A Corporate Governance Asset Pricing Model: Theory and Evidence*

Bruno M. Parigi[†] Loriana Pelizzon[‡]

Ernst-Ludwig von Thadden[§]

April 7, 2015

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. Laxer governance standards increase cash flows, which implies that cash flow risk is spread over higher cash flows and becomes relatively less important, decreasing the stock's β. Various empirical tests with U.S. data using the corporate governance index of Gompers, Ishii, and Metrick (2003) are strongly consistent with our predictions.

Keywords: Corporate governance, CAPM, stock returns, beta, cash flow, agency

JEL Classification: G32, G38, K22

.

*We are grateful to Mike Burkart, Martijn Cremers, Xavier Giroud, Paul Laux, Ulf von Lilienfeld-Toal, Stew Myers, Matthew Rhodes-Kropf, Antoinette Schoar, and Per Stromberg for useful discussions and Ludovic Calès and Andrea Lax for excellent research assistance. This paper supersedes our previous paper "Stock Returns, Corporate Governance, and Capital Market Equilibrium", on which the empirical analysis is based.

[†]University of Padova, and CESifo, brunomaria.parigi@unipd.it

[‡]SAFE, Goethe University Frankfurt, pelizzon@safe.uni-frankfurt.de

[§]Universität Mannheim, ECGI, and CEPR, vthadden@uni-mannheim.de.

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 jointly to corporate cash flows and to stock returns, and by considering 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 model in which managers have discretion to exert effort and divert corporate cash flows for their private benefit. Empirically, we test its predictions and find strong support for them from accounting and 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 thus exposes them to the risk-return structure of cash flows. 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. The firm's optimal governance structure then results from trading off

[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.

shareholder expropriation, managerial effort incentives, and risk sharing. As a result, corporate governance, stock returns, β, and cash flows are all endogenous, and we can predict their 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. To the extent that our model parameters are observable, we can also test their impact on the endogenous variables, which altogether yields a 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 the cash flow is large, despite the fact that the market fully prices private benefit extraction. But corporate governance matters for stock returns not only because it affects expected cash flows but also because it changes the risk-return tradeoff for stock market investors. Since laxer governance increases expected cash flows, the firm's risk is spread over higher cash flows, which means that cash flow risk becomes relatively less important, lowering the stock's β and its idiosyncratic volatility.

One advantage of working in a cash-flow framework rather than with stock returns, already recognized by Lambert, Leuz, and Varrecchia (2007), is that the model yields predictions about accounting values. In particular, our model makes the unusual prediction that in the cross-section total corporate cash flows and governance strictness co-move negatively. Total cash flows in the model are those before private benefit taking by managers, and are thus best proxied by measures of earnings less subject to discretion such as EBITDA. Taken together, our analysis therefore predicts that cross-sectionally β, idiosyncratic stock return volatility, and governance strictness correlate positively, and that these variables correlate negatively with measures of earnings such as EBITDA.

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 earnings via lower effort, and increases the firms' β and idiosyncratic stock return risk.

We test these predictions on a large sample of U.S. listed firms for the period 1990-2006. Measuring the quality of corporate governance poses well-known difficulties. Without any claim to originality on this issue, we 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.[3]

Using this measure, we conduct two sorts of tests. First, we regress our endogenous variables GIM Index, β, and accounting earnings on an empirical proxy of idiosyncratic cash flow risk. Since our model predicts 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, earnings, and stock return beta.[4] Second, and even more simply, we calculate the empirical correlations between our endogenous variables. Without an exception, all these tests lend strong support to our theory.[5]

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.

Apart from our emphasis on corporate governance, our analysis provides an interesting insight into the link between cash flow volatility and stock return volatility. Conventional wisdom has it that stock markets diversify away idiosyncratic firm risk and only price systematic risk. Our theoretical and empirical analysis shows, however, that idiosyncratic cash flow volatility increases stock return risk, via its influence on managerial effort, and corporate governance. This empirical observation, which is difficult to reconcile with the standard CAPM but consistent with our theory, seems to have gone unnoticed before.

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 “incentive approach" to corporate governance (Harris and Raviv, 2010) 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), and the crowding out of intrinsic motivation by extrinsic motivation (Falk and Koesfeld, 2006). As

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

[4] 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.

[5] We deliberately provide only correlations and do not resort to regression evidence, which is fraught with endogeneity problems, as discussed, e.g., by Bhagat, Bolton, and Romano (2008).

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 return 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).[6] Our model differs from this line of thinking as we do not directly assume that stricter governance impedes managerial value creation. Rather, in our model laxer governance makes the manager benefit from the value she creates and thus partially aligns her incentive with those of outside shareholders.

An important recent contribution to the costs and benefits of corporate governance is the work by Kadyrzhanova and Rhodes-Kropf (2011), who analyze the effects of anti-takeover provisions from the perspective of product market competition. 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. Since our work does not consider takeovers but rather the tradeoff between the creation and distribution of corporate value, these two approaches to the costs and benefits of corporate governance are largely complementary.

On the empirical side our work is related to the studies of the relation between corporate governance and asset pricing, most notably Gompers, Ishi, and Metrick (2003) and after them, 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

[6] 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 first-best 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).

endogenizes corporate governance, focusses on its impact on effort, or deals with the relationship between stock return risk, 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.[7] 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 accounting cash flow variables, and by arguing that the observed governance-risk relation is the result of an equilibrium tradeoff.

The rest of this paper is organized as follows. In Section 1 we present our the-

[7] 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).

oretical model of corporate governance choice and capital market equilibrium, and derive our theoretical predictions. Section 2 describes the data. Section 3 tests our theoretical predictions in various forms, and Section 4 concludes. A detailed description of the GIM Index is provided in Appendix A.

1 The model

1.1 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, cash flow, and stock return variables. In the model, neither does corporate governance drive cash flows nor vice versa, as both 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.[8] 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 cash flow $(1 - g_i)\, C_i$ to outside shareholders. The owner/manager appropriates a monetary equivalent $\phi g_i C_i$ of realized cash flows. The dilution parameter ϕ, $0 \leq \phi \leq 1$, is exogenous, common to all firms and depends on aggregate factors such as the legal framework or the overall governance standards in the market. 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 (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 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.[9] We assume that $\overline{\pi}_i < \phi$.[10] 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.

