxity. Various empirical tests with U.S. data using the corporate governance index of Gompers, Ishii, and Metrick (2003) are consistent with our predictions.

Keywords: Corporate governance, CAPM, stock returns, beta, agency
JEL Classification: G32, G38, K22

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Why should corporate governance matter for stock returns? After all, if a firm is run such that managers or large shareholders can appropriate a share of company resources at the expense of outside shareholders, the firm's share price should adjust to reflect such conflicts of interest and the firm's stock returns should be unaffected. However, empirically, stock returns do seem to be related to corporate governance.[1]

Starting with Gompers, Ishii and Metrick (2003), the empirical literature has studied this issue by controlling stock returns for various factors and then relating abnormal returns to measures of corporate governance. We address the problem from a new perspective, both theoretically and empirically, by relating corporate governance to stock return volatility in the form of systematic risk (measured by β) and idiosyncratic risk.

Conceptually, the paper extends the risk-return tradeoff of the classic Capital Asset Pricing Model to a setting in which managers have discretion to exert effort and divert corporate cash flows for their private benefit. We use this cash-flow based model to derive predictions about the relation between corporate governance and stock returns. Empirically, we test these predictions and find strong support for them from standard stock market data.

A key idea of our model is to differentiate between the impact of corporate governance on cash flows and on investor returns. Recently, Myers (2014) has argued that corporate governance affects not only the distribution, but also the creation of corporate value, and what matters for financial investors are governance rules that at the same time encourage the creation of value and the distribution of that value to investors. Governance rules that give investors a greater share of the value do not necessarily give them greater total value. The trade off between the size of the value produced and the share of the value distributed to outside investors is also at the heart of our theory of corporate governance and capital market equilibrium.

Just like Myers (2014), we argue that there is more to corporate governance than simply restricting managerial private benefits. In fact, governance provisions affect managerial behavior along several dimensions. On the one hand, lax governance allows managers to use company resources to their own advantage and dilutes shareholder value. On the other hand, it makes managers more like residual owners of cash flow and hence gives them owner-like incentives. This gives more incentives to exert effort, but also more exposure to cash flow risk.[2]

Our model starts out with corporate cash flows and embeds the single-firm problem in a capital market in which investors behave according to the one-factor CAPM. The market prices the shares of the firm anticipating the manager's effort, given the firm's governance structure and the manager's inside equity. We then determine the owners' optimal governance structure, which results from trading off shareholder expropriation, managerial effort incentives,

[1] See our literature discussion below.

[2] We deliberately abstract from managerial risk-shifting as a source of moral hazard and rather consider the dilution of cash flows. While we believe that risk-shifting is a first order problem in the financial industry, it is probably less important in non-financial firms. Our empirical analysis therefore excludes financial firms.

and risk sharing. As a result, corporate governance, stock returns, β, and cash flows are all endogenous, and we can predict equilibrium correlations in response to variations of the model parameters.

We thus avoid the typical endogeneity problems of empirical finance by predicting equilibrium correlations between endogenous variables, rather than causality.[3] To the extent that our model parameters are observable, we can also test their impact on the endogenous variables, which altogether yields a relatively rich set of testable predictions for a number of variables of interest.

A key result of our model is that laxer governance increases managerial effort and thus total cash flows, because laxer governance gives managers larger effective ownership in the firm. Hence, firms will not choose the most restrictive governance rules unless managers are very risk averse or the idiosyncratic risk of cash flows is large, despite the fact that the market fully prices private benefit extraction from cash flows. However, rather than on firms' accounting performance, the focus of this paper is on the relation between corporate governance and the risk-return tradeoff for stock market investors. Since laxer governance increases expected total cash (before managerial benefit taking), the firm's risk is spread over higher cash flows, which means that cash flow becomes relatively less risky, lowering the stock's β and its idiosyncratic volatility. As a result, our analysis predicts that cross-sectionally β, idiosyncratic stock return volatility, and governance strictness correlate positively.[4]

To the extent that we can identify the exogenous variables of our model empirically, we can use them to directly test the equilibrium relations discussed above. We do this with the firm's idiosyncratic cash flow risk, for which we can construct a convincing empirical proxy from accounting data. Our theoretical prediction is that an increase in idiosyncratic cash flow risk makes exposure to cash flow less attractive, hence making optimal governance stricter. This, in turn, reduces total cash flow via lower effort, and increases the firms' β and idiosyncratic stock return risk, as discussed above.

We test these predictions on a large sample of U.S. listed firms for the period 1990-2006. We follow the literature and use the widely used measure of corporate governance laxity by Gompers, Ishii, and Metrick (2003). This index, which quantifies corporate provisions that protect management from outside interference, captures key elements of our model, although it certainly fails to capture some other components of corporate governance.[5]

Using this measure, we conduct two sorts of tests. First, we regress our endogenous variables GIM Index, β, and idiosyncratic stock return volatility on our empirical proxy of idiosyncratic cash flow risk. Since our model predicts

[3] There are elements of corporate governance that are exogenous to the firm. Variations of such elements have been employed to establish causal links from governance to performance, most notably changes in state anti-takeover legislation (Bertrand and Mullainathan 2003, Giroud and Mueller, 2010).

[4] Hence, by predicting correlations and not causalities, we do not have to use regressions of endogenous variables on governance indices, which are fraught with endogeneity problems, as discussed, e.g., by Bhagat, Bolton, and Romano (2008).

[5] Kadyrzhanova and Rhodes-Kropf (2011) provide a detailed analysis of the impacts of different components of the GIM Index on firm value.

a clear causality, we can use straightforward OLS and do not have to concern ourselves with identification issues. To our knowledge we are the first to construct an empirical proxy of idiosyncratic cash flow volatility and to investigate its relationship with corporate governance and stock return risk.[6] Second, we calculate the empirical correlations between our endogenous variables. These correlations are corrected for the usual controls in the empirical literature and are thus partial correlations in the sense of Peng et al. (2009). Again, these tests lend strong support to our theory.

From an empirical point of view, measurement errors are typically large for the estimation of average stock returns (and therefore of abnormal returns), while the estimation of stock return volatility needed for our theory is usually more accurate. Indeed, all our estimates are statistically highly significant. And interestingly, while the positive association between governance strictness and abnormal returns identified by Gompers, Ishii and Metrick (2003) seems to disappear for the period 2000-2008 (Bebchuk, Cohen and Wang (2013)), our findings are empirically robust for the period 2000-2006.

The rest of this paper is organized as follows. In Section 1 we discuss some of the related literature. Section 2 presents our theoretical model of corporate governance choice and capital market equilibrium. Based on the theoretical analysis, in Section 3, we derive our theoretical predictions. Section 4 then describes the data. Section 5 tests our theoretical predictions in various forms. A detailed description of the GIM Index is provided in Appendix A. Appendix B provides panel regressions as a robustment check of the cross-sectional analysis in the main text.

1 Related literature

This paper is related to different strands of the literature.

On the theoretical side, the notion that strict corporate governance entails costs as well benefits is not new. The benefits of strict governance are usually attributed to the possibility of shareholdes to discipline managers either directly of via the threat of dismissal or takeovers. The "incentive approach" to corporate governance (Harris and Raviv, 2010), on the other hand, emphasizes that strict corporate governance can be counterproductive because it disenfranchises managers and thus discourages value creation. The negative effects of strict corporate governance arise from restricting managerial initiative (Burkart, Gromb, Panunzi, 1997), the potential increase in corporate bureaucracy (Herzberg, 2003), managerial entrenchment (Shleifer and Vishny, 1989), and the crowding out of intrinsic motivation by extrinsic motivation (as discussed more generally by Falk and Koesfeld, 2006). As Myers (2014) has argued, managerial activity is not simply a mechanic necessity generating rents that should be minimized. In fact, managerial private benefits are also a re-

[6] Bates, Kahle, and Stulz (2009) have used measures of cash flow volatility from EBITDA. But our theory points to the importance of correcting such measures for systematic risk, which we do in our empirical analysis.

turn to human capital, and managers use and develop this human capital to the shareholders' and their own benefit. In a formal model in this vein, Lambrecht and Myers (2012) argue that managers capture all the firm's residual value, subject to the constraint that shareholders receive a payment stream that makes them indifferent between firing the managers or retaining them. Hence, "'perfect' investor protection gives managers no hope of future rents and no reason to invest in firm-specific human capital" (p. 1782).[7] We follow this line of thinking by assuming in our model that laxer governance makes the manager benefit more from the value she creates and thus partially aligns her incentives with those of outside shareholders.

Our approach thus takes account of benefits as well as costs of strict corporate governance. In this respect, we follow the work by Kadyrzhanova and Rhodes-Kropf (2011), who analyze the effects of anti-takeover provisions, which constitute an important part of the GIM Index. They show that governance provisions that protect management from hostile takeovers have countervailing effects. Next to the standard agency costs of managerial entrenchment, their theory identifies a "bargaining effect" that allows protected target firms to extract a higher takeover premium in case of a successful takeover. Empirically, Kadyrzhanova and Rhodes-Kropf (2011) can identify which of the governance provisions of Gompers, Ishii, and Metrick (2003) support one or the other effect and how this tradeoff depends on industry structure.

