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Mandatory Disclosure Quality, Inside Ownership, and Cost of Capital*

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Abstract

This paper examines whether and how inside ownership mediates the relation between disclosure quality and the cost of capital. Both ownership and more transparent reporting have the potential to align incentives between managers and investors thereby reducing systematic risk. Employing a large global sample across 35 countries over the 1990 to 2004 period, we show that country-level disclosure regulation is negatively related to (i) inside ownership, and (ii) firms' implied cost of capital and realized returns. We then introduce ownership into the cost-of-capital model, and also find a negative relation. These relations extend to the systematic component of the cost of capital, estimated from Fama-French portfolio sorts on ownership and disclosure regulation. Thus, while the direct effect of disclosure on cost of capital is negative, the indirect effect via ownership is positive, consistent with disclosure quality and ownership acting as substitutes. Using path analysis to assess the relative magnitude, our estimates suggest that the direct effect of disclosure quality outweighs the indirect effect by a ratio of about five to one.

JEL Classification: G15, G30, G38, K22, M41

Key Words: *Cost of equity, Disclosure regulation, Ownership, Law and finance, International accounting, Legal system*

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1. Introduction

As discussed in Lambert *et al.* (2007), disclosure quality could be negatively related to cost of capital due to two separate effects: (i) an information effect in which disclosure reduces the assessed covariance of cash flows (holding the expected cash flows constant), or (ii) a stewardship effect in which disclosure improves managerial alignment with shareholders and therefore increases expected cash flows (holding the assessed covariance of cash flows constant). The stewardship effect is not unique to disclosure, but present in other governance mechanisms that increase managerial alignment such as inside ownership. As a result, these alternative alignment mechanisms potentially reinforce or abate the stewardship effect of disclosure. We test this argument by examining whether inside ownership is negatively associated with the cost of capital and, if included jointly, how inside ownership affects the relation between disclosure and cost of capital. We focus on inside ownership because there is no argument that ownership has an information effect, but it reduces misalignment costs (La Porta *et al.*, 2002). Thus, if we observe a negative relation between inside ownership and the cost of capital, this suggests that misalignment costs affect the cost of capital.

At the same time, a more pronounced negative effect of disclosure on cost of capital after controlling for the stewardship effect of ownership indicates a substitute relation between the two monitoring mechanisms. This interpretation builds on a finding from prior literature—that disclosure quality is negatively related to inside ownership (e.g., La Porta *et al.*, 1998; Leuz *et al.*, 2003; Haw *et al.*, 2004)—which in turn lets us shed light on the relative magnitude of the direct and indirect effects of disclosure. Since disclosure reduces ownership, and (as we predict) ownership reduces the cost of capital, we predict and find a *positive* indirect effect of disclosure through ownership. Accordingly, our analysis of the relation between inside ownership and the

cost of capital has implications for the documented negative relation between disclosure quality and the cost of capital (e.g., Francis *et al.*, 2005; Hail and Leuz, 2006). Our findings suggest that the direct effect of disclosure is higher than previously reported. That occurs because, without controlling for ownership, the direct effect is offset by a *positive* relation between disclosure and cost of capital via the link of inside ownership. Specifically, because disclosure quality serves as a substitute for inside ownership in monitoring, higher disclosure reduces inside ownership, which in turn increases misalignment costs.

To test our hypotheses, we gather a sample of 50,201 firm-year observations from 35 countries between 1990 and 2004. Our proxy for disclosure quality is the index of disclosure requirements in securities offerings from La Porta *et al.* (2006). By using country-level regulations on disclosure as an arguably exogenous proxy for firm-level disclosure quality, we can focus on modeling ownership and predicting its relation with the cost of capital. We measure inside ownership as the percentage of shares held by corporate insiders as indicated in Worldscope.

We begin our analyses by confirming the negative direct link between mandatory disclosure quality and the cost of capital as shown in Hail and Leuz (2006) using firm-year regressions. Next, we examine the role of ownership, and find that it is significantly negatively related to the cost of capital (as proxied by the implied cost of capital and realized returns).[1] The effect is robust to controlling for the potentially endogenous nature of ownership.[2] At the same time, the introduction of ownership in the cost-of-capital model strengthens the direct effect of disclosure, highlighting the importance of controlling for this variable when separating the

[1] Because inside ownership has both alignment effects through cash flow rights, and entrenchment effects through voting rights, we control for entrenchment using proxies for voting rights.

[2] We apply an instrumental variables approach to allow for endogenously determined ownership. The results of the first-stage model in the 2SLS regression also confirm prior findings of a negative relation between disclosure quality and inside ownership, which serves as basis for the computation of the indirect effect of disclosure on cost of capital.

information and stewardship roles of disclosure. Our results suggest that increased ownership reduces incentive misalignment and in turn lowers the cost of capital. They also indicate a substitute relation between mandatory disclosure quality and inside ownership, consistent with a positive indirect effect of disclosure on the cost of capital via the stewardship role of ownership.

To assess the relative magnitude of the direct and indirect effects of disclosure on the cost of capital, we conduct a path analysis. Depending on the specification, the results suggest that the direct effect of disclosure using implied costs of capital is on the order of a 40 to 70 basis points reduction, going from the 25th to the 75th percentile of the disclosure quality index. The indirect effect via inside ownership, on the other hand, is positive and offsets the direct effect by a minimum of 6 but up to 30 basis points.[3] Thus, the relative magnitudes between the direct and indirect effects range from a ratio of about 10:1 to 3:1, suggesting that the opposing forces of the incentive alignment effect of disclosure are substantive enough to offset portion of the information effect.

Our final set of analyses focuses on the systematic component of the cost of capital using portfolio regressions following Fama and French (1998). We employ two different ways of portfolio sorts. First, we form portfolios by intersecting ten groups sorted on disclosure quality with ten groups sorted on the basis of ownership. Second, we form portfolios by sorting firms within each country into five groups on the basis of ownership. For both portfolio strategies, we find that ownership and disclosure quality are negatively and significantly related to the systematic risk of the portfolio, measured either using realized returns or implied costs of capital. Path analyses indicate that the relative magnitudes of the direct and indirect effects of disclosure are similar to those from the firm-year regression analyses.

[3] We compute the indirect effect of disclosure by multiplying the disclosure coefficient from the ownership model with the ownership coefficient from the cost-of-capital model. We then compute the marginal effects (in basis points) as the respective coefficient estimates times the interquartile range of disclosure regulation (= 0.33).

Our paper contributes to the literature in several ways: First, we predict and show a negative relation between inside ownership and (systematic) cost of capital. This finding is related to prior work that documents a positive relation between ownership and firm value (e.g., La Porta *et al.*, 2002). Since value is equal to future cash flows discounted by the cost of capital, a positive relation between ownership can result from increases in profitability as well as decreases in cost of capital. Our results suggest that the positive relation between ownership and firm value is at least partially driven by lowering the cost of capital.

Second, we provide evidence of the direct and indirect effects of disclosure on the cost of capital. As such, our work is related to studies that examine the direct link between governance variables, broadly defined, and the cost of capital (e.g., Garmaise and Liu, 2004; Albuquerque and Wang, 2008; Attig *et al.*, 2008; Ashbaugh-Skaife *et al.*, 2009; Chen *et al.*, 2009; Hail and Leuz, 2009). For instance, Ashbaugh-Skaife *et al.* (2009) use a sample of U.S. firms, and find a negative relation between proxies for the cost of capital, voluntary disclosure, and governance variables such as ownership. Attig *et al.* (2008) and Chen *et al.* (2009) use samples of international firms, and find a negative relation between proxies for the cost of capital and governance attributes including ownership. Our study differs in that our main disclosure variable, defined as mandatory disclosure requirements at the country-level, is more plausibly exogenous, and that we model ownership as an endogenous function of disclosure quality. In addition, we show that the direct effect is negative whereas the indirect effect is positive, which attenuates the total negative relation between disclosure quality and the cost of capital. Finally, the results of our path analysis let us assess the relative importance of the information effect and the stewardship effect of disclosure.[4]

[4] Also related to our work is Himmelberg *et al.* (2004), which studies the relation between investor protection, inside ownership and the marginal return on capital. Our study differs from theirs in two important ways: First,

In Section 2 we develop the hypotheses drawing on the diverse theories linking disclosure quality, inside ownership, and the cost of capital. Section 3 describes the research design including our proxies for the cost of capital, the instrumental variables approach, and the path analyses. Section 4 presents the results, and Section 5 concludes.

2. Hypothesis Development

In this section, we develop predictions on the relation between disclosure quality and the cost of capital with an emphasis on the mediating role of inside ownership. Exhibit 1 illustrates the structural relations between our three constructs of disclosure, ownership, and cost of capital, and indicates the directional predictions.

2.1. Effects of Disclosure Quality and Inside Ownership on the Cost of Capital

As suggested in Lambert *et al.* (2007), disclosure quality can have two direct effects and one indirect effect on the systematic cost of capital. The first direct effect is an information effect and the second direct effect is a stewardship effect. The information effect occurs because disclosure quality reduces parameter uncertainty regarding the estimate of expected returns (e.g., Brown, 1979; Barry and Brown, 1984, 1985). Specifically, better disclosure improves investors' prediction of future cash flows. Since more of the realization of future cash flows is known, the covariance between the firm's cash flows and the cash flows of stocks in the market portfolio becomes lower, which in turn reduces firm beta and the cost of capital. This effect is not diversifiable because it is present for all covariance terms, and hence lowers systematic risk. Empirically, estimation risk predicts a negative relation between disclosure quality and the cost

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Himmelberg *et al.*'s definition of cost of capital more closely captures project profitability whereas we focus on the expected systematic return required by shareholders. Second, Himmelberg *et al*. assume no direct effect of investor protection on cost of capital whereas we, in line with Lambert *et al.* (2007), study the direct and indirect effects of disclosure on cost of capital.

of capital but does not flow through the channel of inside ownership. This is illustrated as link L1 in Exhibit 1. We note that this prediction from Lambert *et al*. (2007) is not without controversy. For example, Johnstone (2014) shows that if information also changes the assessments about the mean of firm value, the cost of capital can *increase* when information precision increases. As another example, Clinch and Verrecchia (2011) show that the cost of capital can *increase* if disclosure increases because of a *voluntary choice* (instead of a *commitment* to more transparency as shown in Lambert *et al*., 2007). Thus, the direction of the relation depicted in link L1 is ultimately an empirical question.

Disclosure can have a second direct (stewardship) effect on the systematic cost of capital. This occurs because better disclosure improves monitoring and lowers the cost of incentive misalignment between corporate insiders and outsiders.[5] The intuition for the direct stewardship effect of disclosure is as follows. Suppose that part of the misalignment cost is a fixed amount that is uncorrelated with cash flows, and the remainder is a variable amount that is perfectly correlated with cash flows. When the misalignment cost has this fixed/variable structure, disclosure quality is negatively related with the systematic cost of capital. The reason is that the fixed misalignment cost reduces expected cash flows, but has no effect on the covariance of a firm's cash flows (CF) with the market cash flows (CF_m). Hence, if disclosure reduces the fixed cost, the covariance of cash flows does not change, but the expected cash flows increase, and so does the firm price (P). Consequently, the covariance of firm returns (R) and market returns (R_m) decreases due to its inverse relation with the stock price (see Lambert *et al.*, 2007, p. 390.):

[5] While misalignment costs are referred to as "misappropriation" in the Lambert *et al.* (2007) model, it is useful to note that three types of costs increase as managers become less aligned with outside shareholders (Jensen and Meckling, 1976; La Porta *et al.*, 2002): managers may (i) misappropriate or steal, (ii) consume perquisites, or (iii) exert less effort.

$$\text{cov}(R, R_m) = \text{cov}(\frac{CF}{P}, \frac{CF_m}{P_m}) = \frac{1}{PP_m}\text{cov}(CF, CF_m) \quad . \tag{1}$$

In other words, an increase in firm price *P* due to lower fixed misalignment costs reduces equity beta (assuming the covariance of cash flows is positive). This is illustrated as link L2 in Exhibit 1. Empirically, both links L1 and L2 yield the same negative prediction of the effect of disclosure on cost of capital.