[8] 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. Our theory holds for any $\pi_0 \leq 1$.

[9] 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.

[10] 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).

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

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

which is the owner-manager's exposure to cash flows: ϕg_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.

The owner/manager's final wealth therefore is

$$\begin{aligned} W_i &= \overline{\pi}_i(1 - g_i)C_i + \phi g_i + m_i(1 + R_M) + (\widehat{\pi}_i P_{i1} - m_i)(1 + R_f) && (4) \\ &= s_i C_i + \widehat{\pi}_i P_{i1}(1 + R_f) + m_i (R_M - R_f). && (5) \end{aligned}$$

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

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

where λ_i denotes her risk aversion, and variance

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

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, the ease with which private benefits can be appropriated.

1.2 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

$$e_i = s_i\theta_i. \tag{7}$$

1.3 Capital market equilibrium

Pricing at date 1 is a simple application of the traditional CAPM. By the CAPM, P_{i1} adjusts such that the expected return of firm i is

$$ER_i = R_f + \beta_i(\overline{R}_M - R_f) \tag{8}$$

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

$$\beta_i = \frac{cov(R_i, R_M)}{var(R_M)}. \tag{9}$$

Substituting for R_i into the CAPM formula (8) yields

$$\frac{EP_{i2}}{P_{i1}} - 1 = R_f + \frac{cov(R_i, R_M)}{var(R_M)}(\overline{R}_M - R_f). \tag{10}$$

By (2),

$$P_{i2} = (1 - g_i)\, C_i = (1 - g_i)\,(\theta_i e_i + B_i\,(R_M - R_f) + \varepsilon_i) \tag{11}$$

which implies

$$\begin{aligned} cov(R_i, R_M) &= cov(\frac{P_{i2} - P_{i1}}{P_{i1}}, R_M) \\ &= \frac{(1 - g_i)\, B_i}{P_{i1}}\sigma_M^2. \end{aligned} \tag{12}$$

From (10), the expected rate of return of stock i therefore is

$$E\frac{P_{i2}}{P_{i1}} - 1 = R_f + \frac{(1 - g_i)\, B_i}{P_{i1}}(\overline{R}_M - R_f). \tag{13}$$

Substituting for P_{i2} in (13) from (11) yields P_{i1}, the firm's date-1 market value:

$$
\begin{aligned}
& (1-g_i)\left(\theta_i e_i + B_i\left(\overline{R}_M - R_f\right)\right) = (1+R_f)P_{i1} + (1-g_i)\,B_i(\overline{R}_M - R_f) \\
\Rightarrow\quad & P_{i1} = \frac{1-g_i}{1+R_f}\theta_i e_i. \qquad (14)
\end{aligned}
$$

Combining (14) with (11) and (7) yields

$$
\begin{aligned}
R_i &= \frac{P_{i2}}{P_{i1}} - 1 && (15)\\
&= \frac{\theta_i e_i + B_i\left(R_M - R_f\right) + \varepsilon_i}{\theta_i e_i}\left(1+R_f\right) - 1 && (16)\\
&= R_f + \frac{B_i\left(1+R_f\right)}{\theta_i^2 s_i}\left(R_M - R_f\right) + \frac{1+R_f}{\theta_i^2 s_i}\varepsilon_i && (17)
\end{aligned}
$$

Equation (17) describes the classic linear regression of firm stock returns on the market excess return. In this regression, the observed beta is given by

$$
\begin{aligned}
\beta_i &= \frac{B_i\left(1+R_f\right)}{\theta_i^2 s_i} && (18)\\
&= \frac{B_i\left(1+R_f\right)}{\theta_i^2(\overline{\pi}_i + (\phi - \overline{\pi}_i)g_i)}. && (19)
\end{aligned}
$$

Writing the idiosyncratic return component in (17) as

$$\eta_i = \frac{1+R_f}{\theta_i^2 s_i}\varepsilon_i, \qquad (20)$$

one can re-write (17) in the standard form

$$R_i = R_f + \beta_i\left(R_M - R_f\right) + \eta_i \qquad (21)$$

which is the stochastic version of the expected-return CAPM equation (8), where the standard deviation of idiosyncratic returns is

$$\sigma_{\eta i} = \frac{1+R_f}{\theta_i^2 s_i}\sigma_i. \qquad (22)$$

(16) and (18) show that stock returns and beta do indeed not depend directly on governance: the impact of governance on earnings is anticipated and rationally priced by the market. However, governance impacts the stock market variables indirectly through its effect on effort. Higher effort impacts 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}. Higher effort, which increases future and current prices, therefore reduces returns and their riskiness. What seems counterintuitive is that effort reduces expected returns. However, the explanation is simple: since effort increases future earnings and current prices, it reduces systematic and idiosyncratic risk per unit of investment and therefore investors require a lower expected return to invest in the firm.

1.4 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 (14), the objective function (6) of the owner/manager becomes

$$U_i = \frac{1}{2}s_i^2\theta_i^2 + (s_iB_i + m_i)\left(\overline{R}_M - R_f\right) + (1-g_i)\,\widehat{\pi}_i\theta_i^2 s_i - \frac{\lambda_i}{2}\left(\sigma_M^2\left(s_iB_i + m_i\right)^2 + s_i^2\sigma_i^2\right). \tag{23}$$

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

$$\frac{\partial U_i}{\partial m} = \overline{R}_M - R_f - \lambda_i\sigma_M^2\left(s_iB_i + m_i\right) = 0 \tag{24}$$

from which

$$m_i = \frac{\overline{R}_M - R_f}{\lambda_i\sigma_M^2} - \left(\phi g_i + \overline{\pi}_i\left(1-g_i\right)\right)B_i. \tag{25}$$