Cremers, Masconale, and Sepe (2015) disentangle the different effects of corporate governance provisions differently. They consider the six key entrenchment provisions identified by Bebchuk, Cohen, and Ferrell (2009)[8] and divide them according to whether they can be unilaterally adopted by directors or whether they need shareholder approval. They then use a comprehensive data set of 30 years to show that only the three provisions that can be adopted unilaterally systematically reduce firm value. This points to a commitment problem along the lines of the incentive approach to corporate governance discussed above.

Giroud and Mueller (2011) take a broader perspective and study how the governance effect of Gompers, Ishi, and Metrick (2003) depends on product market competition and industry structure. They find that the governance ef-

[7] There is a large literature on the problem of managerial effort and corporate governance. See, in particular, Bebchuk and Weisbach (2010), Harris and Raviv (2010), Hellwig (2000), Shleifer and Vishny (1997), Tirole (2001), Vives (2000), and Zingales (2008) for excellent discussions of the costs and benefits of corporate governance. Hellwig (2000), for example, has noted that giving managers residual cash flow rights and reducing external control is akin to giving them ownership status, which is known to create correct effort incentives.

More specifically, in principal-agent theory it has long been argued that monitoring can have negative incentive effects, as too much information can hurt the principal. The classical paper by Crémer (1995), e.g., shows in an adverse selection environment that restricting the information of principals avoids costly renegotiation of long term contracts. An excellent discussion of incentives in organization theory can be found in Prendergast (1999).

[8] Bebchuk, Cohen, and Ferrell (2009) show that most of the explanatory power of the index developed by Gompers, Ishi, and Metrick (2003) comes from 6 entrenchment provisions - staggered boards, poison pills, golden parachutes, supermajority requirements for charter amendments, for bylaws amendments, and for mergers.

fect is strongest in non-competitive industries and small or negligible in highly competitive industries. In fact, across industries they show that the abnormal stock return earned on strictly governed firms compared to firms with weak governance is increasing across the deciles of the distribution of the Herfindahl-Hirschman Index of industry concentration. Different from us, Giroud and Mueller (2011) thus focus on industry competition, which we do not model, and focus on abnormal returns, taking the quality of corporate governance as exogenous and studying the cross effect of governance and competition on abnormal stock returns.

Other influential studies of the relation between corporate governance and asset pricing, next to Gompers, Ishi, and Metrick (2003), include Cremers and Nair (2005), Ferreira and Laux (2007), Bebchuk, Cohen, and Ferrell, (2009), Johnson, Moorman and Sorescu (2009), and Acharya, Gottschalg, Hahn, and Kehoe (2011). Giannetti and Koskinen (2010) investigate the effect of investor protection on stock returns and portfolio allocations for cross-border portfolio investments, both theoretically and empirically. All these studies start with the observation that corporate governance is heterogenous among firms or among countries and investigate its implications for share prices or abnormal equity returns. None of these papers endogenizes corporate governance or deals with the relationship between beta, idiosyncratic cash flow volatility, and corporate governance.

Our paper is also related to the literature on opacity and governance, as lax governance is usually associated with little disclosure. In particular, our paper is related to Jin and Myers (2006) who show that lack of transparency increases the R^2 of stock returns in a cross-country regression. In their theory, stocks are affected by one market factor observable to everyone and two idiosyncratic factors, only one of which is observable also to outsiders. The fact that one factor is observable only to insiders (lack of transparency) allows them to extract private benefits when cash flows are high. This implies that less idiosyncratic risk is impounded into the stock price and thus that the R^2 of stock returns is larger. Jin and Myers (2006) do not consider the choice of opacity or governance, but simply set out from the observation that opacity/corporate governance is heterogenous across firms. In a microstructure context, this theme is echoed by Easley and O'Hara (2004) who show that uninformed traders require compensation to hold stocks with greater private information.

We are not the first to study the theoretical link between agency problems and the cost of capital resulting from equilibrium capital asset pricing. An important earlier paper is the work of Lambert, Leuz and Verrecchia (2007) who investigate the effects of information disclosure on equilibrium stock returns in a simple CAPM. Like us, they note that agency can best be analyzed in terms of cash flows and then transform their cash-flow based model into one of returns. They show that the quality of accounting information can influence the cost of capital through two effects. A direct effect is that better disclosure affects the firm's assessed covariances with other firms' cash flows, as in the above mentioned literature on opacity and governance. An indirect effect occurs if better disclosure affects the firm's real decisions, which can change the firm's ratio of expected future cash flows to the covariance of these cash flows with the sum of all the cash flows in the market. Our model can be interpreted as an extension of this line of argument to the problem of managerial effort provision, private benefit taking, and corporate governance.

The empirical paper closest to ours is Ferreira and Laux (2007), who find at the U.S. company level that lax governance is associated with low transparency, which they proxy by idiosyncratic return volatility.[9] On this front our results are qualitatively similar: a higher GIM Index (laxer governance) is associated with higher opacity of stock returns, measured as lower idiosyncratic stock return volatility over total volatility. We go beyond Ferreira and Laux (2007) by also considering systematic stock return risk, and by arguing that the observed governance-risk relation is the result of an equilibrium tradeoff.

2 The model

2.1 Set up

The structural model developed in this section embeds corporate governance in the basic CAPM in order to generate testable hypotheses about the relations between corporate governance and stock return variables. In the model, corporate governance and cash flows are endogenous and driven by the same factors. Variations in these factors will generate the comparative statics that can be tested empirically.

Consider a competitive capital market with representative firm i, run by an owner/manager. The model has three dates. At date 0, the owner/manager, with initial ownership π_0, decides about the corporate governance regime g_i of the firm.[10] In corporate governance regime g_i the owner/manager extracts a share g_i, $0 \leq g_i \leq 1$, of realized cash flows C_i for her private benefit, leaving an amount of $(1 - g_i)\, C_i$ to outside shareholders. The owner/manager appropriates a monetary equivalent $\phi_i g_i C_i$ of realized cash flows. The dilution parameter ϕ_i, $0 \leq \phi_i \leq 1$, is exogenous, depends on certain aggregate factors such as the legal framework, on industry features, and on firm specific characteristics. g_i describes the laxity of corporate governance: the larger g_i the less the owner/manager is monitored and the higher are managerial private benefits. g_i captures how well the manager is protected from interference by outside shareholders and is thus a theoretical counterpart to the GIM Index, developed by Gompers, Ishi, and Metrick (2003, see Appendix A for a detailed description).

At date 1 the firm's shares are publicly traded at the competitive price P_{i1}. At this price also the owner/manager trades her initial ownership stake. We take

[9] A related interpretation of idiosyncratic volatility is in terms of the availability of information: high levels of idiosyncratic volatility are associated with more efficient capital allocation (Durnev, Morck, and Yeung 2004) and with stock prices being more informative about future earnings (Durnev et al. 2003).

[10] The assumption $\pi_0 = 1$ would correspond to the case of a hypothetical initial founder/manager, or founding family, who chooses the best long-term governance structure before taking the firm public.

her trading decision as exogenous, driven by a number of factors outside our model, and denote by $\overline{\pi}_i$, $0 \leq \overline{\pi}_i \leq \pi_0$, the equity stake that the owner/manager keeps.[11] We assume that $\overline{\pi}_i < \phi_i$.[12] Thus the owner/manager sells the quantity $\widehat{\pi}_i = \pi_0 - \overline{\pi}_i \geq 0$ and uses the proceeds to buy the market portfolio and the risk free-asset.

At date 2 the owner/manager exerts a privately observed effort e_i to increase cash flows, taking as given the firm's governance g_i. Managerial effort has a private cost with monetary equivalent

$$\frac{e_i^2}{2}. \tag{1}$$

which is standard in the literature. For simplicity, we assume that cash flows only accrue at the final date. The date-2 cash flow of firm i is assumed to be given by the standard one-market factor model

$$C_i = \theta_i e_i + B_i(R_M - R_f) + \varepsilon_i \tag{2}$$

where R_M is the market factor with expected value $\overline{R}_M$ and variance σ_M^2, ε_i is random with mean 0 and variance σ_i^2, $cov(\varepsilon_i, R_M) = 0$, R_f is the risk-free interest rate, B_i is constant, and $\theta_i \geq 0$ describes the marginal impact of managerial effort on cash flow. We call θ_i the effort multiplier; it measures the manager's specific contribution to firm value.

Stock market investors, who have mean-variance preferences over wealth at date 2, have homogenous expectations at date 1 and therefore invest according to two-fund separation and price the firm's shares in line with the classical CAPM. Investors take the firm's corporate governance as given and correctly anticipate the owner/manager's effort choice and public cash flows $(1 - g_i)\, C_i$ at date 2.