It is important to note, however, that Lambert *et al.* (2007)'s fixed/variable assumption may not be descriptive. On the one hand, there is evidence supportive of this assumption. For instance, Baker and Hall (2004) find that managerial marginal products do not scale one-for-one with size. This finding suggests that misalignment has a fixed and a variable component, and that changes in misalignment do not translate one-to-one into changes in profits. Moreover, the fixed/variable assumption is equivalent to assuming that misalignment costs are greater in bad states because the opportunity costs of lost growth options are lower (Johnson *et al.*, 2000; Lemmon and Lins, 2003). Similarly, Garmaise and Liu (2005) assume that because managers overinvest in both good states and bad states, proportional misalignment costs are higher in bad states. On the other hand, it is easy to imagine scenarios in which managers misappropriate more in good states, for example because there is more to appropriate in good states and thus it is less likely to be detected. Further, to the extent that takeovers occur more often in good states, takeover deterrents are more costly in good states. If misalignment costs are higher in good states, the logic above suggests a *positive* relation between disclosure and cost of capital. We thus caution that the stewardship effect in Lambert *et al.* is predicated on the assumption of larger proportional misalignment costs in bad states, and while this assumption is consistent with the majority of prior literature, some literature makes the opposite argument.

Given the stewardship effect of disclosure on the cost of capital, alternative corporate governance mechanisms, which also increase alignment (such as inside ownership), will mediate or substitute for the role of disclosure. This presents an additional *indirect* effect of disclosure on the cost of capital due to the substitute relation with inside ownership. The negative link between disclosure and ownership comes from agency models studying entrepreneurs' trade-off between misalignment costs and the necessity to raise equity to fund projects (e.g., Jensen and Meckling, 1976; La Porta *et al.*, 2002; Shleifer and Wolfenzon, 2002; Doidge *et al.*, 2004). In these papers, improved monitoring aligns entrepreneurs by increasing the probability of detection or the amount of penalties conditional on detection. When disclosure quality is low, the entrepreneur's cost of shirking or consuming perquisites is low. Since the entrepreneur internalizes the costs of any misalignment when issuing equity, high inside ownership is the optimal contracting outcome. Thus, inside ownership becomes in essence a substitute for disclosure in aligning the entrepreneur (La Porta *et al.*, 2002), represented as L3 in Exhibit 1.[6] Because an increase in ownership increases alignment, there is also a negative relation between inside ownership and the cost of capital (L6 in Exhibit 1). In combination, the two links lead to an indirect stewardship effect of disclosure quality on the cost of capital through the channel of inside ownership that is positive.

In addition to disclosure quality, other governance features (denoted "*GOV*" in Exhibit 1) can affect alignment. Similar to disclosure quality, *GOV* is expected to have a negative effect on systematic cost of capital, either directly via link L5 or indirectly via ownership (links L4 and L6 for which we expect negative signs). Note that *GOV* can be factors such as investor protection

[6] In our discussion (following La Porta *et al*., 2002), we examine a firm owner and the effect of monitoring, and assume that higher "disclosure quality" leads to better monitoring. When monitoring improves, the entrepreneur owns less (sells more of the firm to outsiders). In standard agency models of the incentives of an employee of the firm owner, "disclosure quality" refers to the amount of noise in a performance measure. In this case, better disclosure quality leads to more incentives (more ownership by the employee).

and securities regulation that reduce misalignment (because of implicit or explicit penalties or because they help monitoring), but also factors like insider voting control that increase entrenchment. Consequently, ownership can substitute for other governance factors in lowering misappropriation. For instance, when legal protection is weak, we expect inside ownership to rise.

2.2. Empirical Predictions

To summarize, we discuss two direct channels through which disclosure can affect the systematic cost of capital—lower estimation risk and lower managerial misalignment. Because ownership (or other governance mechanisms) also affects misalignment, it arises as a substitute for disclosure giving rise to an indirect channel in which disclosure can affect the systematic cost of capital. This suggests the following three testable predictions:

- H_1: *Disclosure quality is negatively related to the systematic cost of capital (direct effect of disclosure).*
- H_2: *Inside ownership is negatively related to the systematic cost of capital (direct effect of ownership).*
- H_3: *Disclosure quality is positively related to the systematic cost of capital through the channel of inside ownership (indirect effect of disclosure).*

For the indirect effect in H_3 to be positive, we implicitly assume (and test) that disclosure quality is negatively related to inside ownership (e.g., La Porta *et al.*, 1998; Leuz *et al.*, 2003; Haw *et al.*, 2004). We do not have specific priors about the relative magnitude of the direct and indirect effects of disclosure on the systematic cost of capital.

3. Research Design

In this section we describe our research design. We begin with estimating a cost-of-capital model in which proxies for the cost of capital are regressed on mandatory disclosure and

other determinants. We then introduce inside ownership into the model, and assess the relative magnitude of the direct and indirect disclosure effects using path analysis. In our second set of tests, we use a more direct proxy for the systematic component of the cost of capital using Fama and French (1998)-style portfolio regressions.

3.1. Cross-Sectional, Time-Series Regressions of the Cost of Capital

Our baseline regression model to investigate the relation between the cost of capital, mandated disclosure, and inside ownership is as follows:

$$COC = \beta_0 + \beta_1 DQ + \beta_2 \alpha + \beta_3 LEGAL + \Sigma \beta_i X_i + \varepsilon, \quad (2)$$

where *COC* is a proxy for the cost of capital, *DQ* is a measure of mandatory disclosure quality, α is a proxy for inside ownership, *LEGAL* is the effectiveness of the legal system, and X_i is a set of firm-level and country-level control variables. In all our regression analyses tabulated below, we cluster the standard errors at the country-level, which explicitly controls for cross-sectional and time-series dependence within a country (we obtain similar results when we apply two-way clustering of the standard errors by country and year).

The coefficient β_1 measures the direct effect of disclosure quality on the cost of capital. We expect this coefficient to be negative (H_1). Our main hypothesis, H_2, is that the effect of inside ownership on the cost of capital (i.e., the coefficient β_2 in Eq. 2) will also be negative. For H_3, we combine the coefficient β_2 on inside ownership from the cost-of-capital model in Eq. (2) with the coefficient on disclosure quality from a model of the determinants of inside ownership (see the Appendix for details), and predict the product of these two coefficients to be positive.

We use two proxies for the cost of capital. First, we follow Hail and Leuz (2006) and employ the average implied cost of capital estimate from four different accounting-based valuation models suggested in Claus and Thomas (2001), Gebhardt *et al.* (2001), Ohlson and

Juettner-Nauroth (2005), and Easton (2004). The basic idea of all four models is to substitute price and analyst forecasts into a valuation equation and to back out the cost of capital as the internal rate of return that equates current stock price with the expected future sequence of residual incomes or abnormal earnings.[7] Since the estimation of these models does not rely on a long time series of data and also does not take a stance on market integration, they are particularly suited for a cross-country setting (e.g., Lee *et al.*, 2007; Pástor *et al.*, 2008). Our second cost of capital proxy is realized returns. We compute annualized buy-and-hold returns in US$ over the 12-month period starting ten months after the end of the fiscal year. The use of month +10 after the fiscal year-end is for consistency with the implied costs of capital. Both our proxies of cost of capital have advantages and disadvantages and, by testing our hypotheses across two independent measures, we show that our results are not driven by a particular variable.

Our proxy for *Disclosure Regulation* (*DQ*) follows La Porta *et al.* (2006) and captures cross-country differences in disclosure requirements in securities offerings. This variable is based on a questionnaire distributed to security-law attorneys in 49 countries as of December 2000. The questionnaire surveys several aspects of disclosure in security offerings such as prospectus requirements, directors' compensation, ownership structure, inside ownership, related-party transactions, etc. We focus on the disclosure requirements index as this variable

[7] More specifically, we obtain financial data from Worldscope, and analyst forecasts and share price information from I/B/E/S. We require each observation to have a one-year-ahead and a two-year-ahead, non-negative earnings forecast, and either a long-term growth forecast or a three-year-ahead earnings forecast. We measure financial data as of the fiscal year end and analyst forecasts and stock prices as of month +10 after the end of the fiscal year. This allows for the financial information to be publicly available and impounded in price by the time of the cost of capital imputation. For details on the estimation procedure see the appendix of Hail and Leuz (2006).

arguably captures differences in countries' mandatory disclosure rules, and at the same time can be assumed exogenous to firms' actual reporting practices.[8]

We proxy for *Inside Ownership* (α) using the Worldscope variable "closely held shares," which represents the percentage of shares held by corporate insiders and others.[9] This measure has been widely used in the past (e.g., La Porta *et al.*, 2002) and is available for a large international cross-section of firms. Yet, the measure might be noisy, as it captures not only inside ownership but also shares held by blockholders. It also does not distinguish between the alignment and the entrenchment effects of ownership, which is why we include controls for entrenchment in the model.[10] Since the ownership measure is bounded between 0 and 100 percent, we follow Demsetz and Lehn (1985) and Himmelberg *et al.* (1999), and use the logit transformed version in the analyses, that is, $\ln(x/(1-x))$ where x is the raw value. This transformation improves the empirical properties of the variable by changing it to an unbounded range while at the same time ensuring that the predicted values from an OLS regression fall within 0 and 100 percent.

We measure *Legal Quality* (*LEGAL*) by using the rule of law index from La Porta *et al.* (1997). This variable is positively correlated with *Disclosure Regulation*. By controlling for the overall quality of the legal system, we mitigate concerns that our findings are driven by institutional factors other than mandatory disclosure, and also allow for the substitute relation

[8] We note that there are ways for firms in a given country to opt out of a mandatory disclosure regime, e.g., by delisting or cross-listing its shares abroad (e.g., Bushee and Leuz, 2005; Hail and Leuz, 2009). However, the proportion of these firms is generally small, so that our assumption of exogenous mandatory disclosure rules seems reasonable for the vast majority of sample firms. A remaining issue is whether securities regulation itself is endogenous because countries might choose their securities regulation to obtain certain outcomes.

[9] Because "closely held shares" includes shares owned by non-insiders, it is arguably a noisy proxy of inside ownership. Worldscope defines closely held shares (Field 05475) as including shares held by officers, directors and their immediate families, shares of the company held by any other corporations, and shares held by individuals who hold 5% or more of the outstanding shares. We convert this variable to a percentage by dividing it by the number of common shares outstanding (Field 05301).

[10] We use the existence of multiple share classes (*Multiple Shares*), firms' dividend payout ratio (*Payout Ratio*), and the number of analysts following a firm (*Analyst Following*) as our proxies for entrenchment. See the Appendix and Section 4.2 for details.

between inside ownership and other governance mechanisms aside from disclosure regulation (as denoted by the *GOV* variable in Exhibit 1).[11]

The remaining control variables comprise *Market Value* and the *Book-to-Market* ratio, which act as firm characteristics explaining the cross-section of expected returns (Fama and French, 1992).[12] In addition, when analyzing the implied cost of capital, we control for the volatility in earnings per share over the last five years (*Earnings Variability*) and the one-year-ahead analyst forecast error (*Forecast Bias*). These variables are intended to control for biases in analysts' forecasts used to impute the implied costs of capital (McInnis, 2010; Guay *et al.*, 2011). We further control for *Inflation* because analyst forecasts are expressed in nominal terms, and hence reflect the expected inflation rates. Finally, we include industry and year fixed-effects throughout the analyses.[13] See the notes to Table 2 for details on the variable measurement.

3.2. Fama-French Portfolio Sorts of (Systematic) Cost of Capital

In addition to the firm-specific regressions above, we use a more direct way to compute the systematic cost of capital using portfolio level regressions on Fama and French (1998) factors after sorting on ownership and disclosure regulation.[14] The main advantage of the portfolio methodology is that firm-level estimates of factor loadings are noisy (Fama and Macbeth, 1973).