The manager's optimal exposure to the market in (25) 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 $\left(\phi g_i + \overline{\pi}_i\left(1-g_i\right)\right)B_i$, which hedges the manager's exposure to the systematic component of her firm's cash flows.[11] 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 (24) into (23) yields

$$U_i = \frac{1}{2}s_i^2\theta_i^2 + (1-g_i)\,\widehat{\pi}_i\theta_i^2 s_i - \frac{\lambda_i}{2}s_i^2\sigma_i^2 + \frac{(\overline{R}_M - R_f)^2}{2\lambda_i\sigma_M^2} \tag{26}$$

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*

$$g_i^* = \frac{\widehat{\pi}_i\theta_i^2\left(\phi - 2\overline{\pi}_i\right) - \left(\phi - \overline{\pi}_i\right)\overline{\pi}_i\left(\lambda_i\sigma_i^2 - \theta_i^2\right)}{\left(\phi - \overline{\pi}_i\right)\left[\left(\phi - \overline{\pi}_i\right)\left(\lambda_i\sigma_i^2 - \theta_i^2\right) + 2\widehat{\pi}_i\theta_i^2\right]}, \tag{27}$$

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

[11] 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).

Proof. If $\lambda_i \sigma_i^2 (\phi - \overline{\pi}_i) > \theta_i^2 (\phi + \overline{\pi}_i - 2\pi_0)$ the objective (26) is inversely U-shaped as a function of g_i. Differentiating yields

$$\frac{\partial U_i}{\partial g_i} = -(\phi - \overline{\pi}_i)((\phi - \overline{\pi}_i) g_i + \overline{\pi}_i)\left(\lambda_i \sigma_i^2 - \theta_i^2\right) + \widehat{\pi}_i \theta_i^2 ((\phi - \overline{\pi}_i)(1 - 2g_i) - \bar{\pi}_i). \tag{28}$$

The maximum therefore is positive iff

$$\widehat{\pi}_i \theta_i^2 (\phi - 2\overline{\pi}_i) > (\phi - \overline{\pi}_i) \overline{\pi}_i \left(\lambda_i \sigma_i^2 - \theta_i^2\right). \tag{29}$$

In this case, the solution is interior and (27) obtains. Otherwise, $g_i^* = 0$.

If $\lambda_i \sigma_i^2 (\phi - \overline{\pi}_i) < \theta_i^2 (\phi + \overline{\pi}_i - 2\pi_0)$ the objective (26) is convex and increasing on $(0, 1)$ as a function of g_i, in which case $g_i^* = 1$.[12]

Proposition 1 trades off the costs and benefits of governance in (26) 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 (7) and the structure of $s_i = (\phi - \overline{\pi}_i) g_i + \overline{\pi}_i$, 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 (26) 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 (26) 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 (24).

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 contributes nothing to cash flows ($\theta_i = 0$), then (26) implies 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.

[12] This case cannot occur if $2\pi_0 \geq \phi + \overline{\pi}_i$, i.e. if initial ownership is sufficiently large or if final ownership is sufficiently small.

1.5 Testable Propositions

In our model, we do not assume that corporate governance has a causal effect on stock prices, nor the opposite. Instead, governance g_i and cash flow C_i on the one hand, and stock returns R_i, idiosyncratic stock risk $\sigma^2_{\eta i}$, and β_i on the other hand, are endogenous, driven by the same set of exogenous parameters. The closed form solution for the optimal governance regime established in Proposition 1 allows us to find the equilibrium relation between the endogenous variables by differentiating the equilibrium expressions (27), (19), and (22) with respect to the exogenous parameters. Two firm-specific exogenous parameters are of particular interest here, idiosyncratic cash flow volatility σ_i and the manager's effort multiplier θ_i.

Consider first an increase in σ_i, a parameter for which we can construct a good empirical proxy from public accounting information, as we will show in the next section. It is easy to see from (27) that $\frac{dg_i^*}{d\sigma_i} < 0$. Economically, this follows directly from the fact that access to cash flows through lax governance is like ownership of the cash flow. Hence, the owner/manager's demand for lax governance declines with the idiosyncratic risk of cash flows.

To understand σ_i's impact on β_i recall that from (19) β_i declines with g_i and note that σ_i does not impact β_i directly. Hence, $\frac{d\beta_i}{d\sigma_i} = \frac{d\beta_i}{dg_i^*}\frac{dg_i^*}{d\sigma_i} > 0$. The intuition is that an increase in σ_i causes g_i^* and hence s_i to decline. This lowers optimal effort $e_i = s_i\theta_i$, which, in turn, lowers cash flows. Hence, the idiosyncratic risk is now spread over lower cash flows, which means that the systematic part of the cash flow risk (B_i) becomes relatively more important.

The effect of σ_i on idiosyncratic stock return volatility in (22) follows the same logic, and is even stronger, because σ_i increases $\sigma_{\eta i}$ directly. Hence,. $\frac{d\sigma_{\eta i}}{d\sigma_i} > 0$.

To trace the impact of σ_i on the firm's equilibrium expected cash flow $E(C_i)$, note that laxer governance increases expected cash flow indirectly via higher effort, so that $\frac{dE(C_i)}{dg_i^*} > 0$. Since $\frac{dg_i^*}{d\sigma_i} < 0$ as argued above, we have $\frac{dE(C_i)}{d\sigma_i} < 0$. In contrast, the impact of σ_i on expected public cash flows, $(1 - g_i^*)\,E(C_i)$ is ambiguous, because laxer governance lowers the fraction$1 - g_i^*$ of expected cash flows that public shareholders appropriate.

The above results are summarized in the following proposition.

Proposition 2 *When idiosyncratic cash flow volatility σ_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 and expected total cash flow $E(C_i)$. The dependence is as follows:*

	g_i^*	$E(C_i)$	β_i	$\sigma_{\eta i}$
$\sigma_i \nearrow$	$\searrow$	$\searrow$	$\nearrow$	$\nearrow$

The impact of changes of the effort multiplier θ_i can be assessed in a similar way to σ_i. In particular, differentiating (27) yields

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

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. As in the earlier discusson, the direct impact of θ_i on β_i and $\sigma_{\eta i}$ is negative, because the increased additive effort reduces the risk components of returns through the baseline effect. This can again be easily seen from (18) and (22). Hence, the direct and indirect effect of θ_i have the same sign.