When selling the stake $\widehat{\pi}_i$ of her firm, the owner/manager realizes cash of $\widehat{\pi}_i P_{i1}$, out of which she invests $m_i \geq 0$ in the market portfolio, whose price we normalize to 1, and keeps the rest in the risk-free asset. Hence, the owner/manager's final wealth consists of the public cash flows from her stake $\overline{\pi}_i$ in her own firm, the monetary value of her private benefits, her holding of the market portfolio, and of the safe asset. It is convenient to denote

$$s_i = \phi_i g_i + \overline{\pi}_i\,(1 - g_i) = \overline{\pi}_i + (\phi_i - \overline{\pi}_i) g_i, \tag{3}$$

which is the owner/manager's exposure to cash flows: $\phi_i g_i$ is the exposure to cash flows through private benefits, and $\overline{\pi}_i\,(1 - g_i)$ is the exposure to cash flows through ownership.

[11] Clearly, the owner-manager's ownership decison is more complex than what our simple models covers. If she has strong preferences for private control of the firm, $\overline{\pi}_i$ is likely to be close to π_0; otherwise, or if she is severely wealth-constrained, has strong liquidity preferences, or if the sale is driven by a generational transition, $\overline{\pi}_i$ is likely to be smaller.

[12] Hence, we assume that managerial ownership is not too large, which is certainly the relevant case in our U.S. stock market data. In our sample, managerial ownership is typically very low, with a median value below 1.5 % according to Execucomp (reporting ownership data for the top 5 highest paid employees according to SEC rules).

The owner/manager's final wealth therefore is

$$W_i = \overline{\pi}_i(1-g_i)C_i + \phi_i g_i C_i + m_i(1+R_M) + (\widehat{\pi}_i P_{i1} - m_i)(1+R_f) \quad (4)$$
$$= s_i C_i + \widehat{\pi}_i P_{i1}(1+R_f) + m_i\left(R_M - R_f\right). \quad (5)$$

Like all other investors, the owner-manager is risk averse, with mean-variance utility

$$U_i = EW_i - \frac{\lambda_i}{2} var(W_i) - \frac{e_i^2}{2} \quad (6)$$

where λ_i denotes her risk aversion, and variance

$$var(W_i) = \sigma_M^2\left(s_i B_i + m_i\right)^2 + s_i^2\sigma_i^2.$$

Our results are driven by cash flow risk and managerial moral hazard. Risk and its impact are measured by the parameters λ_i, B_i, σ_M^2, and σ_i^2. Managerial moral hazard depends on θ_i, the effect of effort on cash flow, and ϕ_i, the ease with which private benefits can be appropriated. Our theory requires that managerial effort is sufficiently important compared to risk-sharing motives. We therefore assume that[13]

$$\theta_i^2 \geq \lambda_i \sigma_i^2. \quad (7)$$

2.2 Effort choice

We solve the model backwards, first determining the owner-manager's effort at date 2, then the share price and the owner/manager's portfolio decision at date 1, and then the corporate governance regime g_i at date 0. Hence, the owner-manager determines g_i knowing that she will later adjust her shareholdings, but that the stock market will price her trading decision.

Since effort is additively separable in our model, inserting (2) into (6) yields the first-order condition for effort choice as

$$e_i = s_i \theta_i. \quad (8)$$

Inserting (8) into (2) shows that realized cash flows are

$$C_i = \theta_i^2 s_i + B_i(R_M - R_f) + \varepsilon_i \quad (9)$$

which is increasing in governance laxity g_i. As regards payouts to investors, $(1-g_i)C_i$, the choice of governance therefore is subject to a basic tradeoff between increasing managerial initiative ("initiative effect") and restricting managerial self-dealing ("dissipation effect"). Strict governance (low g_i) increases the share of the pie distributed to outside shareholders, but decreases the overall size of the pie.

[13] This assumption is stronger than needed, but is simple, as it only involves the comparison of θ_i and σ_i^2. Our theory does not hold if θ_i is close to zero, as the owner/manager is dispensible in this case and standard CAPM arguments dominate the analysis.

2.3 Capital market equilibrium

We price the firm's stock at date 1 using the traditional CAPM. By the CAPM, P_{i1} adjusts such that the expected return of firm i is

$$ER_i = R_f + \beta_i(\overline{R}_M - R_f) \tag{10}$$

where $R_i = P_{i2}/P_{i1} - 1$ is the holding-period rate of return of firm i's shares, and

$$\beta_i = \frac{cov(R_i, R_M)}{var(R_M)}. \tag{11}$$

Substituting for R_i into the CAPM formula (10) yields

$$\frac{EP_{i2}}{P_{i1}} - 1 = R_f + \frac{cov(R_i, R_M)}{var(R_M)}(\overline{R}_M - R_f). \tag{12}$$

By (2),

$$P_{i2} = (1 - g_i)\,C_i = (1 - g_i)\,(\theta_i e_i + B_i\,(R_M - R_f) + \varepsilon_i) \tag{13}$$

which implies

$$\begin{aligned} cov(R_i, R_M) &= cov(\frac{P_{i2} - P_{i1}}{P_{i1}}, R_M) \\ &= \frac{(1 - g_i)\,B_i}{P_{i1}}\sigma_M^2. \end{aligned} \tag{14}$$

From (12), the expected rate of return of stock i therefore is

$$E\frac{P_{i2}}{P_{i1}} - 1 = R_f + \frac{(1 - g_i)\,B_i}{P_{i1}}(\overline{R}_M - R_f). \tag{15}$$

Substituting for P_{i2} in (15) from (13) yields P_{i1}, the firm's date-1 market value:

$$\begin{aligned} & (1 - g_i)\left(\theta_i e_i + B_i\left(\overline{R}_M - R_f\right)\right) = (1 + R_f)P_{i1} + (1 - g_i)\,B_i(\overline{R}_M - R_f) \\ \Rightarrow \quad & P_{i1} = \frac{1 - g_i}{1 + R_f}\theta_i e_i. \end{aligned} \tag{16}$$

Combining (16) with (13) and (8) yields

$$\begin{aligned} R_i &= \frac{P_{i2}}{P_{i1}} - 1 && (17) \\ &= \frac{\theta_i e_i + B_i\,(R_M - R_f) + \varepsilon_i}{\theta_i e_i}\,(1 + R_f) - 1 && (18) \\ &= R_f + \frac{B_i\,(1 + R_f)}{\theta_i^2 s_i}\,(R_M - R_f) + \frac{1 + R_f}{\theta_i^2 s_i}\varepsilon_i && (19) \end{aligned}$$

Equation (19) describes the classic linear regression of firm stock returns on the market excess return. In this regression, the observed beta is given by

$$\beta_i = \frac{B_i\,(1+R_f)}{\theta_i^2 s_i} \tag{20}$$

$$= \frac{B_i\,(1+R_f)}{\theta_i^2(\overline{\pi}_i + (\phi_i - \overline{\pi}_i)g_i)}. \tag{21}$$

Writing the idiosyncratic return component in (19) as

$$\eta_i = \frac{1+R_f}{\theta_i^2 s_i}\varepsilon_i, \tag{22}$$

one can re-write (19) in the standard form

$$R_i = R_f + \beta_i\,(R_M - R_f) + \eta_i \tag{23}$$

which is the stochastic version of the expected-return CAPM equation (10), where the standard deviation of idiosyncratic returns is

$$\sigma_{\eta i} = \frac{1+R_f}{\theta_i^2 s_i}\sigma_i. \tag{24}$$

(18) and (20) show that stock returns do indeed not depend directly on governance: the impact of governance on earnings is anticipated and rationally priced by the market.[14] However, governance impacts the stock market variables indirectly through its effect on effort. Higher effort affects current and future prices (P_{i1} and P_{i2}) similarly (with marginal effect $(1-g_i)\,\theta_i$, appropriately discounted). But since it does not affect cash flow risk, it affects returns only via the baseline effect on P_{i1}. Interestingly, higher effort, which increases future earnings and therefore current prices, reduces expected returns and their riskiness. This makes sense: effort reduces systematic and idiosyncratic risk per unit of investment, and therefore investors require a lower expected return to invest in the firm.

2.4 Portfolio choice

When the owner/manager chooses her market portfolio m_i, the market takes the corporate governance choice g_i as given, correctly anticipates the induced value of effort as a function of g_i and $\overline{\pi}_i$, and sets the stock price accordingly.

Using the optimal effort and the equilibrium stock price in (16), the objective function (6) of the owner/manager becomes

$$U_i = \frac{1}{2}s_i^2\theta_i^2 + (s_iB_i + m_i)\left(\overline{R}_M - R_f\right) + (1-g_i)\,\widehat{\pi}_i\theta_i^2 s_i - \frac{\lambda_i}{2}\left(\sigma_M^2\,(s_iB_i+m_i)^2 + s_i^2\sigma_i^2\right). \tag{25}$$

[14] "If corporate governance matters for firm performance and this relationship is fully incorporated by the market, ... expected returns on the stock would be unaffected ..." (Gompers, Ishi, Metrick, 2003, p. 121).