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[11] Two advantages of the La Porta *et al*. (1997) measure are that it focuses on investor protection and predates most of our sample period, which mitigates endogeneity concerns. However, because the measure is older, it might capture the quality of the legal regime with error. As an alternative, we repeat our analyses with the measure of rule of law from Kaufmann *et al*. (2007) which is time-varying and more recently measured, but captures a broader notion of rule of law encompassing "contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence" (Kaufmann *et al*., 2011). Using this alternative proxy for *Legal Quality*, our results are largely unaffected.

[12] We note that Lambert *et al*. (2007) is based on a single-factor CAPM model. Intuitively, though, their predictions extend to multi-factor models, and we apply them to systematic risk from a multi-factor model including size, book-to-market, etc.

[13] We do not include country fixed-effects because our measure of mandatory disclosure is time-invariant and measured at the country level. However, to gauge the results on insider ownership (a time-varying measure available at the firm level), we repeat our analyses after substituting country fixed-effects for the disclosure variable (and the legal quality variable). We find that our inferences on ownership are unaffected by this choice.

[14] All sorting on ownership utilizes the predicted values from our ownership model as outlined in the Appendix. This accounts for the potentially endogenous nature of ownership.

By grouping firms into portfolios we increase the precision of our estimates of the systematic cost of capital. The potential downside of this approach is that it reduces the cross-sectional variation in ownership and disclosure to the variation across portfolios.

We conduct two different sorts in the portfolio analyses. In the first, we rank and sort firms independently into ten groups on the basis of disclosure quality and into ten groups on the basis of inside ownership. We then form portfolios based on the intersection. This results in 84 disclosure quality-ownership portfolios with at least 60 monthly return observations out of 100 possible portfolios (ten times ten). The 16 empty portfolios (on the off-diagonal) reflect the negative correlation between disclosure quality and ownership. In the second sort, we rank and sort firms within each country into five groups on the basis of ownership. We again require each of these country-ownership portfolios to contain at least 60 monthly return observations, resulting in 169 portfolios. In both cases, we perform the sorts each year, so that a firm may move across portfolios as its ownership changes.

We form portfolios in October of each year t+1.[15] We match twelve months of stock returns to each firm-year and, on a monthly basis, compute returns to an equal-weighted portfolio with annual rebalancing (i.e., a "buy-and-hold" portfolio). We use equal weights because our hypotheses are about the expected returns for a typical or average stock. We rebalance annually to mitigate concerns that frequent rebalancing of an equal-weight portfolio can produce biased estimates of realized returns due to the bid-ask bounce (Blume and Stambaugh, 1983). We then estimate the following time-series regression for each portfolio:

$$R_{P,t} - R_{F,t} = a_{\mathrm{p}} + b_{1,\mathrm{p}} (R_{M,t} - R_{F,t}) + b_{2,\mathrm{p}} HML_t + \varepsilon_{p,t}. \quad (3)$$

[15] We choose October because most of our firms have a December fiscal year end. This timing is consistent with the timing of our measure of implied cost of capital, which is measured at month +10 after a firm's fiscal-year end.

where $R_{P,t}$ is the portfolio return, $R_{F,t}$ is the return on a one-month U.S. Treasury Bill, $R_{M,t}$ is a value-weighted world market index return from Datastream, and HML_t is the Fama and French (1998) value-weighted global book-to-market factor. Fama and French (1998, p. 1975) show that the above two-factor model "captures the value premium in international returns." Next, we calculate the systematic risk of the portfolio using the fitted coefficients $\hat{b}_{1,p}$ and $\hat{b}_{2,p}$. Specifically, we estimate the following:

$$Sys_{RET} = \hat{b}_{1,p}\overline{R}_M + \hat{b}_{2,p}\overline{HML}, \tag{4}$$

In Eq. (4), $\overline{R}_M$ and $\overline{HML}$ are the average values of $R_{M,t}$ and HML_t for our full sample period.

The foregoing approach uses the average values of $R_{M,t}$ and HML_t as estimates of the global market and HML expected risk premiums. In our firm-year analysis, we use both implied cost of capital estimates and realized returns as proxies for the cost of capital. Arguments in Elton (1999) and others suggest that realized returns can provide noisy estimates of expected risk premiums, which can be partially addressed by using implied cost of capital (Pástor *et al.*, 2008). We therefore also re-calculate Eq. (4) using average implied cost of capital estimates (*ICC*) as proxies of the expected risk premiums:

$$Sys_{ICC} = \hat{b}_{1,p}\overline{R}_{M,ICC} + \hat{b}_{2,p}\overline{HML}_{ICC}.^{16} \tag{5}$$

Finally, to test our hypotheses, we regress the systematic cost of capital from the portfolio approach (i.e., Sys_{RET} and Sys_{ICC}) on disclosure regulation, inside ownership and, depending on the specification, various control variables in a model similar to the one presented in Eq. (2).

[16] We calculate the average ICC risk premiums analogous to Fama-French (1998). Specifically, $\overline{R}_{M,ICC}$ is the average annual ICC market expected return, and we calculate the ICC market expected return for the year as the value-weighted ICC for all firms in the Fama-French countries for which we have ICC data that year. To create the HML expected risk premium using ICC, we form book-to-market (BM) deciles by sorting firms in the Fama-French countries each year on BM. We then calculate the HML expected return each year as the difference between the value-weighted ICC of the sample firms in the three highest BM deciles and the value-weighted ICC of the sample firms in the three lowest BM deciles. $\overline{HML}_{ICC}$ is the average annual HML expected return.

4. Results

4.1. Sample Selection and Description

Our sample consists of all firms with accounting data available in Worldscope, stock price data from Datastream, and analyst data from I/B/E/S. We eliminate (i) countries with less than ten individual firms, (ii) country-years with an inflation rate above 25%, and (iii) firm-year observations with market values below US$ five million. In addition, we require all firms to have information on inside ownership, implied cost of capital, realized returns, mandated disclosure, and the control variables. This way we can more directly compare the results across the two dependent variables since the sample is held constant. The final sample consists of 50,201 firm-year observations from 35 countries over the 1990 to 2004 period. We end the sample period in 2004 to avoid the potentially mitigating effects of changes in disclosure regulation on the cost of capital around the mandatory adoption of IFRS in 2005 for many of our sample countries (e.g., Daske *et al.*, 2008).

Table 1 provides descriptive statistics on the number of observations, the cost of capital, inside ownership, disclosure regulation, legal quality, and other macroeconomic factors by country. The average implied cost of capital (realized return) equals 10.95% (13.66%) with a lower bound of 8.2% (-8.9%) and an upper bound of 16.5% (27.7%). The average inside ownership equals 29.9%, with substantial cross-sectional variation (ranging from about 20% in the U.K. and U.S. to more than 70% in the Philippines). Table 2 presents descriptive statistics for the dependent and independent variables used in the cost-of-capital model. The table notes provide details on the data sources and the variable measurement.

4.2. Determinants of Cost of Capital Using Cross-Sectional, Time-Series Regressions

4.2.1. Implied cost of capital as the dependent variable

Table 3, Panel A, presents results on the determinants of the cost of capital when we use the implied cost of capital as a proxy for expected returns. The first model follows Hail and Leuz (2006) in which cost of capital is a function of disclosure regulation, legal quality, inflation, and the firm-level control variables, but without including inside ownership. The results indicate a significantly negative relation between disclosure regulation and cost of capital, consistent with the direct information and/or monitoring effect of disclosure. The coefficient on the legal quality variable is also negative, but not significant at conventional levels in this specification. Cost of capital is negatively related to firm size and positively associated with inflation, book-to-market, earnings variability, and forecast bias. Overall, the results are in line with Hail and Leuz (2006).

Next, in Column (2), we add the inside ownership variable, and find a negative relation between inside ownership and the implied cost of capital. This is consistent with our main hypothesis that inside ownership, by increasing managerial alignment, reduces the cost of capital. At the same time, the relation between disclosure and cost of capital (as well as the relation between legal quality and cost of capital) becomes more pronounced, suggesting that the inclusion of ownership mitigates the hypothesized positive indirect effect of disclosure quality on the cost of capital.

One concern with our specification in Column (2) is that inside ownership not only measures incentive alignment (via the cash flow rights held by corporate insiders), but can also capture managerial entrenchment (because share ownership conveys voting rights as well as cash flow rights). To control for these entrenchment effects, and in the absence of a perfect proxy for voting rights in our large panel, we include in Column (3) three additional firm-level variables to

isolate the entrenchment effect. *Multiple Shares* indicates the existence of multiple share classes thereby facilitating the separation of ownership and control. The *Payout Ratio*, measured as dividends per share divided by earnings per share, controls for the potential of shareholder expropriation. Finally, we include the number of analysts issuing earnings forecasts for the firm (*Analyst Following*) as a proxy for outside monitoring. Adding these variables to the model slightly reduces the significance level of disclosure regulation (*t*-statistic of -1.66 and *p*-value of 10.6%) but has little or no effect on ownership and legal quality.

Another concern is that ownership may be endogenous to the cost of capital. That is, at the time of the IPO the entrepreneur chooses ownership to maximize offering proceeds, thereby reducing misalignment costs. The counter-argument, though, is that while ownership is admittedly endogenous at the IPO date, it is arguably exogenous in subsequent years (La Porta *et al.*, 2002).[17] In the Appendix, we describe two approaches of developing instrumental variables for ownership. We then use these models in a two-stage estimation (2SLS) that attempts to control for the endogenous nature of ownership. In Column (4) we present the 2SLS results using the basic ownership model in the first stage as outlined in the first column of Table A2 in the Appendix. In Column (5) we use an IPO model, i.e., we determine ownership as of the IPO date of the firm (see the second column in Table A2). For both specifications the coefficients on inside ownership and disclosure regulation are negative and statistically significant. This finding suggests that inside ownership, when endogenously determined or optimized at the time of the IPO, remains negatively associated with implied cost of capital.[18] The 2SLS estimation also

[17] La Porta *et al*. (2002) justify this assumption as follows (p. 1165): "Our defense of this assumption is that, generally speaking, ownership patterns are extremely stable, especially outside the United States, and are shaped largely by histories of the companies and their founding families."

[18] Following Larcker and Rusticus (2010), we conduct tests to assess the appropriateness of the 2SLS methodology. We estimate the partial *F*-statistic for our set of five instruments in the first stage, and find an *F*-statistic of 19.92. Comparing this value to the 15.09 suggested by Larcker and Rusticus (p. 192) indicates that our instruments, if valid, are less likely to suffer from a "weak instrument" problem.

increases the coefficient magnitude and the statistical significance of the disclosure regulation (and legal quality) variable in line with the substitute role of ownership for disclosure.

Finally, in Column (6), we show OLS results when we aggregate the 50,201 firm-year observations into 382 country-year observations by computing medians. Following Hail and Leuz (2006), this specification accounts for the fact that disclosure regulation only varies at the country level. The estimated coefficients are largely consistent with those shown for the other regressions, although inside ownership becomes only marginally significant (*t*-statistic of -1.49).

In order to assess the relative magnitude of the direct and indirect effects of disclosure, we next estimate a path model that follows the structural relations outlined in Exhibit 1. We report results for the main coefficients of interest in Panel B of Table 3. To enable comparisons across the ownership model and the cost-of-capital model, we standardize all coefficient estimates, i.e., we multiply the regression coefficients by the ratio of the standard deviation of the dependent variable to the standard deviation of the regressor (Bushee and Noe, 2000). The direct effect of disclosure is the standardized coefficient on disclosure regulation from the cost-of-capital model (i.e., the coefficient β_1 in Eq. 2). For our main specification as reported in Column (3) of Panel A this effect equals -0.056. Using the standard deviation of the implied cost of capital of 3.56%, this estimate suggests a 20 basis points decrease in the cost of capital for a one-standard-deviation increase in disclosure quality. We calculate the indirect effect of disclosure by multiplying the standardized γ_1 coefficient on disclosure regulation from the ownership model (Eq. a1 in the Appendix) with the standardized β_2 coefficient on ownership from the cost-of-capital model (Eq. 2). The resulting estimate of 0.012 (= -0.217 × -0.053) suggests a positive effect of 4 basis points for a one-standard-deviation increase in disclosure quality (= 0.012 × 3.56%). Thus, in this specification, the direct effect of disclosure quality

outweighs the indirect effect by a ratio of about 5:1. For the 2SLS model and the country-year regression also depicted in Panel B of Table 3, the relative magnitudes are on the order of 2.3:1 and 11:1, respectively.