However, the effort multiplier is more difficult to proxy for empirically. But regardless of which of the two exogenous parameters moves, the induced correlations between the endogenous variables are the same. 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 or θ_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 and of the expected cash flows $E(C_i)$. The detailed correlation is as follows:*

	g_i^*	$E(C_i)$	β_i
$E(C_i)$	+		
β_i	−	−	
$\sigma_{\eta i}$	−	−	+

2 Data

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

2.1 Corporate governance

As noted in the introduction, measuring corporate governance poses serious difficulties.[13] An important practical index is the index compiled by the IRRC (Investor Responsibility Research Center) that has been used by Gompers, Ishii and Metrick (2003) in the construction of 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 therefore describes how much management is protected from outside interference and provides a plausible proxy for our g_i

[13] See Bhagat, Bolton, and Romano (2008) for an excellent overview, and Larcker, Richardson, and Tuna (2007) for a detailed principal-component analysis.

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 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.[14]

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 governance choice is the result of a trade-off.

Furthermore, we observe no major change in the GIM Index over time. Table 1 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 1 HERE

For this reason we concentrate our analysis on the cross-section of the data (that is on 2740 observations that correspond to the number of firms in the sample) and calculate the average GIM Index of each company in the sample (see Appendix A and Table 2 for the definitions and sources of variables).

INSERT Table 2 HERE

[14] Values from 20 to 24 are not considered because there are no firms having these values of the GIM Index.

Table 3 reports the mean, standard deviation, 5th percentile, median, and 95th percentile of the GIM Index for the companies in our sample.[15].

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.

2.2 Cash flows and earnings

In the model, we do not distinguish between cash flows, earnings, and accounting returns, as we abstract from taxes, debt service, depreciation, and other (non-) expenses. Our cash flow variable C_i therefore relates to cash flows as well as performance from an accounting perspective. Empirically, it corresponds most directly to EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization), because EBITDA is the least vulnerable to managerial manipulation among the accounting earnings variables. After normalizing for size, we therefore proxy the model's expected public cash flows $E(C_i)$ by the average of the firms' yearly $EBITDA_{i,t}$ and we indicate this variable with $EBITDA_i$.

Table 3 reports the statistics of $EBITDA_i$, indicating that on average corporate earnings are 11% of the total assets with a large dispersion around the mean as indicated by the standard deviation of 15.6%.

With respect to volatility, the theoretical analysis shows that one must disentangle the component of cash flows related to market volatility ($B_i^2\sigma_M^2$) and the cash flow risk specific to firm i, that is σ_i^2. We do this 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", $EBITDA_{M,t}$, 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, and we regress the firms' yearly cash flows over total assets on market cash flow, that is, for each firm i, we perform the following regression:

$$EBITDA_{i,t} = \alpha_i + \gamma_i EBITDA_{M,t} + u_{i,t}, \tag{30}$$

where $EBITDA_{i,t}$ are the cash flows over total assets of firm i at time t (corresponding to C_i in our model), α_i is the regression constant, and $u_{i,t}$ is an error term.

After estimating $\widehat{\alpha}_i$ and $\widehat{\gamma}_i$ for each firm i, we calculate the estimated residuals $\hat{u}_{i,t}$ (that is $\hat{u}_{i,t} = EBITDA_{i,t} - \widehat{\alpha}_i + \widehat{\gamma}_i EBITDA_{M,t}$). Then for each firm we calculate the volatility of the estimated residuals of each regression which we

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

call $ICFV_i$ (Idiosyncratic cash flow volatility), and use this variable as a proxy of the idiosyncratic cash flow volatility σ_i^2 in our model.[16]

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 to perform a proper cross-sectional analysis. Idiosyncratic cash flow volatility is relatively heterogeneous across firms, with a mean of 4.5% of total assets and a standard deviation of 3.2%. 5% of all firms have an idiosyncratic cash flow volatility of less than 1.1%, 5% more than 10.1%.

2.3 Stock return beta and idiosyncratic risk

In order to estimate stock return beta, β_i, and idiosyncratic stock return volatility $\sigma^2_{\eta_i}$ we use the daily stock return data from the Center for Research in Security Prices (CRSP), as documented in Table 2. 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 (**??**). This regression yields $Beta_{i,t}$, the beta of stock i for the year t, and the residuals $\eta_{i,t,d}$ for each day d of the year t considered. For each year, we can then calculate the volatility $\sigma^2_{\eta_{i,t}}$ of the daily residuals $\eta_{i,t,d}$. 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 $\sigma^2_{M,t}$, calculated from daily market returns for the year t. That is we calculate $IRV_{i,t} = \sqrt{\sigma^2_{\eta_{i,t}}/\sigma^2_{M,t}}$, the normalized idiosyncratic return volatility of stock i in year t. Since in our tests we concentrate on the cross section, we then compute the average of $Beta_{i,t}$ and $IRV_{i,t}$ for the years where we have data on the GIM-Index, to obtain the cross-section of our key stock return variables $Beta_i$ and IRV_i.

Table 3 shows their descriptive statistics. The average $Beta_i$ is 1.059 with a standard deviation of 0.5 indicating again a large heterogeneity of systematic risk in our sample. The average IRV_i is 3.3 with a standard deviation of 1.92, 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 (see Ferreira and Laux, 2007). In particular, idiosyncratic volatility represents the larger part of overall stock volatility.

3 Empirical Results

Our theoretical analysis has yielded two types of results. First, Proposition 2 predicts the impact of idiosyncratic cash flow volatility, which is exogenous in our model, on various endogenous variables. Second, Proposition 3 predicts the

[16] Our approach is similar to Bates, Kahle, and Stulz (2009) who also use EBITDA to estimate cash flow volatilities. However, they do not correct for market risk and the focus of that paper is quite different from ours, as it investigates the role of cash flow volatility for corporate cash holdings.

correlations between our endogenous variables for a broader set of exogenous variations, which are not necessarily observable. We now test both types of predictions in turn.