Through her exposure to the firm's cash flow, the owner/manager is exposed to idiosyncratic risk σ_i^2 and market risk σ_M^2. She therefore chooses m_i such as to hedge the risks from ownership and governance. For simplicity, we ignore the short-selling constraint $0 \leq m_i \leq \widehat{\pi}_i P_{i1}$, which will be satisfied at the unconstrained optimum if $\widehat{\pi}_i$ is sufficiently large. The interior optimum then is given by

$$\frac{\partial U_i}{\partial m} = \overline{R}_M - R_f - \lambda_i \sigma_M^2 \left(s_i B_i + m_i \right) = 0 \tag{26}$$

from which

$$m_i = \frac{\overline{R}_M - R_f}{\lambda_i \sigma_M^2} - \left(\phi_i g_i + \overline{\pi}_i \left(1 - g_i \right) \right) B_i. \tag{27}$$

The manager's optimal exposure to the market in (27) is composed of her standard demand for the market portfolio in a mean-variance framework, $\frac{\overline{R}_M - R_f}{\lambda_i \sigma_M^2}$, minus the term $\left(\phi_i g_i + \overline{\pi}_i \left(1 - g_i \right) \right) B_i$, which hedges the manager's exposure to the systematic component of her firm's cash flows.[15] Note that the manager is exposed to the firm's risk even if she reduces her ownership to $\overline{\pi}_i = 0$ because of her private benefits that derive from cash flows.

Inserting (26) into (25) yields

$$U_i = \frac{1}{2} s_i^2 \theta_i^2 + \left(1 - g_i \right) \widehat{\pi}_i \theta_i^2 s_i - \frac{\lambda_i}{2} s_i^2 \sigma_i^2 + \frac{(\overline{R}_M - R_f)^2}{2 \lambda_i \sigma_M^2} \tag{28}$$

This is the owner/manager's objective function when she determines her preferred level of governance, g_i^*.

Proposition 1 *The optimal corporate governance regime is unique and is given by*

$$g_i^* = \frac{\widehat{\pi}_i \theta_i^2 \left(\phi_i - 2\overline{\pi}_i \right) + \left(\phi_i - \overline{\pi}_i \right) \overline{\pi}_i \left(\theta_i^2 - \lambda_i \sigma_i^2 \right)}{\left(\phi_i - \overline{\pi}_i \right) \left[2 \widehat{\pi}_i \theta_i^2 - \left(\phi_i - \overline{\pi}_i \right) \left(\theta_i^2 - \lambda_i \sigma_i^2 \right) \right]}, \tag{29}$$

at an interior solution. If idiosyncratic risk σ_i^2 and managerial risk aversion λ_i are sufficiently large, then $g_i^* = 0$.

Proof. Since $\lambda_i \sigma_i^2 \left(\phi_i - \overline{\pi}_i \right) > \theta_i^2 \left(\phi_i + \overline{\pi}_i - 2\pi_0 \right)$ by (7), the objective (28) is inversely U-shaped as a function of g_i. Differentiating yields

$$\frac{\partial U_i}{\partial g_i} = - \left(\phi_i - \overline{\pi}_i \right) \left(\left(\phi_i - \overline{\pi}_i \right) g_i + \overline{\pi}_i \right) \left(\lambda_i \sigma_i^2 - \theta_i^2 \right) + \widehat{\pi}_i \theta_i^2 \left(\left(\phi_i - \overline{\pi}_i \right) \left(1 - 2 g_i \right) - \overline{\pi}_i \right). \tag{30}$$

The maximum therefore is positive and given by (29) iff

$$\left(\phi_i - \overline{\pi}_i \right) \overline{\pi}_i \left(\theta_i^2 - \lambda_i \sigma_i^2 \right) > - \widehat{\pi}_i \theta_i^2 \left(\phi_i - 2\overline{\pi}_i \right). \tag{31}$$

[15] This is a standard result in the literature, because if the manager holds a fraction of her wealth in the firm, the portfolio choice problem becomes an optimization problem with an additional constraint (see Mayers (1973) and Anderson and Danthine (1981) for the general case where an asset is constrained).

In this case, the solution is interior and (29) obtains. Otherwise, $g_i^* = 0$.

Proposition 1 trades off the costs and benefits of governance in (28) with all their ramifications with respect to managerial effort, the firm's market value, and the manager's portfolio choice. The first, fundamental, observation stems from (8) and the structure of $s_i = (\phi_i - \overline{\pi}_i) g_i + \overline{\pi}_i$, the owner/manager's exposure to cash flows: laxer governance increases the manager's cash flow exposure and therefore effort.

The term $\frac{1}{2}s_i^2\theta_i^2$ in (28) then is the equilibrium value of $s_i\theta_i e_i - \frac{1}{2}e_i^2$ in (6) and (5), the manager's expected cash flow gain net of effort costs. The term $(1-g_i)\,\widehat{\pi}_i\theta_i^2 s_i = \widehat{\pi}_i P_{i1}\,(1+R_f)$ reflects the fact that laxer governance increases effort but decreases public cash flows which has an ambiguous impact on the price, $P_{i1} = \frac{1-g_i}{1+R_f}\theta_i^2 s_i$, at which the owner/managers sells her share $\widehat{\pi}_i$. Finally, the term $-\frac{\lambda_i}{2}s_i^2\sigma_i^2$ in (28) represents the impact of higher cash flow exposure on the manager's disutility from risk. Note that increased exposure to market risk through the firm's cash flow is neutralized by the manager's portfolio adjustment in (26).

The trade off between the costs and benefits of an increase in governance laxity can be understood in terms of a risk-effort tradeoff from the two basic effects of managerial cash flow diversion. On the one hand, the proportional extraction of risky cash flows is like owning a risky asset, the demand for which depends on risk aversion and the risk of the asset. On the other hand proportional extraction of risky cash flows is like giving the owner/manager variable pay, which increases the owner/manager's incentives to generate cash flows through effort because she partially benefits from the additional cash flow produced.

Note that managerial effort is important in the determination of the corporate governance regime. If the agent who makes the governance choice were to contribute nothing to cash flows ($\theta_i = 0$), then (28) would imply that she would optimally choose the strictest possible governance rules. Otherwise, she would pay the cost of lax governance without any benefit in terms of additional cash flows.

3 Testable Propositions

In our model, corporate governance has a causal effect on public cash flows and stock prices, but is itself endogenous. Our main exogenous variables are $\theta_i, \sigma_i, \pi_i, \phi_i, \lambda_i, B_i$; the endogenous variables are governance g_i, public cash flows $(1-g_i)C_i$, stock returns R_i, idiosyncratic stock risk $\sigma_{\eta i}$, and β_i. The closed form solution for the optimal governance regime established in Proposition 1 allows us to trace the impact of exogenous variables explicitly and to find equilibrium relations between endogenous variables. Among our exogenous variables, the idiosyncratic cash flow risk σ_i is of particular interest, because this is a variable for which we can construct a convincing empirical proxy that allows us to take the theory to the data despite the endogeneity of governance.[16]

As discussed in the previous section, (21) shows that β_i declines with g_i: an increase in g_i increases optimal effort $e_i = s_i\theta_i$, which, in turn, increases cash flows. Hence, stock return risk is now spread over higher cash flows, which implies that systematic cash flow risk becomes less important.

But governance g_i is itself endogenous. From (29), the impact of σ_i on g_i can easily be computed as $\frac{dg_i^*}{d\sigma_i} < 0$. Economically, this negative relation follows directly from the fact that access to cash flows through lax governance is similar to ownership of the cash flow. Hence, the owner/manager's demand for lax governance declines with the idiosyncratic risk of cash flows.

Since σ_i has no direct impact on β_i, these two negative partial effects give the full effect of σ_i on β_i, which by the chain rule is positive.

The effect of σ_i on idiosyncratic stock return volatility $\sigma_{\eta i}$ in (24) follows the same logic, and is even stronger, because σ_i also has a direct impact on $\sigma_{\eta i}$ and increases it directly. Hence, $\frac{d\sigma_{\eta i}}{d\sigma_i} > 0$. As the relevant formulas (21), (24), and (29) immediately show, the same comparative statics hold for the risk aversion parameter λ_i. The following proposition summarizes these results.

Proposition 2 *Suppose that $g_i^* > 0$. When idiosyncratic cash flow volatility σ_i or risk aversion λ_i change, the equilibrium values of β_i and $\sigma_{\eta i}$ move in the same direction, and opposite to that of the governance variable g_i. The dependence is as follows:*

$$\begin{array}{llll} & g_i^* & \beta_i & \sigma_{\eta i} \\ \lambda_i, \sigma_i \nearrow & \searrow & \nearrow & \nearrow \end{array}$$

The impact of changes of the effort multiplier θ_i can be assessed in a similar way to σ_i. After some calculations, differentiating (29) yields

$$\frac{dg_i^*}{d\theta_i} = \frac{2\theta_i\lambda_i\sigma_i^2\phi_i\left(\pi_0 - \overline{\pi}_i\right)}{\left(\lambda_i\sigma_i^2\left(\phi_i - \overline{\pi}_i\right) - \theta_i^2(\phi_i - 2\pi_0 + \overline{\pi}_i)\right)^2} > 0 \tag{32}$$

Intuitively, a higher effort multiplier puts more weight on effort in the risk-effort tradeoff described above, and therefore makes the owner/manager want to have more cash flow exposure through lax governance.