4.2.2. Realized annual returns as the dependent variable

Table 4 presents the results for the determinants of the cost of capital when using realized returns as a proxy. With respect to the risk controls, realized returns are negatively related to firm size and positively associated with book-to-market, consistent with Fama and French (1992). Regarding our main variables of interest, the coefficients on disclosure regulation and inside ownership are generally not statistically significant in the OLS regressions, contrasting the implied cost of capital results. We note, however, that the coefficients on disclosure regulation and ownership become negative and, in the latter case, significant in the OLS regression when we drop extreme annualized buy-and-hold return observations (i.e., above or below 50%). These coefficients both become significantly negative when we exclude observations from the United States from the sample. These findings are consistent with realized returns being a noisy proxy of expected risk premiums (Elton, 1999). Moreover, in the country-year specification reported in Column (6), disclosure regulation and inside ownership are negatively related to realized returns, but only significant at the 13% level (*t*-statistic of -1.56).

Yet, when we account for the endogenous nature of ownership, both the disclosure regulation and inside ownership variables become significantly negatively related to realized returns. Specifically, we find a significantly negative relation between "predicted" ownership and realized returns in the two 2SLS regressions in Columns (4) and (5). Further, disclosure regulation also becomes negatively related to the cost of capital. These results are in line with the

implied cost of capital findings and underscore the importance of controlling for the underlying determinants of ownership.

Panel B of Table 4 reports results from the path analysis for realized returns. The interpretation of the direct effect in the OLS firm-year specification is not sensible as the coefficient is insignificant. For 2SLS and the country-year analysis, though, the direct effect is negative and, in the case of the aggregate analysis, comparable in relative magnitude to the implied cost of capital results. The indirect effects of disclosure are all positive and the standardized coefficient estimates range from 0.001 (= -0.217 × -0.006) to 0.065 (= -0.214 × -0.302). These estimates result in a ratio between the direct and indirect effects of disclosure of almost 1:1 and 1:4 in the 2SLS model and the country-year specification, respectively.

Taken together, consistent with the predictions in Lambert *et al.* (2007), we find that disclosure quality has a direct effect on the cost of capital. In addition, we show that the indirect stewardship effect is positive, attenuating the total negative relation between disclosure quality and the cost of capital. While the total effect continues to be negative when using implied cost of capital, it has a substantially smaller (in some specifications even zero) net effect with realized returns.

4.2.3. Sensitivity analyses

We conduct several sensitivity analyses to assess the robustness of our findings. First, we assess the sensitivity of the disclosure variable to firms voluntarily adopting another set of accounting standards than local GAAP. Specifically, in many countries firms could voluntarily adopt IAS/IFRS during our sample period, which has been shown to go along with cost of capital benefits when firms were serious about their commitment to more transparency (Daske *et al.*,

2013).[19] We control for the potentially mitigating effects of this voluntary accounting choice by (i) excluding voluntary IAS/IFRS adopting firms from the sample, or (ii) including an indicator variable marking firm-years with voluntary IAS/IFRS reporting in the model. In both cases, the results are very similar to those reported in the text and none of our inferences changes. Thus, our findings seem not confounded by voluntary IAS/IFRS adoptions.

Second, we assess the impact of the sample composition on our results, namely the effect of the three largest sample countries. As indicated in Table 1, U.S. firms comprise almost 50% of the sample, whereas firm-year observations from the U.K. and Japan account for about 10% and 7% of the sample. Thus, it is possible that our results might be overrepresented by the firms in these countries. Dropping the U.S. observations reduces the significance levels of the 2SLS estimation when using the implied cost of capital as the dependent variable, but strengthens the realized returns results. Notably, in the OLS regressions the coefficients on disclosure regulation and ownership become significantly negative in Column (3) of Table 4. When we retain the U.S., but drop the U.K., the implied cost of capital results become stronger in the OLS estimation: all the disclosure and ownership coefficients are significantly negative, including those in the country-year regression, but the 2SLS models are insignificant. The realized returns analyses are similar to those reported. Excluding Japanese firms also strengthens the implied cost of capital results, and for one exception (the coefficient on ownership in Column 6) all disclosure, ownership, and legal quality coefficients are negative and significant. The realized returns results are similar to before. Overall, our findings seem not greatly affected by the large sample countries; if anything, the full sample analyses produce slightly weaker results than after excluding any of the three countries.

[19] In 2001, IAS were renamed IFRS and thus our sample comprises both firms with voluntary IAS and IFRS reporting. Note that we stop our sample in 2004, that is, before the bulk of mandatory IFRS adoption took place.

Finally, and still related to the sample composition, we re-run the analyses with the largest realized returns sample possible. That is, instead of holding the sample constant across both dependent variables, we utilize all realized returns observations with available data. Because we do not require analyst forecasts, we can expand the sample to 158,034 firm-year observations, thereby mitigating potential selection bias. Expanding our sample does not substantially affect the results and none of the inferences changes.

4.3. Determinants of Systematic Cost of Capital Using Fama-French Portfolio Sorts

Table 5 presents the results on the determinants of the systematic cost of capital. We estimate the beta coefficients on the world market portfolio and on the world HML portfolio using portfolio-level regressions of Eq. (3) above. We then estimate the cost of capital by multiplying the beta coefficients with the average sample risk premiums. Panels A and B present results for the average realized returns and implied costs of capital using the systematic risk as estimated in Eq. (4) and (5), respectively.

The first two columns of each panel report results for the 84 portfolios formed when we rank and sort firms independently into ten groups on the basis of disclosure quality and predicted ownership. We compute our test variables by averaging ownership and disclosure regulation for each portfolio over the time period of the portfolio.[20] We apply the same procedure to the control variables. Column (1) shows results for the test variables and legal quality only. Consistent with our hypothesis, ownership is significantly negatively related to systematic risk. Disclosure regulation and legal quality are also negative and significant. Results across the two dependent variables are similar.

[20] We require portfolios to have 60 months (five years) of data. Most portfolios have 180 months (15 years) of data.

In Column (2), we add the three controls for entrenchment (i.e., multiple shares, payout ratio, analyst following) and, in Panel B, the controls for biases in the implied cost of capital (i.e., inflation, forecast bias, and earnings variability). The entrenchment controls are insignificant for the realized returns specification, but are significant with the expected signs in the implied cost of capital regression. That is, consistent with an entrenchment interpretation, the cost of capital is positively associated with multiple shares, and negatively with the payout ratio and analyst following. The main results are not affected by this model expansion.

The third and fourth columns of each panel report results for the 169 portfolios formed when we sort firms within each country into five groups on the basis of predicted ownership. The results are generally weaker than those using the previous sorting algorithm. This likely reflects our sort design, which generates more variation in ownership than it does in disclosure regulation. In Column (3), consistent with our hypothesis, ownership is significantly negatively related to systematic cost of capital. The coefficient on disclosure regulation is also negative and significant (as is the coefficient on legal quality). Adding the control variables reduces the statistical power, and only the ownership and disclosure variables are significant in the implied cost of capital specification. None of the entrenchment variables are significant.

To assess the relative magnitude of the direct and indirect effects of disclosure on the systematic cost of capital, we repeat the path analysis for the Fama-French portfolio sorts and report results in Panel C of Table 5. We use the model specification without controls as basis for the computations (i.e., Columns 1 and 3 in Panels A and B). We estimate the direct effect of disclosure as the standardized coefficient on disclosure regulation from the cost-of-capital

model.[21] The indirect effect is the product of the standardized coefficient on disclosure regulation in the ownership model (see Table A2 in the Appendix) and the standardized coefficient of ownership in the cost-of-capital model. The total effect is the sum of the two.

Focusing on systematic realized returns, the direct effect of disclosure equals -0.44 in the two-way sorts and -0.27 in the one-way sorts. Since the annual standard deviation of systematic realized returns is 2.02% (2.72%) for the one-way (two-way) sorts, this estimate suggests an 89 (73) basis points decrease in the cost of capital for a one-standard-deviation increase in disclosure quality. The indirect effect, on the other hand, is positive for both sorts, consistent with a substitute relation between disclosure and ownership. Specifically, an increase in disclosure is associated with a reduction in ownership. However, because reduced ownership increases misalignment, higher disclosure increases the systematic cost of capital via ownership. As a result, the total effect of disclosure equals -0.35 in the two-way sorts (-0.22 in the one-way sorts), suggesting a 71 (60) basis points *net* decrease in the systematic cost of capital for a one-standard-deviation increase in disclosure quality (after accounting for the positive indirect effects of 17 and 14 basis points in the two specifications, respectively). Consistent with our findings above, these estimates suggest a relative magnitude of the direct and indirect effects of disclosure on the order of 5:1.

For systematic implied cost of capital, the total effects are slightly smaller. The standardized coefficient on disclosure equals -0.53 in the two-way sorts (-0.36 in the one-way sorts). Since the annual standard deviation of systematic implied cost of capital is 1.02% (1.24%) for the one-way (two-way) sorts, this estimate suggests a 54 (45) basis points *net* decrease in the cost of capital for a one-standard-deviation increase in disclosure quality. The direct information

[21] To compute standardized coefficients, we standardize each dependent and independent variable (by subtracting its mean and dividing by its standard deviation) so that that the variables have a mean of zero and standard deviation of one, and re-run each regression. This transformation does not affect the *t*-statistic.

effect of disclosure outweighs the indirect stewardship effect by a ratio of about 6:1, and again these numbers are very similar to those found in the firm-level regression analyses.

5. Conclusion

In this study, we provide evidence for the stewardship effect of disclosure, and how it interrelates with other governance mechanisms also affecting stewardship. Following Lambert *et al.* (2007), we hypothesize that disclosure can have a direct and an indirect effect on the cost of capital, with the indirect (stewardship) effect flowing through governance mechanisms such as inside ownership. In addition, ownership can directly affect the systematic cost of capital due to lower incentive misalignment (e.g., La Porta *et al.*, 2002).

We test these hypotheses on a sample of 50,201 firm-year observations from 35 countries between 1990 and 2004. We begin by confirming prior findings that disclosure quality is negatively related to the cost of capital (Hail and Leuz, 2006). Next, we examine the role of ownership, and find that it is significantly negatively related to the cost of capital. Further, because ownership is also negatively related to disclosure quality, it serves as a substitute to lowering misalignment costs through disclosure. When we compute the direct and indirect effects of disclosure on the cost of capital, we find that while the first effect is negative the second effect is positive. Greater disclosure quality reduces ownership, which in turn increases incentive misalignment and the cost of capital. Results from our path analysis suggest that the direct effect of disclosure quality outweighs the indirect effect by a ratio of, on average, about five to one. Our final set of tests employs Fama and French-style portfolio regressions sorted on ownership and disclosure regulation and finds evidence consistent with the firm-specific analyses.

Our results make several contributions to the literature. First, we predict and show a negative relation between ownership and cost of capital. Prior literature documents a positive relation between ownership and firm value. We extend this literature by suggesting that this finding is at least partially driven by decreases in the cost of capital due to lower misalignment costs. Second, we provide evidence of the direct and indirect effects of disclosure on the cost of capital. Specifically, we show that the direct effect is negative whereas the indirect effect is *positive*, thereby attenuating the total negative relation between disclosure quality and the cost of capital. Finally, we assess the relative importance of the information effect and the stewardship effect of disclosure for the systematic cost of capital using path analysis. While prior theory suggests these complex relations between disclosure, inside ownership, and the cost of capital, empirical evidence of these effects is scarce.