3.1 Regressions

In this subsection, we regress different endogenous variables on the idiosyncratic cash flow volatility variable $ICFV$ described 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 cross-sectional regressions. First, as Table 4 shows, the univariate regression yields a coefficient of -10.25 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 are standard in the literature, including leverage (LEV), Price-to-book-value (PTBV), equity capitalization (SIZE), dividend yield (DY), and firm age (AGE). We measure variables for each firm-year and calculate the averages for our cross-section analysis.[17] 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 -5.36, still significant at 1%. The inclusion of sectorial dummies, the third cross sectional regression, reported in column (3), does not change this result.

We next test the prediction of Proposition 2 that idiosyncratic cash flow risk impacts average firm cash flows negatively. We do this by regressing the cash flow variable $EBITDA_i$ described above on the idiosyncratic cash flow volatility variable $ICFV_i$. In the same way as for the GIM Index we perform three different cross-sectional regressions: a univariate regression, a multivariate regression with control variables, and a multivariate regression where we include also sector dummies. Results are reported in Table 5.

INSERT Table 5 HERE

According to the univariate regression estimates, reported in column (1), average cash flows, $EBITDA_i$, depend negatively and significantly on idiosyncratic cash flow volatility, $ICFV_i$, as predicted by Proposition 2. The coefficient is equal to -0.44 and is significant at the 1% level. The inclusion of control and

[17] A description of each control variable is in Table 2, with descriptive statistics provided in Table 3.

sector dummy variables in the multivariate regression confirms the negative and highly significant relation.

Finally, we turn to the stock market risk variables β_i and $\sigma^2_{\eta_i}$. Proposition 2 predicts that both depend positively on idiosyncratic cash flow volatility, σ^2_i. We perform the three different cross-sectional regressions described above and report the results in Table 6.

INSERT Table 6 HERE

The results from Table 6 are as predicted. The univariate regression estimate shows that companies with higher idiosyncratic cash flow volatility, $ICFV_i$, have higher stock return betas, $Beta_i$, and higher idiosyncratic stock return volatility, IRV_i. Results are confirmed in the multivariate setting that includes control and sector dummies variables.

As before, the coefficient of $ICFV_i$ decreases when we include more controls, but it remains large and strongly significant. For the beta regression it decreases from 4.00 for the univariate regression (column 1) to 2.52 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 times as large, with coefficients ranging from 11.95 (column 1) to 7.58 (column 3), all statistically significant at the 1% level.

These regression results also provide an interesting new insight into the link between cash flow volatility and stock return volatility. Conventional wisdom has it that idiosyncratic firm risk has no impact on expected stock returns because this risk can be eliminated through portfolio diversification and only systematic risk is priced. Our theoretical and empirical analysis shows, however, that idiosyncratic cash flow volatility impacts stock return risk, both systematic and idiosyncratic, via its influence on managerial effort and corporate governance. As noted in the Introduction, this is an interesting complement to the conventional wisdom that seems to have gone unnoticed before.

3.2 Correlations

While idiosyncratic cash flow volatility provides an exogenous source of variation that we can identify well empirically, other exogenous variations cannot be as easily identified. However, Proposition 3 shows that several of these variations lead to the same changes of the endogenous variables and predicts the resulting equilibrium correlations. We now test these predictions of Proposition 3 empirically by looking at the correlations among the estimated endogenous variables used to proxy corporate governance (GIM Index), accounting performance ($EBITDA_i$), stock return beta ($Beta_i$), and idiosyncratic stock return volatility (IRV_i). Table 7 reports the correlations among the four endogenous variables.

INSERT Table 7 HERE

The signs in Table 7 are as predicted in the table in Proposition 3. All correlation coefficients are significant at the 1% level. The correlation analysis therefore lends support to our theoretical model on a broad basis.

As noted in the introduction, Table 7 shows in particular that the GIM Index and total accounting cash flows are positively correlated. In the light of standard theory, this is remarkable: the stricter is corporate governance according to the GIM Index, the lower are corporate cash flows. The finding supports our theory that strict corporate governance reduces the diversion of corporate cash for the private benefit of managers, but decreases total cash flows. The correlation is no direct test of our assumption about the role of managerial effort, because it reflects endogenous equilibrium outcomes driven by these assumptions.[18] But it is highly suggestive.

In summary, the correlation analysis supports our theoretical predictions. It is worth stressing that most of the literature on this topic is either only theoretical or only empirical, and the empirical analyses usually only concentrate on one single relation. Our model provides several predictions of relations among variables from very different sources: corporate governance variables, accounting variables, and stock market variables. The fact that this combination of empirical evidence is consistent with our model lends additional credibility to the model.

3.3 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 sectional 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

[18] Such direct tests could be provided by laboratory experiments. The closest such study to our knowledge is Dickinson and Villeval (2008) who find that monitoring tends to crowd out work incentives when it becomes too strict. But their experimental set-up is different from our model assumptions.

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.

Finally, 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.

4 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 the company cash flows as private benefits. On the other hand, laxer governance makes the owner/manager benefit from the value she creates, partially aligning her incentive with those of the outside shareholders. The optimal governance rules balances the resulting marginal costs and benefits. In capital market equilibrium, the above trade-off has implications for the firm's stock returns volatility, and earnings, because different governance choices are associated with different firm risk-return structures. The idiosyncratic cash flows volatility, an exogenous parameter for which we can construct a good empirical proxy, plays a crucial role in our paper. When a form's idiosyncratic cash flow volatility increases, a risk averse owner/manager finds it more costly to extract private benefits from risky cash flows. This makes the optimal corporate governance rules stricter, lowers managerial effort and cash flows, which means that the idiosyncratic risk is now spread over lower cash flows. This implies that the cash flow risk becomes relatively more important, thus increasing the stock's β and idiosyncratic risk

Our analysis predicts that cross-sectionally β, idiosyncratic stock return volatility, and governance strictness correlate positively, and that these variables correlate negatively with earnings. We test these predictions on a large sample of U.S. listed firms for the period 1990-2006 proxying the laxity of corporate governance by the widely used Gompers, Ishii, and Metrick (2003) index. Idiosyncratic cash flow risk being a good source of exogenous variation, we can perform simple OLS regressions of our endogenous variables GIM Index, β, and accounting earnings, without concerning ourselves with identification issues. The OLS regressions and the correlations between our endogenous variables analysis strongly confirm our theoretical predictions.