Hence, the indirect effect of θ_i on β_i, $\frac{d\beta_i}{dg_i}\frac{dg_i}{d\theta_i}$, is negative, and the same for $\sigma_{\eta i}$. As in the earlier discussion, the direct impact of θ_i on β_i and $\sigma_{\eta i}$ is negative, too, because the increased additive effort reduces the risk components of returns through the baseline effect of increased cash flows. Formally, this can again be easily seen from (20) and (24). Hence, the direct and indirect effect of θ_i have the same sign.

The impact of the diversion parameter ϕ_i can be calculated similarly. This impact is negative on β_i and $\sigma_{\eta i}$, and positive on g_i.

[16] Ownership π_i, of course, is also observable. Unfortunately, managerial ownership is often very small, so that it is difficult to work with standard data bases (see, e.g., von Lilienfeld-Thoal and Ruenzi, 2014).

Variations of the parameters θ_i and ϕ_i therefore have the same observable impact as σ_i on the co-movement of the endogenous variables g_i, $\sigma_{\eta i}$, and β_i. This is remarkable, because the economic logic of θ_i, and ϕ_i is different from that of λ_i and σ_i. However, θ_i and ϕ_i are more difficult to proxy for and to measure empirically.[17] Without resorting to causal statements as in Proposition 2, we can summarize these predictions as follows.

Proposition 3 *When any of the parameters σ_i, λ_i, θ_i, or ϕ_i changes, the equilibrium values of β_i and $\sigma_{\eta i}$ move in the same direction, and opposite to that of the governance variable g_i.*

4 Data

Not all our theoretical variables are easily observable empirically. In this section, we describe the choice and construction of our empirical variables. Table 1 provides a summary.

INSERT Table 1 HERE

4.1 Corporate governance

As noted in the introduction, measuring corporate governance is conceptionally difficult.[18] An important practical measure is the index compiled by the IRRC (Investor Responsibility Research Center) that has been used by Gompers, Ishii and Metrick (2003) to construct their own index. The GIM Index includes 24 anti-takeover provisions such as the existence of a staggered board, poison pills, supermajority voting requirements, etc. A full description is given in Appendix A. The GIM Index summarizes how well management is protected from outside interference and provides a plausible proxy for our g_i variable. It is available for 2, 740 U.S. non-financial firms, for the years 1990, 1993, 1995, 1998, 2000, 2002, 2004 and 2006 (in total 10,137 observations). Our sample period is therefore longer than the period in Gompers, Ishii, and Metrick (2003), which allows us to address the objection by Bebchuk, Cohen, and Wang (2013) that the observed positive correlation between the GIM Index and abnormal stock returns disappears after 2000.

As in Bates, Kahle and Stulz (2009), Ferreira and Laux (2007) and others, we exclude financial firms because their regulation, capital structure, and

[17] θ_i can be interpreted as a measure of agency costs, in the sense that managers with higher θ_i are more important to the firm. If one adopts this interpretation, the empirical proxies for agency costs in Fahlenbrach (2009) may be useful for empirical tests. If one adopts this interpretation and if one uses the empirical proxies for agency costs in Fahlenbrach (2009), then (32) is consistent with Fahlenbrach's (2009) findings that higher GIM values are associated with higher managerial agency costs.

[18] See Bhagat, Bolton, and Romano (2008) for an excellent overview. Larcker, Richardson, and Tuna (2007) provide a principal-component analysis of some important dimensions of corporate governance.

managerial moral hazard is more complex than the structure considered in our model. We also exclude utilities because they are subject to special regulatory supervision.

Figure 1 presents a visual summary of the frequency distribution of the GIM Index values. For expositional reasons we have re-scaled the 19 possible values the GIM Index takes on into 6 values. The mapping is as follows: values (1,2,3) of the GIM Index become 0; (4,5,6)→1; (7,8,9)→2; (10,11,12)→3; (13,14,15)→4; (16,17,18,19)→5 is the strictest governance, 5 is the least strict.[19]

INSERT Figure 1 HERE

In line with the prediction of proposition 1, the GIM Index is not zero in the large majority of cases indicating that most firms do not choose the strictest possible governance rules. Instead there is substantial heterogeneity in corporate governance levels, and the median is at the centre of the distribution, suggesting that the choice of governance is the result of a trade-off.

Furthermore, we observe no major change in the GIM Index over time. Table 2 presents a transition matrix showing the number of changes in the GIM Index for consecutive years over the sample. When a change occurs it is most likely an increase of the GIM Index. Hence, most of the variation in the governance data is cross-sectional and not dynamic.

INSERT Table 2 HERE

For this reason, we will not make use of the panel structure of our data and rather take time-averages of our variables and focus our econometric analysis on the cross-section. This is consistent with our model, which is static and focusses on cross-sectional characteristics. In Appendix B, we re-do our regressions for the panel and show that all effects are qualitatively identical.

Table 3 reports the mean, standard deviation, 5th percentile, median, and 95th percentile of the GIM Index for the companies in our sample.[20]

INSERT Table 3 HERE

The average GIM Index on a scale from 1 to 19 is 8.53 with a standard deviation of 2.53. Thus there is concentration in the middle, but also heterogeneity in the distribution of corporate governance rules: 5% of the firms have a GIM Index below 4.5 and 5% an index above 13.

[19] Values from 20 to 24 are excluded because they are not firm-specific.

[20] We reports statistics for the original GIM index because the empirical analysis is performed with the original GIM index based on the full set of provisions.

4.2 Idiosyncratic Cash-Flow Volatility

Cash-flow volatility has been studied, in particular, by Bates, Kahle, and Stulz (2009), who investigate the role of cash flow volatility for corporate cash holdings. Different from them, we consider the idiosyncratic component of cash flow volatility, as suggested by our theoretical analysis. Hence, we disentangle the component of cash flows related to market volatility ($B_i \sigma_M$) and the cash flow risk specific to firm i, that is σ_i.

Bates, Kahle and Stulz (2009) calculate cash flow volatility as the standard deviation of the ratio of cash flows to the book value of assets, computed as follows. For each firm-year, they compute the standard deviation of cash flow to assets for the previous 10 years. They require at least three observations. They define cash flows as EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) minus interest, taxes, and common dividends. We use the same approach but proxy cash flow with EBITDA only, because we need a variable that is as free of managerial manipulation as possible. Since interest, taxes, dividends, and depreciation can be influenced to some extent by management, and since these variables are not relevant to our model, we use simple EBITDA. The cash flow ratio then is the ratio of EBITDA to the book value of total assets and we indicate this variable with $EBITDA_{it}$.

We identify the cash flow risk specific to firm i, that is σ_i, using standard regression analysis. Starting from the 2,740 firms in our sample of the GIM Index for each year, we compute the "market cash flow", $EBITDA_{Mt}$, as the weighted average of the ratio between firm cash flow to assets in the sample of that year, with weights given by the firms' market value. For each firm we require at least five observations. For each firm, we compute cash flow idiosyncratic volatility for the previous 5 years by regressing the firms' yearly cash flow ratio on market cash flow, that is, for each firm i and each year we perform the following regression:

$$EBITDA_{it} = \alpha_i + \gamma_i EBITDA_{Mt} + u_{it}, \tag{33}$$

where α_i is the regression constant and u_{it} is an error term.

After estimating α_i and γ_i for each firm i, we calculate the estimated residuals $\hat{u}_{it} = EBITDA_{it} - \widehat{\alpha}_i - \widehat{\gamma}_i EBITDA_{Mt}$, where $\widehat{\alpha}_i$ and $\widehat{\gamma}_i$ are the estimates of α_i and γ_i. Then for each firm we calculate the volatility of the estimated residuals of each regression, which we call $ICFV_i$ (Idiosyncratic cash flow volatility), and use this variable as a proxy of the idiosyncratic cash flow volatility σ_i in our model.

Table 3 reports the statistics of $ICFV_i$ for the companies in our sample. The number of firms with at least 5 observations in our sample is 1,678, still large enough. Idiosyncratic cash flow volatility is relatively heterogeneous across firms, with a mean of 3.3% of total assets and a standard deviation of 2.7%. 5% of all firms have an idiosyncratic cash flow volatility of less than 0.7%, 5% more than 8.9%.

4.3 Beta and idiosyncratic risk

In order to estimate stock return beta, β_i, and idiosyncratic stock return volatility $\sigma_{\eta i}$ we use the daily stock return data from the Center for Research in Security Prices (CRSP), as documented in Table 1. We follow an approach similar to that of Ferreira and Laux (2007). For each stock i and each year t we consider the daily stock return and the daily market return, where the latter is defined as the market value weighted index of stock returns in our dataset. We then perform the standard regression of returns on the market, as in (23). This regression yields $Beta_{it}$, the beta of stock i for the year t, and the residuals η_{itd} for each day d of the year t considered. For each year, we can then calculate the volatility $\sigma_{\eta it}$ of the daily residuals. Since our sample period ranges from 1990 to 2006 with significant changes in market volatility, we normalize the idiosyncratic stock return volatility by the market volatility σ^2_{Mt}, calculated from daily market returns for the year t. That is we calculate $IRV_{it} = \sqrt{\sigma^2_{\eta it}/\sigma^2_{Mt}}$, the normalized idiosyncratic return volatility of stock i in year t.