Appendix: Determinants of Inside Ownership

In this appendix we discuss a model of inside ownership. This model serves several purposes. First, by modeling ownership as a function of disclosure, we are able to estimate the indirect stewardship effect of disclosure on the cost of capital through the channel of inside ownership (see Exhibit 1). Second, it allows us to use this model as a first-stage prediction model in the 2SLS estimation presented in Tables 3 and 4. Finally, we can use it to confirm prior evidence of a negative relation between disclosure quality and inside ownership for our cost-of-capital sample (e.g., La Porta *et al.*, 1998; Leuz *et al.*, 2003; Haw *et al.*, 2004).

We model inside ownership α as a function of mandatory disclosure (*DQ*), the overall quality of the legal system (*LEGAL*), and a set of firm-level and country-level control variables Z_i. This results in the following regression specification:

$$\alpha = \gamma_0 + \gamma_1 DQ + \gamma_2 LEGAL + \Sigma \gamma_i Z_i + u. \quad \text{(a1)}$$

We use the same proxies for *Inside Ownership*, *Disclosure Regulation*, and *Legal Quality* as in our cost-of-capital model (see Section 3.1). The choice of the control variables follows prior research (e.g., Himmelberg *et al.*, 1999, 2004; La Porta *et al.*, 1998, 2002). We expect inside ownership to be a function of *log(Sales)*, the ratio of sales to property, plant and equipment (*Sales/PPE*), the ratio of research and development expense to sales (*R&D/Sales*), and the idiosyncratic volatility of monthly stock returns (*Return Variability*). Because R&D information is often missing, we also include a binary *R&D Indicator*, which takes on the value of one for firm-years without valid R&D information. To account for nonlinearities in the relation between ownership and size, we include $log(Sales)^2$ in the model. In addition, we control for (the logarithm of) the annual gross domestic product (GDP). Wealthier nations have more

large firms that are widely held. At the same time, GDP might also capture entrepreneurial wealth, which is an important (unobserved) determinant of ownership (Bitler *et al*., 2005).

Our dependent variable measures the percentage of cash flow rights held by insiders. However, it is possible that it also captures managerial entrenchment since the voting rights and cash flow rights of shares are correlated. In the absence of a perfect proxy for voting rights in our large panel, we include the same three additional firm-level variables to isolate the entrenchment effect as in the cost-of-capital model (i.e., *Multiple Shares*, the *Payout Ratio*, and *Analyst Following*). Finally, we include industry and year fixed-effects. See Table A1 for descriptive statistics of the variables used in the ownership model and details on the variable measurement.

One concern with our main analysis is the potentially endogenous nature of inside ownership. To estimate a 2SLS regression, we need instruments that determine ownership but are not included in the cost-of-capital model in Eq. (2). We attempt to address this issue in two ways. First, we include in the ownership model proxies for the volatility of a risk-averse manager's stake in the firm (i.e., Sales/PPE, R&D/Sales, return variability, and countries' GDP). Thus, we implicitly assume that these measures are valid instruments based on the idea that they likely capture innate firm volatility, managerial risk aversion, and managerial wealth. A concern with this approach is that some of our instruments (e.g., R&D) are arguably endogenous. Thus, as an alternative, we follow La Porta *et al.* (2002) and assume that ownership is optimized at the time of the initial offering of shares (IPO). Specifically, we set our determinants of ownership equal to the actual realizations of these variables in the *first year* a firm enters the sample (our proxy for the IPO year), and subsequently eliminate this first year from the analyses when estimating the cost-of-capital model. The idea is that, by measuring the instrumental variables at

the beginning of the sample period, they sufficiently predate the years in which we measure the cost of capital, and thus are less likely to be chosen in anticipation of future equity capital needs.

Table A2 presents three specifications of the ownership model. In the first column, we use the same firm-year observations as in the cost-of-capital model. In the second column, we estimate the IPO model as described above (note that we lose about 10,000 firm-years because we eliminate the first year a firm enters the sample). In the third column, we aggregate the firm-years into 382 country-year observations by computing medians for continuous variables and means for binary indicator variables. This aggregation addresses the concerns that large sample countries might unduly affect the results, and that the statistical significance of the institutional variables measured at the country level might be overstated. For all regressions, we report *t*-statistics based on robust standard errors that are clustered by country.

Regardless of the model, disclosure regulation is always significantly and negatively related to inside ownership. This finding is consistent with the idea that ownership serves as a substitute to disclosure regulation in preventing managers from expropriating outside/minority shareholders. Thus, when we multiply the negative coefficient γ_1 from Eq. (a1) with a negative coefficient on inside ownership in the cost-of-capital model, the resulting indirect effect of disclosure on the cost of capital is positive.

The control variables are generally significant and exhibit the expected signs (less so for the country-year specification). The coefficients on *log(Sales)* and $log(Sales)^2$ suggest a concave relation between firm size and ownership that is decreasing except for small values of sales. This is consistent with better monitoring for larger firms. It is also consistent with larger firms having higher shareholder protection, which reduces the likelihood of incentive misalignment. Inside ownership is positively associated with the sales to capital ratio (although the coefficients are

often insignificant). To the extent that this measure is a proxy for (the inverse of) asset tangibility, it suggests that ownership is lower when there are more fixed assets. Higher R&D is associated with lower inside ownership. One possible explanation for this (counter-intuitive) result is that firms with higher R&D intensity might be more exposed to idiosyncratic risk, lowering the incentives for managers to hold equity (Himmelberg *et al.*, 2004). The positive sign on return variability suggests that idiosyncratic risk may not proxy for risk that lowers inside ownership, but for uncertainty and monitoring difficulty that increases inside ownership. The three entrenchment variables suggest that insiders of firms with multiple shares hold more equity (consistent with higher agency problems), and that higher payout ratios and analyst following reduce the need for incentive alignment via ownership. Finally, firms in wealthier countries and from countries with more effective legal systems have lower inside ownership.

References

Albuquerque, R. and Wang, N. (2008) Agency conflicts, investment, and asset pricing, *Journal of Finance,* 63(1), pp. 1–40.

Ashbaugh-Skaife, H., Collins, D. and LaFond, R. (2009) Corporate governance, risk and cost of equity, Working Paper, University of Wisconsin.

Attig, N., Guedhami, O. and Mishra, D. (2008) Multiple large shareholders, control contests, and implied cost of equity, *Journal of Corporate Finance,* 14(5), pp. 721–737.

Baker, G. and Hall, B. (2004) CEO incentives and firm size, *Journal of Labor Economics,* 22(4), pp. 767–798.

Barry, C. and Brown, S. (1984) Differential information and the small firm effect, *Journal of Financial Economics,* 13(2), pp. 283–294.

Barry, C. and Brown, S. (1985) Differential information and security market equilibrium, *Journal of Financial and Quantitative Analysis,* 20(4), pp. 407–422.

Bitler, M., Moskowitz, T. and Vissing-Jørgensen, A. (2005) Testing agency theory with entrepreneur effort and wealth, *Journal of Finance,* 60(2), pp. 539–576.

Blume, M. and Stambaugh, R. (1983) Biases in computed returns: An application to the size effect, *Journal of Financial Economics,* 12(3), pp. 387–404.

Brown, S. (1979) The effect of estimation risk on capital market equilibrium, *Journal of Financial and Quantitative Analysis,* 14(2), pp. 215–220.

Bushee, B. and Leuz, C. (2005) Economic consequences of SEC disclosure regulation: Evidence from the OTC bulletin board, *Journal of Accounting and Economics,* 39(2), pp. 233–264.

Bushee, B. and Noe, C. (2000) Corporate disclosure practices, institutional investors, and stock return volatility, *Journal of Accounting Research* 38(supplement), pp. 171–202.

Chen, K., Chen, Z. and Wei, K. (2009) Legal protection of investors, corporate governance, and the cost of equity capital, *Journal of Corporate Finance,* 15(3), pp. 273–289.

Claus, J. and Thomas, J. (2001) Equity premia as low as three percent? Evidence from analysts' earnings forecasts for domestic and international stock markets, *Journal of Finance,* 56(5), pp. 1629–1666.

Clinch, G. and Verrecchia, R. (2011) Voluntary disclosure and the cost of capital, Working Paper, University of Melbourne and University of Pennsylvania.

Core, J., Guay, W. and Verdi, R. (2008) Is accruals quality a priced risk factor? *Journal of Accounting and Economics,* 46(1), pp. 2–22.

Daske, H., Hail, L., Leuz, C. and Verdi, R. (2008) Mandatory IFRS reporting around the world: Early evidence on the economic consequences, *Journal of Accounting Research,* 46(5), pp. 1085–1142.

Daske, H., Hail, L., Leuz, C. and Verdi, R. (2013) Adopting a label: Heterogeneity in the economic consequences around IAS/IFRS adoptions, *Journal of Accounting Research,* 51(3), pp. 495–547.

Demsetz, H. and Lehn, K. (1985) The structure of corporate ownership: Causes and consequences, *Journal of Political Economy* 93(6), pp. 1155–1177.

Doidge, C., Karolyi, G. A. and Stulz, R. (2004) Why are foreign firms listed in the U.S. worth more? *Journal of Financial Economics,* 71(2), pp. 205–238.

Easton, P. (2004) PE ratios, PEG ratios, and estimating the implied expected rate of return on equity capital, *The Accounting Review,* 79(1), pp. 73–95.

Elton, E. (1999) Expected return, realized return, and asset pricing tests, *Journal of Finance,* 54(4), pp. 1199–1220.

Fama, E. and French, K. (1992) The cross-section of expected stock returns, *Journal of Finance,* 47(2), pp. 427–465.

Fama, E. and French, K. (1998) Value versus growth: The international evidence, *Journal of Finance,* 53(6), pp. 1975–1999.

Fama, E. and MacBeth, J. (1973) Risk, return, and equilibrium: Empirical tests, *Journal of Political Economy,* 81(3), pp. 607–636.

Francis, J., Khurana, I. and Pereira, R. (2005) Disclosure incentives and effects on cost of capital around the world, *The Accounting Review,* 80(4), pp. 1125–1162.

Garmaise, M. and Liu, J. (2004) Corruption, firm governance, and the cost of capital, Working Paper, University of California, Los Angeles.

Gebhardt, W., Lee, C. and Swaminathan, B. (2001) Toward an implied cost of capital, *Journal of Accounting Research,* 39(1), pp. 135–176.

Guay, W., Kothari, S. P. and Shu, S. (2011) Properties of implied cost of capital using analysts' forecasts, *Australian Journal of Management,* 36(2), pp. 125–149.

Hail, L. and Leuz, C. (2006) International differences in the cost of equity capital: Do legal institutions and securities regulation matter? *Journal of Accounting Research,* 44(3), pp. 485–531.

Hail, L. and Leuz, C. (2009) Cost of capital and changes in growth expectations around U.S. cross-listings, *Journal of Financial Economics,* 93(3), pp. 428–454.

Haw, I., Hu, B., Hwang, L. and Wu, W. (2004) Ultimate ownership, income management, and legal and extra-legal institutions, *Journal of Accounting Research,* 42(2), pp. 423–462.

Himmelberg, C., Hubbard, G. and Love, I. (2004) Investor protection, ownership, and the cost of capital, Working Paper, Columbia University and World Bank.

Himmelberg, C., Hubbard, G. and Palia, D. (1999) Understanding the determinants of managerial ownership and the link between ownership and performance, *Journal of Financial Economics,* 53(3), pp. 353–379.

Jensen, M. and Meckling, W. (1976) Theory of the firm: Managerial behavior, agency costs, and capital structure, *Journal of Financial Economics* 3(4), pp. 305–360.

Johnson, S., Boone, P., Breach, A. and Friedman, E. (2000) Corporate governance in the Asian financial crisis, *Journal of Financial Economics* 58(1-2), pp. 141–186.

Johnstone, D. (2014) Information and the cost of capital in a mean-variance efficient market, *Journal of Business Finance and Accounting*, forthcoming.

Kaufmann, D., Kraay, A. and Mastruzzi, M. (2007) Governance matters VI: Aggregate and individual governance indicators 1996–2006, *World Bank Policy Research*, Washington, D.C.

Kaufmann, D., Kraay, A. and Mastruzzi, M. (2011) The worldwide governance indicators: Methodology and analytical issues, *Hague Journal on the Rule of Law,* 3(2), pp. 220–246.