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.[19] 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,[20] 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 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

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

  - 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

References

Acharya, V., O. Gottschalg, M. Hahn and C. Kehoe, 2011, "Corporate Governance and Value Creation: Evidence from Private Equity", NYU Working Paper No. FIN-08-032.

Anderson, R. W. and J-P. Danthine, 1981, "Cross Hedging", Journal of Political Economy, 89, 6, 1182-96.

Bates, T.W., K.M. Kahle, and R. Stulz, 2009, "Why do US firms hold so much more cash than they used to?" The Journal of Finance, 64, 5, 1985-2021.

Bhagat, S., B. Bolton, and R. Romano, 2008, "The Promise and Peril of Corporate Governance Indices", Columbia Law Review 108, 1803-82.

Bebchuk, L., A. Cohen, and A. Ferrell, 2009, "What Matters in Corporate Governance?", Review of Financial Studies, 22, 2, 783-827.

Bebchuk, L., A. Cohen, and C.C.Y. Wang, 2013, "Learning and the Disappearing Association Between Governance and Returns", Journal of Financial Economics, 108, 323-348.

Bebchuk, L. and M. Weisbach, 2010, "The State of Corporate Governance Research", Review of Financial Studies 23, 939-961.

Burkart, M., D. Gromb, and F. Panunzi, 1997, "Large Shareholders, Monitoring, and the Value of the Firm", Quarterly Journal of Economics,112, 693-728.

Cella, C., A. Ellul, and M. Giannetti, 2013, "Investors' horizons and the Amplification of Market Shocks," Review of Financial Studies, forthcoming.

Crémer, J., 1995, "Arm's length relationships", Quarterly Journal of Economics, 90, 275-295.

Cremers, K.J.M. and V.B. Nair, 2005, "Governance Mechanisms and Equity Prices", Journal of Finance, 60, 2859-2894.

Dickinson, D. and M.-C. Villeval, 2008, "Does Monitoring Decrease Work Effort? The complementarity between agency and crowding out theories", Games and Economic Behavior 63, 56-76.

Durnev, A., R. Morck, and B. Yeung, 2004, "Value-enhancing capital budgeting and firm-specific stock return variation", Journal of Finance, 59, 65-105.

Durnev, A., R. Morck, B. Yeung, and P. Zarowin, 2003, "Does greater firm-specific return variation mean more or less informed stock pricing?", Journal of Accounting Research 41, 797-836.

Easley, D. and M. O'Hara, 2004, "Information and the Cost of Capital", Journal of Finance 59, 1553-1583.

Falk, A. and M. Kosfeld, 2006 "The Hidden Costs of Control," American Economic Review 96, 1611-1630.

Ferreira, M. and P. Laux, 2007, "Corporate Governance, Idiosyncratic Risk, and Information Flow", Journal of Finance 62, 951-989.

Giannetti M. and Y. Koskinen, 2010, "Investor Protection, Equity Returns and Financial Globalization", Journal of Financial and Quantitative Analysis 45, 135-168.

Gompers, P., J. Ishii, and A. Metrick, 2003, "Corporate Governance and Equity Prices", Quarterly Journal of Economics 118, 107-155.

Harris, M. and A. Raviv, 2010, "Control of Corporate Decisions: Shareholders vs. Management", Review of Financial Studies 23, 4115-47.

Hellwig, M. F., 2000, "On the Economics and Politics of Corporate Finance and Corporate Control," in Vives, X. (Ed.), "Corporate Governance, Theoretical and Empirical Perspectives", Cambridge University Press, 95-134.

Herzberg, F., 2003, "One More Time: How Do You Motivate Employees?" Harvard Business Review, January.

Jin, L. and S.C. Myers, 2006, "R^2 around the world: new theory and new tests" Journal of Financial Economics 25, 257-292.

Johnson S., T. Moorman, and S. M. Sorescu, 2009, "A Reexamination of Corporate Governance and Equity Prices", Review of Financial Studies 22, 4753-4786.

Kadyrzhanova, D. and M. Rhodes-Kropf, 2011, "Concentrating on Governance" Journal of Finance 66, 1649-1685

Lambert, R.A., C. Leuz, and R. Verrecchia, 2007, "Accounting Information Disclosure, and the Cost of Capital", Journal of Accounting Research 45, 385-420.

Lambrecht, B. and S. Myers, 2012, "A Lintner Model of Payout and Managerial Rents", Journal of Finance, 67, 1761-1810.

Larcker, D., S. Richardson, and I. Tuna, 2007, "Corporate Governance, Accounting Outcomes, and Organizational Performance", Accounting Review 82, 963-1008.

Mayers, D., 1973, "Nonmarketable Assets and the Determination of Capital Asset Prices in the Absence of a Riskless Asset." Journal of Business, 46, 258–267.

Myers, S., 2014, "How to think about Corporate Governance" Western Finance Association Keynote address, Monterey, California, June 17, 2014.

Prendergast, C., 1999, "The Provision of Incentives in Firms", Journal of Economic Literature 37, 7-63.

Shleifer, A. and Vishny, R. W., 1997, "A Survey of Corporate Governance", Journal of Finance 52, 737–783.

Tirole, J. 2001, "Corporate Governance", Econometrica 69, 1-35.

Vives, X., 2000, "Corporate Governance: Does It Matter?" in Vives., X. (Ed.), "Corporate Governance, Theoretical and Empirical Perspectives", Cambridge University Press, 1-22.