Table 3 shows their descriptive statistics. The average $Beta_i$ is 0.97 with a standard deviation of 0.46 indicating again a large heterogeneity of systematic risk in our sample. The average IRV_i is 2.73 with a standard deviation of 1.06, a large dispersion around the mean. Moreover, we find that idiosyncratic stock return volatility is on average three times larger than market volatility, in line with previous empirical evidence by Ferreira and Laux (2007). In particular, idiosyncratic volatility represents the larger part of overall stock volatility.

5 Empirical Results

Our theoretical analysis has yielded two types of predictions. First, Proposition 2 predicts the impact of idiosyncratic cash flow volatility, which is exogenous in our model, on the three endogenous variables g_i, β_i, and $\sigma_{\eta i}$. Second, Proposition 3 predicts correlations between our endogenous variables for a broader set of exogenous variations, which are not necessarily observable. We now test these predictions in turn.

As noted in Section 4.1, there is very little intertemporal variation of firms' GIM indices. Hence, most empirical findings are driven by the cross-section, which is what we focus on in this section. In Appendix B, as a robustness check we estimate the corresponding panel regressions and find the same, if not stronger results.

5.1 Cash Flow Volatility Regressions

In this subsection, we regress different variables on the idiosyncratic cash flow volatility variable $ICFV_i$ defined above. We winsorize extreme observations at the bottom and top 1% levels to avoid spurious inferences.

We begin with the GIM Index and perform three different regressions. First, as Table 4 shows, the univariate regression yields a coefficient of -9.5 significant at the 1% level. This is in line with our theoretical predictions: companies with lower idiosyncratic cash flow volatility exhibit laxer governance.

INSERT Table 4 HERE

In order to verify that this result is not driven by omitted variables we use an extensive number of control variables. In the second regression, we include various balance-sheet variables to control for factors that might induce a spurious correlation. These controls, which are standard in the literature, include book-to-market-value (Log BMKT), total assets (TA), firm age in years (AGE), and a dummy for companies located in Delaware (DELAWARE). We measure variables for each firm-year and then calculate the time-averages. Table 4 displays the estimates and shows that the inclusion of control variables confirms the significant negative impact of idiosyncratic cash flow volatility on the GIM Index. The inclusion of the control variables reduces the value of the coefficient to -5.1, still significant at 1%. The inclusion of sectorial dummies, the third cross section regression, reported in column (3), changes neither the sign of the coefficient nor its significance.

Next, we turn to the stock market risk variables β_i and $\sigma_{\eta i}$. Proposition 2 predicts that both depend positively on idiosyncratic cash flow volatility, σ_i. We perform the three different regressions as above, with results in Table 5.

INSERT Table 5 HERE

The results from Table 5 are as predicted. The univariate regression estimate shows that companies with higher idiosyncratic cash flow volatility, $ICFV_i$, have both higher stock return betas, $Beta_i$, and higher idiosyncratic stock return volatility, IRV_i. These results are confirmed in the multivariate setting that includes control and sector dummies variables.

In the Beta regression the coefficeint of $ICFV_i$ increases from 1.4 for the univariate regression (column 1) to 1.9 for the regression with all control variables (column 3), all significant at the 1% level. The impact on idiosyncratic stock return volatility IRV_i is three to four times as large, with coefficients ranging from 6.5 (column 1) to 6.0 (column 3), all statistically significant at the 1% level. In Appendix B we again report the results for the panel regression and confirm the positive and significant relationships.

5.2 Correlations

While idiosyncratic cash flow volatility provides an exogenous source of variation that we can identify empirically, other exogenous variations cannot be as easily identified. However, Proposition 3 shows that variations of $\sigma_i, \lambda_i, \theta_i$, or ϕ_i all lead to the same changes of the endogenous variables β_i, $\sigma_{\eta i}$ and g_i in our theoretical model and predicts the resulting equilibrium correlations. We now test these predictions of Proposition 3 empirically.

If we were to calculate the simple correlations among the different variables we would ignore other factors that might drive the correlation.[21] Therefore, we investigate partial correlations, i.e. the degree of association between random variables after controlling for variables that are known to influence the empirical variables through OLS regressions. These partial correlations are calculated among our endogenous variables, and the control variables are those already used in the previous section: the book-to-market-value (Log BMKT), total asssets (Log TA) and firm age (Log AGE), a dummy for companies located in Delaware (DELAWARE) and the 48 Fama and French sector dummies variables. Table 6 reports the estimated correlation coefficients among the three variables GIM Index, Beta, and IRV of Proposition 3.

INSERT Table 6 HERE

The signs in the upper two lines of Table 6 are consistent with the prediction in Proposition 3 and significant at the 5% level. The partial correlation analysis is consistent with the results of Ferrera and Laux (2007) who investigate the empirical relation between IRV and the GIM Index. We have also calculated the partial correlation using the panel rather than the cross-section of our variables and the results (reported in appendix B) confirm the signs reported above, with significance levels of 1% throughout.

5.3 Robustness analysis

We have tested the robustness of our results with respect to different model specifications and different regressions methods. All the results reported in this subsection are available on request.

First, regressions with the GIM Index re-scaled from 0 to 5 as in Figure 1 yield similar results. Second, we have investigated whether our empirical results disappear in the more recent part of the sample. The issue of a sample break has been raised by Bebchuk, Cohen, and Wang (2013) in the traditional framework of estimating abnormal returns. They have shown that the findings of Gompers et al. (2003) largely vanish for the period 2000-2008 and attribute this to learning by market participants. We have performed the univariate and multivariate analysis for the sub-sample of 2000-2006 and find that our results are confirmed. This shows that our findings are mainly due to a cross section rather than a time series effect that is persistent through time, in line with our modelling approach.

Third, we have investigated whether our results are related only to a subset of the twenty-four governance provisions of the GIM Index. This issue has been

[21] See, e.g., Core et al. (2006) and Giroud and Mueller (2011) for careful discussions of these factors

raised by Bebchuk, Cohen, and Farrell (2009), who show that only six provisions are associated with economically significant reductions of firm valuation and abnormal negative returns. Our results continue to hold when we use the Entrechment Index based on the six provisions identified by Bebchuk, Cohen, and Ferrell (2009) instead of the GIM Index for the period 2000-2006. We have also repeated the analysis for the index based on the other eighteen provisions and the relationship are confirmed. Hence, our findings hold over subsets of the twenty-four governance provisions of the GIM Index.

Fourth, in line with the work of Ferreira and Laux (2007) and the work of Cella, Ellul, and Giannetti (2013) that shows that institutional investor ownership matters in amplifying the effect of shocks on stock returns, we have also considered institutional ownership as a control variable. The results are qualitatively similar.

6 Conclusion

This paper has constructed a model that incorporates two key elements of the managerial agency problem into the CAPM, with countervailing effects of lax corporate governance. On the one hand laxer governance allows the owner/manager to extract a larger fraction of corporate cash flows as private benefits. On the other hand, laxer governance makes the owner/manager benefit more from the value she creates, partially aligning her incentive with those of the outside shareholders. The optimal governance strictness balances the resulting marginal costs and benefits. In capital market equilibrium, the above trade-off has implications for the firm's stock return volatility and earnings, because different governance choices are associated with different risk-return structures. When different exogenous parameters of our model change, this changes the owner/manager's valuation of extracting private benefits from risky cash flows. This changes her attitude towards the strictness of corporate governance rules, impacts managerial effort and cash flows, and in turn affects how idiosyncratic risk is spread over cash flows. This changes the valuation of stock returns, in particular the stock's β and idiosyncratic risk.

Idiosyncratic cash flow risk being a good source of exogenous variation, we can perform simple OLS regressions of our endogenous variables on this variable, without concerning ourselves with identification issues. These OLS regressions confirm our theoretical predictions.

Theoretically we argue that governance, stock maket performance, and accounting performance are all endogenous. We therefore cannot conduct regressions of these variables on governance indices of the sort found in the literature. Instead, our analysis predicts that cross-sectionally β, idiosyncratic stock return volatility, and governance strictness correlate positively. We test these predictions by using partial correlations, which measure correlations after controlling for various firm characteristics, and find strong support for them.

Our theoretical model of cash flow generation by the firm is too simple to be used for a serious analysis of firms' operating performance. The previous literature, with governance as an exogenous variable, has found little or no significance of governance in this respect (in particular, Gompers et al. (2003), Core et al. (2006)), indicating that this relationship is indeed more complex. Mueller and Giroud (2011) show that industry competition is an important driver here, and it would be interesting to extend our model in this direction.