Lambert, R., Leuz, C. and Verrecchia, R. (2007) Accounting information, disclosure, and the cost of capital, *Journal of Accounting Research,* 45(2), pp. 385–420.

La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. (2006) What works in securities laws? *Journal of Finance,* 61(1), pp. 1–32.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. (1997) Legal determinants of external finance, *Journal of Finance,* 52(3), pp. 1131–1150.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. (1998) Law and finance, *Journal of Political Economy,* 106(6), pp. 1113–1155.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. (2002) Investor protection and corporate valuation, *Journal of Finance,* 57(3), pp. 1147–1170.

Larcker, D. and Rusticus, T. (2010) On the use of instrumental variables in accounting research, *Journal of Accounting and Economics,* 49(3), pp. 186–205.

Lee, C., Ng, D. and Swaminathan, B. (2009) Testing international asset pricing models using implied costs of capital, *Journal of Financial and Quantitative Analysis,* 44(2), pp. 307–335.

Lemmon M. and Lins, K. (2003) Ownership structure, corporate governance, and firm value: Evidence from the East Asian financial crisis, *Journal of Finance,* 58(4), pp. 1445–1468.

Leuz, C., Nanda, D. and Wysocki, P. (2003) Earnings management and investor protection: An international comparison, *Journal of Financial Economics,* 69(3), pp. 505–527.

McInnis, J. (2010) Earnings smoothness, average returns and implied cost of capital, *The Accounting Review,* 85(1), pp. 315–341.

Ohlson, J. and Juettner-Nauroth, B. (2005) Expected EPS and EPS growth as determinants of value, *Review of Accounting Studies,* 10(2-3), pp. 349–365.

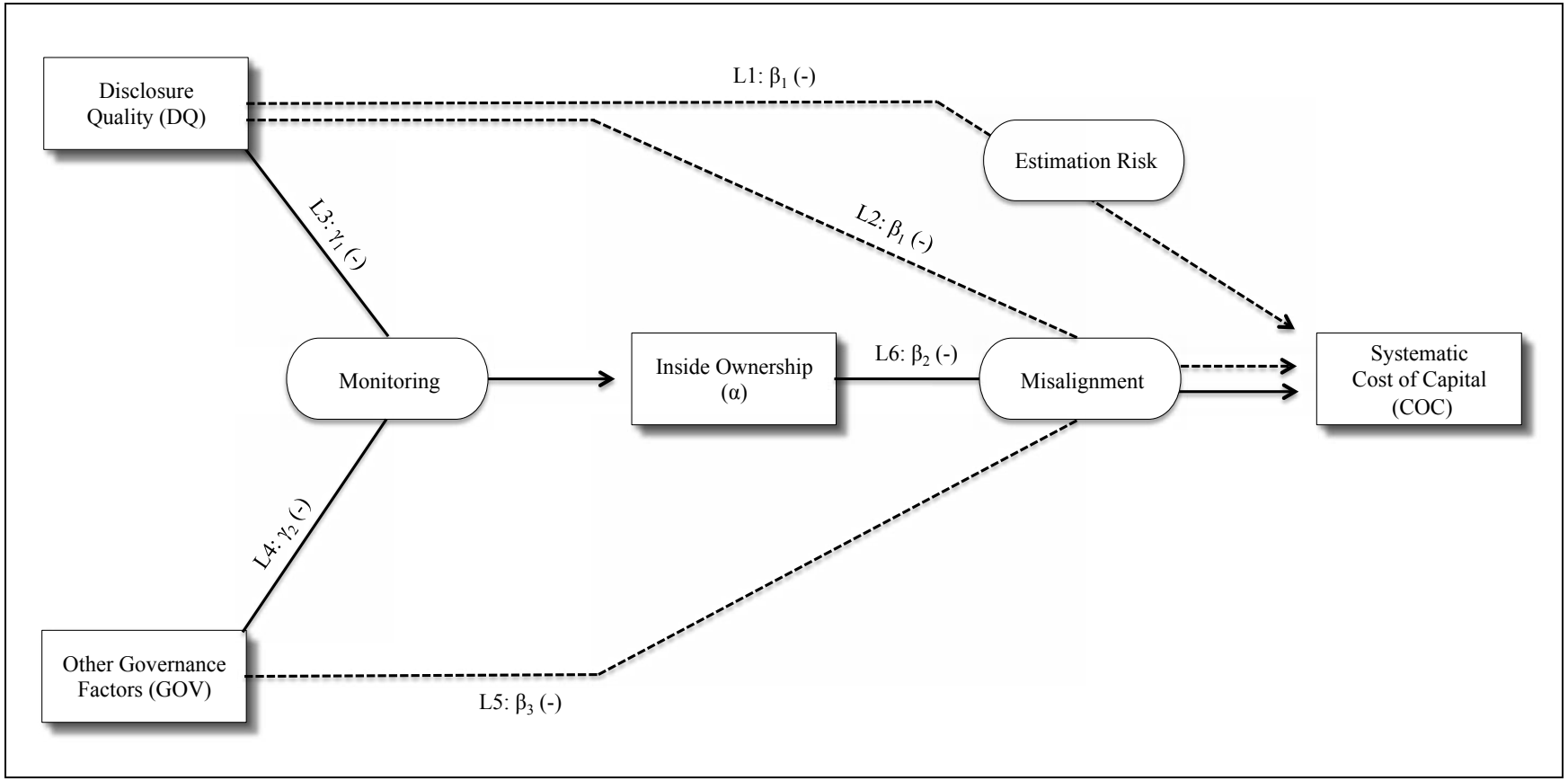
Pástor, L., Sinha, M. and Swaminathan, B. (2008) Estimating the intertemporal risk-return tradeoff using the implied cost of capital, *Journal of Finance,* 63(6), pp. 2859–2897.

Prendergast, C. (2002) The tenuous trade-off between risk and incentives, *Journal of Political Economy,* 110(5), pp. 1071–1102.

Shleifer, A. and Wolfenzon, D. (2002) Investor protection and equity markets, *Journal of Financial Economics,* 66(1), pp. 3–27.

Smith, C. and Watts, R. (1992) The investment opportunity set and corporate financing, dividends, and compensation policies, *Journal of Financial Economics,* 32(3), pp. 263–292.

Exhibit 1. Structural relations between disclosure regulation, inside ownership, and cost of capital



Notes: The graph depicts the structural relations between disclosure quality or other governance factors and systematic cost of capital, either directly (dotted lines) or indirectly via inside ownership (solid lines). Rectangles represent exogenous and endogenous variables, arrows stand for stipulated causal relations, and rounded boxes indicate the underlying theoretical argument. We also indicate the direction of the causal relations.

Table 1. Sample composition and descriptive statistics by country

Country	Unique firms	Firm-years	Implied cost of capital	Realized returns	Inside ownership	Disclosure regulation	Legal quality	Log(GDP)	Inflation
Argentina	11	30	12.41	-8.91	58.02	0.50	0.53	12.54	0.10
Australia	361	1,563	10.95	13.41	33.23	0.75	1.00	12.84	2.52
Austria	33	117	11.34	20.49	53.74	0.25	1.00	12.12	1.84
Belgium	77	384	11.33	10.86	51.19	0.42	1.00	12.30	1.87
Brazil	59	110	16.50	22.73	49.51	0.25	0.63	13.40	6.60
Canada	285	812	10.80	14.43	27.15	0.92	1.00	13.40	2.05
Chile	32	117	13.11	10.26	60.49	0.58	0.70	11.19	4.46
Denmark	101	445	11.58	10.89	32.94	0.58	1.00	11.91	2.10
Finland	89	374	12.91	19.76	33.74	0.50	1.00	11.66	1.18
France	426	2,171	10.95	13.93	50.95	0.75	0.90	14.03	1.69
Germany	294	1,273	10.74	10.81	48.74	0.42	0.92	14.40	1.94
Greece	49	90	12.06	16.29	52.83	0.33	0.62	11.78	3.71
Hong Kong	239	802	13.76	10.58	54.42	0.92	0.82	11.99	3.06
India	97	252	12.77	27.73	51.38	0.92	0.42	13.11	4.66
Indonesia	77	211	16.02	5.42	63.40	0.50	0.40	12.04	8.49
Ireland	45	213	12.56	19.78	25.43	0.67	0.78	11.39	3.22
Israel	14	30	10.82	22.61	47.57	0.67	0.48	11.72	2.11
Italy	153	500	10.98	13.39	45.36	0.67	0.83	13.88	2.74
Japan	993	3,665	8.16	13.29	40.13	0.75	0.90	15.35	-0.18
Korea (South)	179	452	14.59	17.00	32.21	0.75	0.53	13.12	3.52
Malaysia	265	1,112	10.71	3.84	50.20	0.92	0.68	11.33	2.66
The Netherlands	175	937	12.83	11.89	40.72	0.50	1.00	12.75	2.31
New Zealand	73	317	11.35	10.95	53.98	0.67	1.00	10.80	1.93
Norway	102	384	12.92	14.18	39.46	0.58	1.00	11.96	2.04
Philippines	34	112	12.65	18.92	72.22	0.83	0.27	11.27	5.43
Portugal	45	132	11.54	7.53	50.49	0.42	0.87	11.57	2.98
Singapore	192	766	11.05	7.44	53.30	1.00	0.86	11.26	1.24
South Africa	184	775	16.07	14.03	50.34	0.83	0.44	11.78	6.16
Spain	117	591	11.23	20.00	43.66	0.50	0.78	13.19	3.39
Sweden	171	696	11.93	16.39	34.36	0.58	1.00	12.35	1.20
Switzerland	144	771	11.38	15.34	39.26	0.67	1.00	12.40	0.91
Taiwan	136	255	12.06	9.83	26.12	0.75	0.85	13.12	1.25
Thailand	109	292	14.81	15.06	51.79	0.92	0.62	11.80	2.50
United Kingdom	1,051	4,819	11.33	9.31	19.45	0.83	0.86	14.11	2.74
United States	4,415	24,631	10.61	15.02	20.48	1.00	1.00	15.98	2.65
Total (Mean)	10,827	50,201	10.95	13.66	29.90	0.86	0.93	14.64	2.40

(Continued)

Table 1. Continued

Notes: The sample comprises 50,201 firm-year observations from 35 countries between 1990 and 2004 with sufficient financial data from Worldscope, analyst forecast data from I/B/E/S, and stock price data from Datastream to compute the dependent and independent variables in our analyses. The sample excludes countries with less than ten individual firm observations or with inflation rates above 25%, and firms with market value below 5 US$ million. The table reports the number of unique firms, the number of firm-year observations, and the means of the primary test variables and control variables by country. The *implied cost of capital* is the average cost of capital estimate implied by the mean I/B/E/S analyst consensus forecasts and stock prices using the Claus and Thomas (2001) model, the Gebhardt *et. al.* (2001) model, the Ohlson and Juettner-Nauroth (2005) model, and the Easton (2004) model. See Hail and Leuz (2006) for details on the estimation procedure. *Realized returns* are buy-and-hold returns computed over one year, using price information adjusted for dividends and stock splits, and translated into US$. We measure implied costs of capital and realized returns as of month +10 after the fiscal-year end, and truncate both variables at the first and 99th percentile. *Inside ownership* equals the number of closely held shares by corporate insiders (field 05475) divided by the number of common shares outstanding (field 05301) as defined in Worldscope. We measure the level of *disclosure regulation* by the index of disclosure requirements in securities offerings from La Porta *et al*. (2006). *Legal quality* represents the general quality of the legal environment and is measured as the rule of law index (divided by 10) from La Porta *et al*. (1997). *GDP* is countries' annual gross domestic product (in constant US$ billion) as reported by the World Bank. We transform GDP using the natural log. *Inflation* is the yearly median of country-specific, one-year-ahead realized monthly percentage changes in local consumer price indices as reported in Datastream.