Zingales, L., 2008, "Corporate Governance" in Durlauf, S.N. and L.E. Blume (Eds.), "The New Palgrave Dictionary of Economics". Second Edition, Macmillan, London.

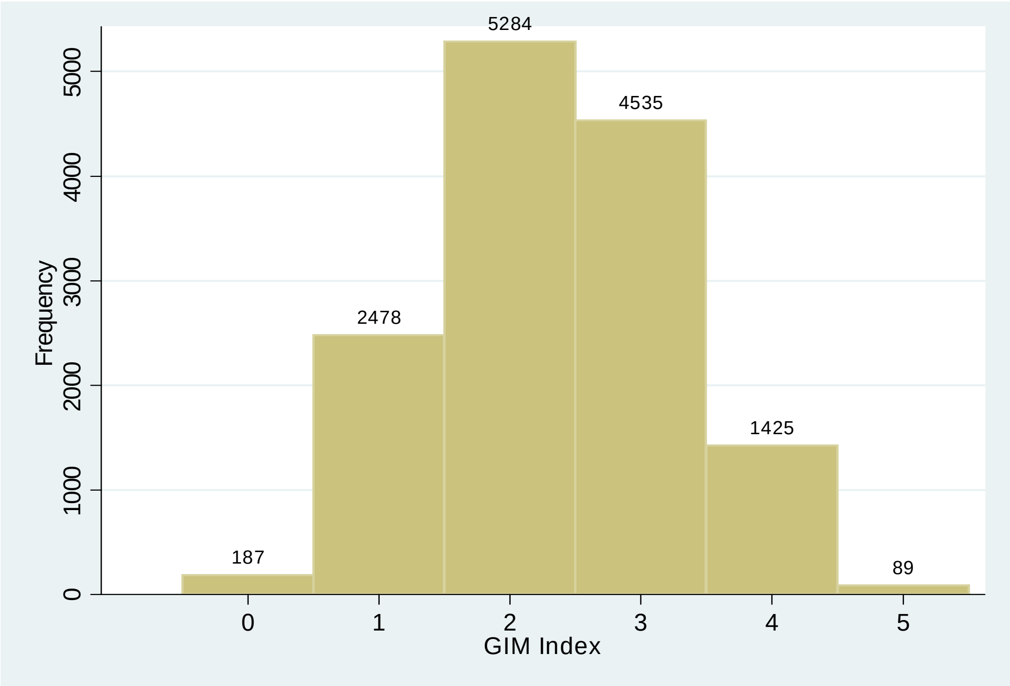

Figure 1: Distribution of the re-scaled GIM Index. Number of observations on the vertical axis. For expositional reasons we have re-scaled the 19 values of the GIM Index into 6 values. The mapping is as follows: values (1,2,3) of the GIM Index become 0; (4,5,6)→1; (7,8,9)→2; (10,11,12)→3; (13,14,15)→4;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

Table 1: **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 2: Variables description

VARIABLE	DEFINITION	SOURCE
GIMIndex	Gompers, Ishii, and Metrick (2003) governance index, which is based on 24 antitakeover provisions.	IRRC
IRV	Square root of the Normalized idiosyncratic volatility given by the ratio of Idiosyncratic volatility to Market volatility	CRSP
Beta	Yearly Beta of asset i	CRSP
EBITDA	Average of the Earnings Before Interest, Taxes, Depreciation and Amortization to Assets Ratio	S&P Compustat
ICFV	Firm Standard Deviation of residuals of the EBITDA market model regression. Market value used to compute weights for market index.	S&P Compustat
ROA	Return on Asset defined as the ratio of Earnings to Total Assets	S&P Compustat
LEV	Leverage defined as the ratio of long term debt to total assets	S&P Compustat
MKTV	Market Value defined as the Annual Fiscal Price Close divided by Common Shares Outstanding	S&P Compustat
LNMV	Natural logarithm of MKTV	S&P Compustat
PTBV	Price to Book Value defined as the Annual Fiscal Price Close multiplied by the Book Value per Share	S&P Compustat
DY	Dividend Yield defined by the ratio of Total dividends to Market Value	S&P Compustat
AGE	Number of years between the year of observation and the year of stock inclusion in the CRSP database	S&P Compustat
LNAGE	Natural logarithm of AGE	S&P Compustat

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

Table 3: Descriptive Statistics

	Mean	Sd	p5	p50	p95	N. Obs
GIM Index	8.583	2.530	4.667	8.515	13.000	2740
ICFV	0.045	0.032	0.011	0.036	0.108	1678
EBITDA	0.110	0.156	-0.096	0.124	0.266	2689
ROA	-0.008	0.242	-0.283	0.035	0.134	2736
Beta	1.059	0.507	0.353	0.971	1.984	2740
IRV	3.334	1.916	1.628	2.875	6.422	2740
MKTV	3631	12205	54	883	13770	2733
DY	0.022	0.175	0.000	0.003	0.047	2730
PTBV	1.854	45.494	-0.056	2.191	8.113	2726
LEV	0.214	0.205	0.000	0.182	0.570	2735
AGE	17.348	16.111	3.000	11.000	59.000	2740

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: GIM Index Regression

	GIM Index		
	(1)	(2)	(3)
ICFV	-10.25***	-5.362***	-5.205***
	(-5.521)	(-2.900)	(-2.705)
LN AGE		0.596***	0.574***
		(7.005)	(6.608)
LNMV		0.0877*	0.101**
		(1.899)	(2.129)
LEV		0.753*	0.707*
		(1.901)	(1.695)
DY		26.85***	25.49***
		(5.199)	(4.583)
PTBV		-0.0205	-0.0252
		(-0.777)	(-0.954)
Constant	9.499***	6.582***	6.752***
	(88.36)	(16.65)	(15.02)
Sector Dummies	No	No	Yes
N.Obs.	1,678	1,678	1,678
R^2	0.017	0.103	0.116