Open issues for future work:
1. managerial ownership $\overline{\pi}_i$ exogenous
2. Steady state: endogenous $\pi_i = \pi_0$
3. no managerial incentive contract
4. governance determined by initial owner, not the stock market
5. No model of industry competition (reduced form for firm cash flows)

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Appendix A: The GIM Index

The "Governance Index" introduced by Gompers, Ishii, and Metrick (2003) is a proxy for the level of shareholder protection in a company. It has been computed for about 1500 U.S. firms, covering more than 93% of the total capitalization of the NYSE, AMEX and NASDAQ, in 1990, 1993, 1995, 1998, 2000, 2002, 2004 and 2006.[22] This index is based on 24 corporate-governance provisions. It is computed as the number of provisions, among these 24 provisions, which reduce shareholder's rights. So, the index ranges from 0 to 24 and, the higher is the index, the weaker are shareholder rights. 22 of these provisions are provided by the Investor Responsibility Research Center (IRRC). 6 other provisions are instituted by state law, among which 4 are redundant with the IRRC provisions. However, not all the U.S. states have adopted these 6 provisions. So, in case of redundancy of two provisions, they count only for one. Thus, the index in made up of 24 provisions. The list of the provisions, along with a short description, is provided below. The provisions are clustered in five functional groups: “Delay", which contains tactics for delaying hostile bidders; “Voting", containing shareholder rights in elections or charter/bylaw amendments; “Protection", with provisions that offer protection for directors/officers against job-related liability and compensations; “Other", containing other anti-takeover provisions; and “State", which refers to protective state laws.

Some provisions may vary in amplitude: for instance, the supermajority threshold can vary from 51% to 100%; however, no distinction is made, only the presence of such provision is considered. Also notice that even though some provisions might have a positive effect for shareholders in certain circumstances,[23] as long as they increase management's power they are considered as weakening shareholder protection. The Secret ballot and the Cumulative voting provisions are the only ones increasing the shareholders' rights and their absence increases

[22] The GIM Index is available on Andrew Metrick's web page and in the WRDS database.
[23] See our discussion of Kadyrzhanova and Rhodes-Kropf (2011) in Section 2.

the index by one point each. It is interesting to note that the index has no obvious industry concentration.

The detailed list of provisions is as follows:

- Delay: tactics for delaying hostile bidders
  - Blank check: the issuance of preferred stocks, which give additional rights to its owner, to friendly investors is used as a "delay" strategy.
  - Classified board: the directors are placed into different classes and serve overlapping terms.
  - Special meeting: it increases the level of shareholder support required to call special meetings
  - Written consent: it limits actions beyond state law requirement
- Voting: shareholder's rights in elections or charter/bylaw amendments
  - Compensation plans: it enables participants in incentive bonus plans to cash out options or accelerate the payout of bonuses in case of change in control.
  - Contracts: contracts between the company and some directors/officers indemnifying them from legal expenses and judgments resulting from lawsuits. The contracts comes in addition to indemnification.
  - Golden parachutes: severance agreements that provides a compensation to senior executives upon an event such as termination, resignation, etc.
  - Indemnification: it uses bylaws and/or charters to indemnify directors/officers from legal expenses and judgment. The contracts comes in addition.
  - Liability: it is a limitation on director personal liability to the extent allowed by state law.
- Protection: protection for director/officer against job-related liability, and compensations
  - Bylaws: it limits the shareholder's ability to amend the governing documents of a company through bylaws.
  - Charter: it limits the shareholder's ability to amend the governing documents of a company through charter.
  - Cumulative voting: it allows a shareholder to allocate his total votes in any manner desired.
  - Secret ballot: an independent third party counts votes and the management agrees not to look at individual votes
  - Supermajority: it increases the level of the majority, with respect to the state law requirement, required to approve a merger

- Unequal voting: it limits the voting rights of some shareholders and expands those of others.

- Other: other anti-takeover provisions
  - Anti-greenmail: it discourages agreements between a shareholder and a company whose aim is the accumulation of large quantities of stocks.
  - Director's duties: it allows a director to consider constituencies other than shareholders, i.e. employees, suppliers, etc., when considering a merger.
  - Fair price: it limits the range of prices a bidder can pay in two-tier offers.
  - Pension parachutes: it prevents an acquirer from using surplus cash in the pension fund of the company
  - Poison pill: it provides special rights to their holders in case of specific events such as a hostile takeover. Such rights are made to render the target unattractive.
  - Silver parachutes: similar to golden parachutes except that it is extent to a large number of employees

- State: state laws
  - Anti-greenmail law (7 U.S. states)
  - Business combination law: imposes a moratorium on certain transactions between a large shareholder and a company (27 U.S. states)
  - Cash-out law: enables shareholders to sell their stake to a controlling shareholder at a certain price (3 U.S. states)
  - Directors' duties law
  - Fair price law
  - Control share acquisition law: see supermajority

Appendix B: Panel Analysis

In the main body of the paper we have reported regressions for the cross-section of time averages of our variables, because, as already noted by Gompers et al. (2003) and shown in Table 2 , the GIM Index is quite stable through time so the main drivers of the variability of this index is the cross-section dimension. In this appendix, as a robustness check, we estimate the corresponding panel regressions. Since in panel regressions the residuals may be correlated across firms or across time and OLS standard errors can be biased (see Petersen, 2008), we use firm-clustered standard errors and time fixed effects.

We construct the panel by performing all the auxiliary regressions described in Sections 4 and 5 on a yearly basis and thus obtain yearly data. Table 8 reports the panel regressions of the GIM-Index, Beta, and IRV with respect to ICFV in line with the cross-sectional analysis reported in Tables 4 and 5.

INSERT Table 8 HERE

The Table shows that the results of the cross-sectional analysis are confirmed by the panel analysis. Also in the panel, the relationship between the GIM Index and the Idiosyncratic Cash Flow Volatility (ICFV) is negative and significant at 1% level. It is positive and significant between beta and ICFV and IRV and ICFV.

Table 9 reports the panel partial correlations among the GIM Index, Beta, and IRV, which are as in the corresponding cross-sectional table 6.

INSERT Table 9 HERE

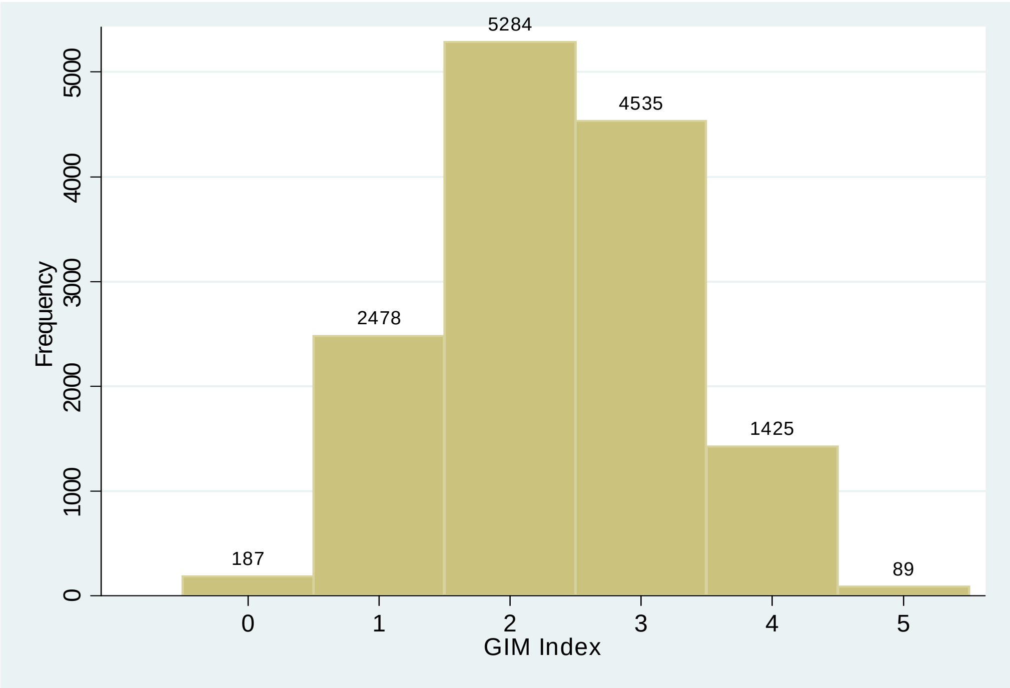

Figure 1: Distribution of the re-scaled GIM Index. Number of observations on the vertical axis. For expositional reasons we have re-scaled the 19 values of the GIM Index into 6 (4,5,6)→1; (7,8,9)→2; (10,11,12)→3; (13,14,15)→4; (16,17,18,19)→5. 0 is the strictest governance, 5 is the least strict.

Table 1: Description of Variables

VARIABLE	DEFINITION	SOURCE
GIM Index	Gompers, Ishii, and Metrick (2003) governance index which is based on 24 antitakeover provisions.	IRRC
ICFV	Firm Standard Deviation of residuals of the EBITDA market model regression. Market value used to compute weights for market index.	Elab. on CRSP data
Beta	Yearly Beta of asset i.	Elab. on CRSP data
IRV	Square root of the Normalized Idiosyncratic volatility to Market volatility.	Elab. on CRSP data
EBITDA	Average of Earnings Before Interest, Depreciation and Amortization, Taxes to Total Assets ratio.	Elab. on CRSP data
ROA	Return on Asset defined as the ratio of Earnings to Total Assets.	Elab. on S&P Compustat data
DELAWARE	Dummy variable equal to 1 if rhe Firm is located in Delaware	Compustat
AGE	Number of years between the year of observation and the year of stock inclusion in the CRSP database.	Elab. on S&P Compustat data
TA	Total Assets.	Elab. on S&P Compustat data
BMKT	Book to Market Value defined as the Book Value per share divided by the Annual Fiscal Price Close.	Elab. on S&P Compustat data

This Table reports the description of the variables used in the analysis and the source of these variables.