Table 2. Descriptive statistics for dependent and independent variables

Variables (N = 50,201)	Mean	Std. dev.	P1	P25	Median	P75	P99
Test variables (%):							
Implied cost of capital	10.95	3.56	5.19	8.54	10.30	12.65	22.81
Realized returns	13.66	43.56	-70.83	-13.01	9.50	33.87	163.69
Inside ownership	29.90	23.75	0.03	9.59	25.84	47.85	87.14
Control variables:							
Inflation	2.398	1.531	-0.885	1.546	2.436	3.029	8.734
Market value (US$ million)	3,230.4	12,542.1	25.2	212.1	605.2	1,987.6	46,436.1
Book-to-market	0.586	0.401	0.074	0.318	0.499	0.740	2.043
Earnings variability	0.033	0.051	0.001	0.009	0.018	0.036	0.268
Forecast bias	0.006	0.033	-0.048	-0.003	0.000	0.006	0.155
Multiple shares	0.127	0.333					
Payout ratio	0.354	0.382	0.000	0.000	0.287	0.500	1.786
Analyst following	9.7	7.8	1	4	7	14	34

Notes: The sample comprises 50,201 firm-year observations from 35 countries between 1990 and 2004 with financial data from Worldscope, analyst forecast data from I/B/E/S, and stock price data from Datastream. We report descriptive statistics for the dependent and independent variables used in the analyses. We use the following primary test variables: (1) the *implied costs of capital* are the means of four estimates for the implied cost of equity capital (Hail and Leuz, 2006). (2) *Realized returns* are yearly buy-and-hold returns. (3) *Inside ownership* equals the number of closely held shares by corporate insiders (field 05475) divided by the number of common shares outstanding (field 05301) as defined in Worldscope. The independent variables are: *inflation* is the yearly median of country-specific, one-year-ahead realized monthly percentage changes in local consumer price indices as reported in Datastream. *Market value* is stock price times the number of shares outstanding (in US$ million). *Book-to-market* is the ratio of the accounting book value to the market value of equity. We measure *earnings variability* as a firm's standard deviation of annual earnings per share over the last five years scaled by total assets per share. *Forecast bias* is the one-year-ahead I/B/E/S analyst forecast error (mean forecast minus actual) scaled by forecast-period stock price. *Multiple shares* indicates which firms have more than one type of common shares or ordinary shares as defined in Worldscope (field 11501). This variable is only available for the most recent fiscal year and therefore time-invariant. We measure the *payout ratio* as dividends per share divided by earnings per share. *Analyst following* is the number of analysts issuing one-year-ahead earnings forecasts in I/B/E/S. Accounting data and market values are measured as of the fiscal-year end, implied costs of capital, realized returns, forecast bias, and analyst following as of month +10 after the fiscal-year end. In the analyses that follow, we apply a logit transformation to the percentage of inside ownership, i.e., $\ln(x/(1-x))$ where x is the raw value, and use the natural log of the raw variables where indicated. Except for variables with natural lower or upper bounds, we truncate all variables at the first and 99th percentile.

Table 3. Implied cost of capital as dependent variable

Panel A: Regression analysis of implied cost of capital on disclosure regulation and inside ownership

Variables	(1) OLS (Firm-year model, reduced)	(2) OLS (Firm-year model, reduced)	(3) OLS (Firm-year model, full)	(4) 2SLS (Base ownership model)	(5) 2SLS (IPO ownership model)	(6) OLS (Country-year model)
Test variables:						
Disclosure regulation	-1.127*	-1.337**	-1.130	-1.790*	-1.602*	-2.129**
	(-1.76)	(-2.06)	(-1.66)	(-1.84)	(-1.95)	(-2.62)
Inside ownership		-0.085**	-0.091**	-0.347*	-0.204*	-0.322
		(-2.53)	(-2.40)	(-1.84)	(-1.76)	(-1.49)
Control variables:						
Legal quality	-2.192	-2.455*	-2.549*	-3.419**	-2.940*	-2.131
	(-1.50)	(-1.78)	(-1.89)	(-2.23)	(-1.96)	(-1.43)
Inflation	0.550***	0.537***	0.528***	0.484***	0.548***	0.332***
	(3.41)	(3.50)	(3.74)	(3.33)	(3.80)	(3.64)
Log(market value)	-0.526***	-0.563***	-0.591***	-0.688***	-0.578***	-0.481
	(-5.72)	(-5.68)	(-4.24)	(-5.80)	(-4.73)	(-1.37)
Book-to-market	1.914***	1.888***	1.871***	1.801***	1.954***	2.674***
	(6.56)	(6.48)	(6.35)	(7.18)	(6.86)	(3.29)
Earnings variability	5.309***	5.194***	5.213***	4.774***	4.938***	74.127***
	(8.08)	(8.02)	(8.59)	(5.27)	(6.33)	(4.14)
Forecast bias	20.928***	20.968***	21.005***	21.116***	20.657***	69.942***
	(9.59)	(9.66)	(9.72)	(9.64)	(8.70)	(5.05)
Multiple shares			0.383	0.535*	0.398	0.856
			(1.12)	(1.97)	(1.40)	(1.21)
Payout ratio			0.036	-0.135	0.012	1.101
			(0.36)	(-0.81)	(0.11)	(0.92)
Log(analyst following)			0.059	0.014	0.019	-0.448
			(0.36)	(0.07)	(0.12)	(-1.11)
Fixed effects:						
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
R^2	31.93%	32.12%	32.24%	30.58%	31.96%	63.57%
N	50,201	50,201	50,201	50,201	39,374	382

(Continued)

Table 3. Continued

Panel B: Path analysis of the effect of disclosure regulation on implied cost of capital via inside ownership

	(1) OLS (Firm-year model, full)		(2) 2SLS (Base ownership model)		(3) OLS (Country-year model)	
Variables	Std. coefficients	Percent	Std. coefficients	Percent	Std. coefficients	Percent
Direct effect:						
(i) Disclosure regulation	-0.056	127%	-0.088*	176%	-0.172**	110%
	(-1.66)		(-1.84)		(-2.62)	
Indirect effect:						
(ii) Disclosure regulation	-0.217**		-0.186***		-0.155*	
	(-2.44)		(-3.04)		(-1.71)	
(iii) Inside ownership	-0.053**		-0.203*		-0.098	
	(-2.40)		(-1.84)		(-1.49)	
(iv) Total indirect [(ii)*(iii)]	0.012	-27%	0.038	-76%	0.015	-10%
Total effect [(i) + (iv)]	-0.044	100%	-0.050	100%	-0.157	100%
N	50,201		50,201		382	

Notes: The sample comprises up to 50,201 firm-year observations from 35 countries between 1990 and 2004 (see Table 1). Panel A reports results from various OLS regression specifications of the cost-of-capital model using the *implied cost of capital* as the dependent variable. Models 1 through 5 are based on firm-year observations. In Model 4, we use the ownership model as described in the Appendix in the first stage of a two-stage-least-squares estimation (2SLS) and report the second stage results. Model 5 also reflects 2SLS estimation, but we use the initial public offering (IPO) model of ownership in the first stage (see the Appendix). In Model 6, we aggregate the firm-year observations into 382 country-year observations by computing medians. For binary indicator variables we compute the country-year means instead. We require at least 10 firm-year observations for a given country and year to be included. Panel B reports the direct and indirect effects of *disclosure regulation* on the *implied cost of capital* via *inside ownership* using path analysis and the structural model described in Exhibit 1. The three specifications correspond to Models 3, 4, and 6 in Panel A, respectively. The direct effect is the standardized coefficient estimate on *disclosure regulation* from the cost-of-capital model. The indirect effect equals the standardized coefficient estimate on *disclosure regulation* from the ownership model (see the Appendix) multiplied by the standardized coefficient estimate on *inside ownership* from the cost-of-capital model. The total effect of disclosure regulation is the sum of the direct and indirect effects. For a description of the dependent and control variables see Table 2. We use the natural log of the raw values where indicated. We include an intercept, one-digit SIC industry, and year fixed effects in the regressions, but do not report the coefficients. The table reports coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors that are clustered by country.
***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 4. Realized returns as dependent variable

Panel A: Regression analysis of realized returns on disclosure regulation and inside ownership

Variables	(1) OLS (Firm-year model, reduced)	(2) OLS (Firm-year model, reduced)	(3) OLS (Firm-year model, full)	(4) 2SLS (Base ownership model)	(5) 2SLS (IPO ownership model)	(6) OLS (Country-year model)
Test variables:						
Disclosure regulation	2.673	2.470	1.659	-16.287**	-16.866***	-7.231
	(0.92)	(0.77)	(0.54)	(-2.65)	(-2.94)	(-1.56)
Inside ownership		-0.074	-0.125	-6.328***	-5.262***	-2.857
		(-0.34)	(-0.55)	(-3.36)	(-3.43)	(-1.56)
Control variables:						
Legal quality	10.682*	10.508*	10.043	-5.948	-7.657	1.826
	(1.76)	(1.73)	(1.67)	(-0.58)	(-0.75)	(0.23)
Log(market value)	-0.504***	-0.536***	-0.480*	-2.666***	-2.189***	-1.673
	(-5.15)	(-3.52)	(-1.84)	(-5.40)	(-4.86)	(-1.15)
Book-to-market	6.580***	6.565***	6.713***	5.724***	6.061***	15.032**
	(7.68)	(7.79)	(7.81)	(4.59)	(4.88)	(2.62)
Multiple shares			0.226	3.613**	2.758***	-1.586
			(0.20)	(2.49)	(2.91)	(-0.44)
Payout ratio			-1.809***	-5.724***	-6.137***	0.111
			(-4.95)	(-4.63)	(-8.25)	(0.02)
Log(analyst following)			-0.097	-1.314	-1.551	2.656
			(-0.16)	(-0.83)	(-1.13)	(1.32)
Fixed effects:						
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
R^2	6.29%	6.29%	6.31%	4.56%	1.37%	48.07%
N	50,201	50,201	50,201	50,201	39,374	382

(Continued)

Table 4. Continued

Panel B: Path analysis of the effect of disclosure regulation on realized returns via inside ownership

	(1) OLS (Firm-year model, full)		(2) 2SLS (Base ownership model)		(3) OLS (Country-year model)	
Variables	Std. coefficients	Percent	Std. coefficients	Percent	Std. coefficients	Percent
Direct effect:						
(i) Disclosure regulation	0.007	88%	-0.066**	6,600%	-0.059	131%
	(0.54)		(-2.65)		(-1.56)	
Indirect effect:						
(ii) Disclosure regulation	-0.217**		-0.214**		-0.155*	
	(-2.44)		(-2.43)		(-1.71)	
(iii) Inside ownership	-0.006		-0.302***		-0.088	
	(-0.55)		(-3.36)		(-1.56)	
(iv) Total indirect [(ii)*(iii)]	0.001	12%	0.065	-6,500%	0.014	-31%
Total effect [(i) + (iv)]	0.008	100%	-0.001	100%	-0.045	100%
N	50,201		50,201		382	

Notes: The sample comprises up to 50,201 firm-year observations from 35 countries between 1990 and 2004 (see Table 1). Panel A reports results from various OLS regression specifications of the cost-of-capital model using *realized returns* as the dependent variable. Models 1 through 5 are based on firm-year observations. In Model 4, we use the ownership model as described in the Appendix in the first stage of a two-stage-least-squares estimation (2SLS) and report the second stage results. Model 5 also reflects 2SLS estimation, but we use the initial public offering (IPO) model of ownership in the first stage (see the Appendix). In Model 6, we aggregate the firm-year observations into 382 country-year observations by computing medians. For binary indicator variables we compute the country-year means instead. We require at least 10 firm-year observations for a given country and year to be included. Panel B reports the direct and indirect effects of *disclosure regulation* on *realized returns* via *inside ownership* using path analysis and the structural model described in Exhibit 1. The three specifications correspond to Models 3, 4, and 6 in Panel A, respectively. The direct effect is the standardized coefficient estimate on *disclosure regulation* from the cost-of-capital model. The indirect effect equals the standardized coefficient estimate on *disclosure regulation* from the ownership model (see the Appendix) multiplied by the standardized coefficient estimate on *inside ownership* from the cost-of-capital model. The total effect of disclosure regulation is the sum of the direct and indirect effects. For a description of the dependent and control variables see Table 2. We use the natural log of the raw values where indicated. We include an intercept, one-digit SIC industry, and year fixed effects in the regressions, but do not report the coefficients. The table reports coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors that are clustered by country.
***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 5. Analysis of inside ownership, disclosure regulation, and systematic cost of capital