This table reports estimates of coefficients of the cross-sectional firm-level regression

$$GIMIndex_i = c_0 + c_1 ICFV_i + c_2 LNAGE_i + c_3 LNMV_i + c_4 LEV_i + c_5 DY_i + c_6 PTBV_i + \varsigma_i$$

where $GIMIndex$ is the Gompers, Ishii, and Metrick (2003) governance index and $ICFV$ is the Idiosyncratic Cash Flows Volatility. The control variables include Natural Logarithm of Firm Age (LNAGE), leverage (LEV), Natural Logarithm of firm market value (LNMV), Dividend Yield (DY), Price-to-Book Value ratio (PTBV). Refer to Table 2 for variable definitions. Regressions include industry fixed effects (sectors dummies) where indicated. The sample period is from 1990 to 2006. Financial and utilities industries are excluded. All variables are winsorized at the bottom and top 1% levels. Robust t-statistics are in parentheses. *** Coefficients significant at the 1% level, ** Coefficients significant at the 5% level, * Coefficients significant at the 10% level.

Table 5: EBITDA OLS Regressions

	EBITDA		
ICFV	-0.439***	-0.443***	-0.350***
	(-7.124)	(-6.981)	(-5.547)
LN AGE		0.00632***	0.00468**
		(3.192)	(2.375)
LNMV		0.0116***	0.0123***
		(7.287)	(7.538)
LEV		-0.117***	-0.143***
		(-9.185)	(-11.01)
DY		0.0915	-0.218*
		(0.742)	(-1.852)
PTBV		0.00468***	0.00544***
		(3.326)	(3.955)
Constant	0.0534***	-0.0362***	-0.0224*
	(18.09)	(-3.052)	(-1.794)
Sectors Dummies	No	No	Yes
N.Obs.	1,678	1,678	1,678
R^2	0.041	0.241	0.297

This table reports estimates of coefficients of the cross-sectional firm-level regression

$$EBITDA_i = c_0 + c_1 ICFV_i + c_2 LNAGE_i + c_3 LNMV_i + c_4 LEV_i + c_5 DY_i + c_6 PTBV_i + \varsigma_i$$

where $EBITDA$ is Earnings Before Interest, Taxes, Depreciation and Amortization and $ICFV$ is the Idiosyncratic Cash Flows Volatility. The control variables include Natural Logarithm of Firm Age (LNAGE), leverage (LEV), Natural Logarithm of firm market value (LNMV), Dividend Yield (DY), Price-to-Book Value ratio (PTBV). Refer to Table 2 for variable definitions. Regressions include industry fixed effects (sectors dummies) where indicated. The sample period is from 1990 to 2006. Financial and utilities industries are excluded. All variables are winsorized at the bottom and top 1% levels. Robust t-statistics are in parentheses. *** Coefficients significant at the 1% level, ** Coefficients significant at the 5% level, * Coefficients significant at the 10% level.

Table 6: Stock Return volatility Regressions

	Beta			IRV		
	(1)	(2)	(3)	(4)	(5)	(6)
ICFV	3.993***	3.371***	2.522***	11.95***	9.334***	7.579***
	(11.08)	(9.994)	(8.901)	(13.94)	(12.91)	(10.50)
LN AGE		-0.0488***	-0.0332***		-0.0392	-0.00116
		(-3.692)	(-2.857)		(-1.346)	(-0.0421)
LNMV		0.0633***	0.0684***		-0.378***	-0.390***
		(9.740)	(11.26)		(-20.05)	(-21.56)
LEV		-0.172**	0.151**		0.699***	1.188***
		(-2.576)	(2.390)		(4.407)	(7.600)
DY		-9.458***	-7.149***		-8.865***	-3.388
		(-13.45)	(-11.29)		(-4.075)	(-1.538)
PTBV		-0.00520	-0.00617		0.0161	0.00634
		(-1.169)	(-1.555)		(1.256)	(0.531)
Constant	0.830***	0.718***	0.522***	2.349***	5.153***	4.815***
	(50.76)	(12.46)	(8.801)	(54.60)	(34.14)	(31.61)
Sector Dummies	No	No	Yes	No	No	Yes
N.Obs.	1,678	1,678	1,678	1,678	1,678	1,678
R^2	0.093	0.265	0.454	0.128	0.408	0.478

This table reports estimates of coefficients of the cross-sectional firm-level regression

$$RISK_i = c_0 + c_1 ICFV_i + c_2 LNAGE_i + c_3 LNMV_i + c_4 LEV_i + c_5 DY_i + c_6 PTBV_i + \varsigma_i$$

where $RISK$ is alternatively, *Beta*, stock return beta or IRV, idiosyncratic stock return volatility and $ICFV$ is the Idiosyncratic Cash Flows Volatility. The control variables include Natural Logarithm of Firm Age (LNAGE), leverage (LEV), Natural Logarithm of firm market value (LNMV), Dividend Yield (DY), Price-to-Book Value ratio (PTBV). Refer to Table 2 for variable definitions. Regressions include industry fixed effects (sectors dummies) where indicated. The sample period is from 1990 to 2006. Financial and utilities industries are excluded. All variables are winsorized at the bottom and top 1% levels. Robust t-statistics are in parentheses. *** Coefficients significant at the 1% level, ** Coefficients significant at the 5% level, * Coefficients significant at the 10% level.

Table 7: Correlations

	GIM Index	EBITDA	Beta
EBITDA	0.06***		
Beta	-0.09***	-0.12***	
IRV	-0.09***	-0.31***	0.16***

This table presents cross-sectional correlations between the variables $GIMIndex$ (the Gompers, Ishii, and Metrick (2003) governance index), $EBITDA$ ((Earnings Before Interest, Taxes, Depreciation and Amortization), *Beta* (stock return beta) and IRV (idiosyncratic stock return volatility) that are proxies of the endogenous variables of the theoretical model, as described in Proposition 3. Cross-sectional correlations are based on 2470 observations. The sample period is from 1990 to 2006. *** Coefficients significant at the 1% level, ** Coefficients significant at the 5% level, * Coefficients significant at the 10% level.