Table 2: Transition matrix of the (re-scaled) GIM Index

t \ t+1	0	1	2	3	4	5
0	47	36	7	0	0	0
1	7	1,004	310	16	3	0
2	0	61	2,355	334	13	0
3	1	6	135	2,150	133	0
4	0	3	8	93	731	11
5	0	0	0	0	6	35

This table describes the number of firms that reports a certain level of the GIM Index at time t (Rows) and the same or another GIM index at time t+1 (Columns). Higher GIM Index indicates less strict governance. The sample period is from 1990 to 2006. Number of observations 10,137.

Table 3: Descriptive Statistics

	Mean	Sd	p5	p50	p95	N. Obs
GIM Index	8.969	2.316	5.000	9.000	13.000	1678
ICFV	0.045	0.032	0.011	0.036	0.108	1678
Beta	0.984	0.336	0.507	0.927	1.627	1678
IRV	2.767	0.791	1.707	2.632	4.245	1678
ROA	0.043	0.038	-0.020	0.041	0.111	1678
Log TA	7.050	1.132	5.425	6.916	9.201	1678
Log AGE	2.781	0.704	1.713	2.759	3.989	1678
Log BMKT	-0.886	0.501	-1.823	-0.849	-0.124	1678

This table reports the mean, the standard deviation, the 5th percentile, the median, the 95th percentile and the number of firms of the cross sectional dataset. All variables are as defined in Table 2. Sample period 1990 - 2006.

Table 4: Idiosyncratic Cash Flow Volatility and GIM

	GIM Index		
ICFV	-9.526***	-5.126***	-4.668***
	(-5.579)	(-2.962)	(-2.598)
Log TA		0.220***	0.262***
		(4.273)	(4.802)
Log AGE		0.823***	0.755***
		(10.095)	(8.966)
Log BMKT		-0.035	-0.039
		(-0.313)	(-0.330)
DELAWARE		-0.410***	-0.413***
		(-3.599)	(-3.571)
Constant	9.345***	5.531***	3.716***
	(94.415)	(13.317)	(5.625)
Sector Dummies	No	No	Yes
N.Obs	1,678	1,678	1,678
R^2	0.017	0.110	0.157

This table presents the estimation results of the cross-sectional OLS regressions where the dependent variables is the firm-mean GIM Index. Explanatory variable ICFV (σ_i), and control variables are as defined in Table 1. The sample period is 1990-2006. We exclude firms with less than five observations of EBITDA/TA. All variables are winsorized at the bottom and top 1% levels. Robust standard errors in parenthesis. *** Coefficients significant at the 1% level, ** Coefficients significant at the 5% level, * Coefficients significant at the 10% level.

Table 5: Idiosyncratic Cash Flow Volatility and Stock Return Risk

	Beta			IRV		
ICFV	1.406***	1.537***	1.928***	6.478***	4.645***	5.964***
	(7.243)	(7.560)	(8.655)	(12.873)	(9.407)	(11.797)
Log TA		0.040***	0.044***		-0.183***	-0.226***
		(7.325)	(7.491)		(-12.606)	(-15.916)
Log AGE		-0.032***	-0.041***		-0.211***	-0.257***
		(-3.619)	(-4.468)		(-9.580)	(-11.756)
Log BMKT		-0.044***	-0.050***		0.105***	0.108***
		(-3.458)	(-3.666)		(2.930)	(3.012)
DELAWARE		0.005	0.016		0.015	0.050*
		(0.446)	(1.363)		(0.510)	(1.726)
Constant	-0.052***	-0.298***	-0.244***	-0.140***	1.907***	2.344***
	(-5.184)	(-6.627)	(-2.997)	(-5.129)	(16.508)	(11.686)
Sector Dummies	No	No	Yes	No	No	Yes
N.Obs	1,678	1,678	1,678	1,678	1,678	1,678
R^2	0.033	0.086	0.140	0.092	0.260	0.368

This table presents the estimation results of the cross-sectional OLS regressions where the dependent variables are the firm-mean Beta (Yearly Beta of asset i) and idiosyncratic risk IRV_i, and all variables are defined in Table 1. Dependent variables are previously industry-adjusted by subtracting the industry median in a given 48 FF industry and year The sample period is 1990-2006. We exclude firms with less than five observations of EBITDA/TA. All variables are winsorized at the bottom and top 1% levels. Robust standard errors in parenthesis. *** Coefficients significant at the 1% level, ** Coefficients significant at the 5% level, * Coefficients significant at the 10% level.

Table 6: Partial Correlations

	GIM Index	Beta
Beta	-0.05**	
IRV	-0.084***	0.584***

This table presents the cross-section partial correlation, i.e. the correlations between the residuals resulting from the linear regression of the cross-sectional variables GIM-Index, Beta, and IRV, with the set of control variables: Log TA, Log AGE, Log BMKT, and the DELAWARE dummy variable as well as the 48 Fama and French sectors. The variables are described in Table 1. The dependent variables are industry-adjusted by subtracting the industry median in a given 48 Fama and French industry and year. The sample period is 1990-2006. Correlation coefficients are based on 1,678 observations. All variables are winsorized at the bottom and top 1% levels. *** Coefficients significant at the 1% level, ** Coefficients significant at the 5% level, * Coefficients significant at the 10% level.

Table 7: Panel: Descriptive Statistics

	Mean	Sd	p5	p50	p95	N. Obs
GIM Index	8.965	2.463	5	9	13	10231
ICFV	0.033	0.027	0.007	0.025	0.089	9672
Beta	0.979	0.456	0.353	0.919	1.784	19673
IRV	2.734	1.056	1.415	2.510	4.701	19673
ROA	0.044	0.053	-0.053	0.047	0.124	19647
Log TA	7.129	1.216	5.418	7.003	9.214	19657
Log AGE	2.853	0.751	1.609	2.944	3.989	19673
Log BMKT	-0.899	0.614	-1.981	-0.842	-0.014	19578

This table reports the mean, the standard deviation, the 5th percentile, the median, the 95th percentile and the number of firms of the panel dataset. We obtain yearly ICFV with 5-year rolling window. All variables are as defined in Table 2. Sample period 1990 - 2006.

Table 8: Panel OLS Regressions.

	GIM Index	**Beta**	**IRV**
ICFV	-4.631**	2.189***	8.040***
	(-2.487)	(8.710)	(15.165)
Log TA	0.190***	0.044***	-0.173***
	(3.056)	(7.258)	(-13.089)
Log AGE	0.821***	-0.069***	-0.219***
	(7.294)	(-6.167)	(-8.659)
Log BMKT	0.084	-0.036***	0.097***
	(0.871)	(-3.546)	(3.974)
DELAWARE	-0.384***	-0.009	0.001
	(-2.699)	(-0.697)	(0.037)
Constant	6.230***	-0.183*	2.339***
	(2.788)	(-1.696)	(17.560)
Sector Dummies	Yes	Yes	Yes
N.Obs	9,471	9,471	9,471
R^2	0.141	0.093	0.271

This table presents the estimation results of the panel OLS regressions where the dependent variables are the GIM Index, the Beta (Yearly Beta of asset i) and idiosyncratic risk IRV_i, as defined in Table **??** and control variables as defined in Table **??**. We obtain yearly ICFV with 5-year rolling window. The sample period is 1990-2006. All dependent variables except GIM Index are industry-adjusted by subtracting the industry median in a given 48 FF industry and year. We exclude firms with less than five observations of EBITDA/TA. All variables are winsorized at the bottom and top 1% levels. Robust standard errors (firm clustered) in parenthesis. *** Coefficients significant at the 1% level, ** Coefficients significant at the 5% level, * Coefficients significant at the 10% level.

Table 9: Panel Partial Correlations

	GIM Index	**Beta**
Beta	-0.031***	
IRV	-0.045***	0.415***

This table presents the panel partial correlation, i.e. the correlations between the residuals resulting from the linear regression of the cross-sectional variables GIM-Index, Beta, and IRV with the set of control variables: Log TA, Log AGE, Log BMKT, and the DELAWARE dummy variable as well as the 48 Fama and French sectors. The variables are described in Table **??**. The dependent variables are industry-adjusted by subtracting the industry median in a given 48 Fama and French industry and year. The sample period is 1990-2006. Correlation coefficients are based on 17,213 observations. All variables are winsorized at the bottom and top 1% levels. *** Coefficients significant at the 1% level, ** Coefficients significant at the 5% level, * Coefficients significant at the 10% level. All variables are winsorized at the bottom and top 1% levels.