Panel A: Systematic realized returns based on Fama-French two-factor model and portfolio-sorts

	Two-way sorting by disclosure regulation and predicted ownership		One-way sorting by predicted ownership within country	
Variables	(1)	(2)	(3)	(4)
Test variables:				
Disclosure regulation	-0.34***	-0.58***	-0.30*	-0.31
	(-4.44)	(-3.61)	(-1.85)	(-1.26)
Inside ownership$_{Pred}$	-0.06***	-0.12***	-0.05**	-0.07
	(-3.49)	(-2.86)	(-2.06)	(-0.95)
Control variables:				
Legal quality	-0.78***	-0.90***	-0.45***	-0.46**
	(-3.97)	(-3.90)	(-3.07)	(-2.30)
Multiple shares		-0.06		0.06
		(-0.73)		(0.83)
Payout ratio		-0.16		-0.17
		(-1.35)		(-0.91)
Log(analyst following)		-0.07		0.04
		(-1.17)		(0.51)
R^2	28.1%	31.5%	12.1%	14.0%
N	84	84	169	169

Panel B: Systematic implied cost of capital based on Fama-French two-factor model and portfolio-sorts

	Two-way sorting by disclosure regulation and predicted ownership		One-way sorting by predicted ownership within country	
Variables	(1)	(2)	(3)	(4)
Test variables:				
Disclosure regulation	-0.24***	-0.38***	-0.22**	-0.26*
	(-7.25)	(-5.75)	(-2.20)	(-1.98)
Inside ownership$_{Pred}$	-0.04***	-0.08***	-0.03**	-0.06*
	(-4.55)	(-4.92)	(-2.48)	(-1.76)
Control variables:				
Legal quality	-0.27***	-0.73***	-0.23***	-0.23
	(-3.25)	(-5.94)	(-2.81)	(-1.68)
Inflation		-0.04***		0.01
		(-3.24)		(0.69)
Earnings variability		0.03		0.66
		(0.04)		(0.92)
Forecast bias		-3.60**		0.09
		(-2.42)		(0.06)
Multiple shares		0.10**		0.07*
		(2.51)		(1.96)
Payout ratio		-0.21***		-0.09
		(-4.21)		(-1.05)
Log(analyst following)		-0.05*		0.01
		(-1.97)		(0.16)
R^2	43.3%	58.4%	18.4%	25.4%
N	84	84	169	169

(Continued)

Table 5. Continued

Panel C: Path analysis of the effect of disclosure regulation on systematic cost of capital

	(1) Two-way sorting by disclosure regulation and predicted ownership		(2) One-way sorting by predicted ownership within country	
Variables	Std. coeff.	Percent	Std. coeff.	Percent
Systematic realized returns as dependent variable				
Direct effect:				
(i) Disclosure regulation	-0.44***	124%	-0.27*	123%
	(-4.44)		(-1.85)	
Indirect effect:				
(ii) Disclosure regulation	-0.22**		-0.22**	
	(-2.44)		(-2.44)	
(iii) Inside ownership	-0.39***		-0.23**	
	(-3.49)		(-2.06)	
(iv) Total indirect [(ii)*(iii)]	0.086	-24%	0.051	-23%
Total effect [(i) + (iv)]	-0.354	100%	-0.219	100%
Systematic implied cost of capital as dependent variable				
Direct effect:				
(i) Disclosure regulation	-0.63***	119%	-0.43**	119%
	(-7.25)		(-2.20)	
Indirect effect:				
(ii) Disclosure regulation	-0.22**		-0.22**	
	(-2.44)		(-2.44)	
(iii) Inside ownership	-0.45***		-0.31**	
	(-4.55)		(-2.48)	
(iv) Total indirect [(ii)*(iii)]	0.099	-19%	0.068	-19%
Total effect [(i) + (iv)]	-0.531	100%	-0.362	100%

(Continued)

Table 5. Continued

Notes: The base sample comprises 50,201 firm-year observations from 35 countries between 1990 and 2004 (see Table 1). The table reports results from regression analyses of the systematic component of cost of capital on *inside ownership*, *disclosure regulation* and additional control variables. In Panel A (for *realized returns*) and Panel B (for *implied costs of capital*), we sort firms into portfolios using two approaches. For the two-way sorting, we start with forming 84 portfolios by intersecting ten ranks of *disclosure regulation* with ten ranks of predicted *inside ownership* based on Model 1 in the Appendix. For the one-way sorting, we form 169 portfolios by ranking all firm-year observations in a given country into five groups based on predicted *inside ownership*. We then match twelve months of stock returns to each firm-year starting in October of each year t+1.We require a minimum of 60 monthly return observations per portfolio. For each portfolio we then estimate the following time-series regression: $(R_{P,t} - R_{F,t}) = a_{\mathrm{p}} + b_{1,\mathrm{p}} (R_{M,t} - R_{F,t}) + b_{2,\mathrm{p}} HML_t + \varepsilon_{p,t}$, where R_P is the equal-weighted buy-and-hold return of the portfolio, R_F is the return on a one-month U.S. Treasury bill, R_M is a value-weighted return on a world market index from Datastream, and *HML* is the Fama and French (1998) value-weighted global book-to-market factor. Next, for *realized returns*, we calculate the systematic risk of the portfolio by multiplying the fitted coefficients with the average values of $(R_M - R_F)$ and *HML* over the estimation period. For the *implied costs of capital*, we calculate the systematic risk by multiplying the same fitted coefficients with the value-weighted average implied cost of capital for our sample (as a proxy for the market risk factor), and with the difference in value-weighted average implied costs of capital between the sample firms in the three highest and the three lowest book-to-market deciles (as a proxy for the book-to-market factor). In Panel C, we report the direct and indirect effects of *disclosure regulation* on systematic cost of capital via *inside ownership* using path analysis and the structural model described in Exhibit 1. The direct effect is the standardized coefficient estimate on *disclosure regulation* from the Fama-French two-factor model with portfolio sorts from Panels A and B (Models 1 and 3). The indirect effect equals the standardized coefficient estimate on *disclosure regulation* from the ownership model in the firm-year analysis (Appendix, Model 1) multiplied by the standardized coefficient estimate on *inside ownership* from the Fama-French two-factor model with portfolio sorts. The total effect of disclosure regulation is the sum of the direct and indirect effects. We report (standardized) OLS coefficient estimates and (in parentheses) t-statistics based on robust standard errors that are clustered by country. Panel C reports only the primary variables of interest, but the full set of controls and fixed-effects is included in the regressions.

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table A1. Descriptive statistics for ownership model

Variables (N = 50,201)	Mean	Std. dev.	P1	P25	Median	P75	P99
Test variables (%):							
Inside ownership	29.90	23.75	0.03	9.59	25.84	47.85	87.14
Control variables:							
Sales (US$ million)	2,560.6	11,843.4	1.4	156.9	493.3	1,706.6	32,164.3
Sales/PPE	8.147	14.280	0.171	2.076	4.194	7.977	78.741
R&D/sales	0.018	0.044	0.000	0.000	0.000	0.011	0.208
R&D indicator	0.653	0.476					
Return variability	0.098	0.041	0.039	0.068	0.090	0.121	0.218
Multiple shares	0.127	0.333					
Payout ratio	0.354	0.382	0.000	0.000	0.287	0.500	1.786
Analyst following	9.7	7.8	1	4	7	14	34
GDP (US$ billion)	4,977.8	3,999.2	56.5	639.1	4,885.1	8,647.6	10,623.9

Notes: The sample comprises 50,201 firm-year observations from 35 countries between 1990 and 2004 with financial data from Worldscope, analyst forecast data from I/B/E/S, and stock price data from Datastream. We report descriptive statistics for the dependent and independent variables used in the analyses. The dependent variable, *inside ownership*, equals the number of closely held shares by corporate insiders (field 05475) divided by the number of common shares outstanding (field 05301) as defined in Worldscope. The independent variables are: *sales* equal gross sales and other operating revenue less discounts, returns and allowances in US$ million. *Sales/PPE* is sales divided by gross property, plant and equipment. *R&D/sales* is the ratio of research and development expense divided by sales. If research and development expense is missing, we set the *R&D indicator* variable equal to one. *Return variability* is the annual standard deviation of monthly stock returns. *Multiple shares* indicates which firms have more than one type of common shares or ordinary shares as defined in Worldscope (field 11501). This variable is only available for the most recent fiscal year and therefore time-invariant. We measure the *payout ratio* as dividends per share divided by earnings per share. *Analyst following* is the number of analysts issuing one-year-ahead earnings forecasts in I/B/E/S. *GDP* is countries' annual gross domestic product (in constant US$ billion) as reported by the World Bank. Accounting data are measured as of the fiscal-year end, return variability and analyst following as of month +10 after the fiscal-year end. Except for variables with natural lower or upper bounds, we truncate all variables at the first and 99th percentile.

Table A2. Determinants of inside ownership

Variables	(1) (Base ownership model)	(2) (IPO ownership model)	(3) (Country-year model)
Test variables:			
Disclosure regulation	-2.574**	-2.819**	-0.585*
	(-2.44)	(-2.66)	(-1.71)
Control variables:			
Log(sales)	0.725***	0.708***	0.459
	(4.36)	(3.62)	(1.56)
Log(sales)^2	-0.037***	-0.035***	-0.022
	(-4.54)	(-3.60)	(-1.57)
Sales/PPE	0.003	0.005*	0.017
	(0.98)	(2.02)	(0.40)
R&D/sales	-2.944***	-2.141***	7.066
	(-5.91)	(-2.82)	(0.84)
R&D indicator	0.339**	0.487***	1.375***
	(2.44)	(2.76)	(3.67)
Return variability	4.589***	4.044**	-3.901
	(3.04)	(2.35)	(-1.30)
Multiple shares	0.437	0.459*	-0.152
	(1.60)	(1.75)	(-0.66)
Payout ratio	-0.517***	-0.533***	0.220
	(-4.59)	(-4.48)	(0.55)
Log(analyst following)	-0.340**	-0.429***	0.432***
	(-2.53)	(-2.82)	(3.00)
Log(GDP)	-0.085	-0.085	-0.131*
	(-0.71)	(-0.67)	(-1.80)
Legal quality	-1.924**	-2.425**	-1.986***
	(-2.11)	(-2.36)	(-5.22)
Fixed effects:			
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
R^2	27.36%	27.30%	60.15%
N	50,201	39,374	382

Notes: The sample comprises up to 50,201 firm-year observations from 35 countries between 1990 and 2004 (see Table 1). The table reports various specifications of the ownership model. Models 1 and 2 are based on firm-year observations. In Model 2, in the spirit of an initial public offering (IPO) model, we set the independent variables equal to the earliest realization per firm over the sample period, and delete the corresponding first firm-year observation from the analysis. In Model 3, we aggregate the firm-year observations into 382 country-year observations by computing medians. For binary indicator variables (e.g., multiple shares) we compute the country-year means. We require at least 10 firm-year observations for a given country and year to be included in the country-year analysis. We use *inside ownership*, i.e., the number of closely held shares by corporate insiders divided by the number of common shares outstanding, as the dependent variable. We apply the following logit transformation to the percentage of inside ownership: $\ln(x/(1-x))$, where x is the raw value. We measure the level of *disclosure regulation* by the index of disclosure requirements in securities offerings from La Porta *et al*. (2006). *Legal quality* represents the general quality of the legal environment and is measured as the rule of law index from La Porta *et al*. (1997). For a description of the remaining control variables see Table A1. We use the natural log of the raw values and square the variables where indicated. We include an intercept, one-digit SIC industry, and year fixed effects in the regressions, but do not report the coefficients. We report OLS coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors that are clustered by country.

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.