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Managerial ability and cost of equity capital

Soomi Jang [a], Heeick Choi [b,*], Hyungtae Kim (Ted) [c]

[a] School of Business, Hanyang University, South Korea
[b] SKK Business School, Sungkyunkwan University, South Korea
[c] Craig School of Business, California State University Fresno, United States of America

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ABSTRACT

This study examines whether more capable managers affect the cost of equity capital. After controlling for standard risk factors and firm characteristics, we find that higher managerial ability is associated with a lower implied cost of equity. Moreover, our results show that the negative association between managerial ability and the cost of equity capital is more pronounced for firms with high information asymmetry among investors, with less institutional ownership, and with high capital intensity. The results are robust to a variety of sensitivity tests, including change specifications, an instrumental variable approach, and alternative measures of managerial ability.

1. Introduction

Managerial characteristics affect both corporate and investor behaviors in the capital markets (e.g., Hackbarth, 2008). Using a new proxy of managerial ability, recent research examines the effect of managerial ability on various corporate policies and practices. These studies find that more capable managers improve firms' disclosure quality, information environment, investment efficiency, and tax policies (e.g., Baik, Brockman, Farber, & Lee, 2018; Demerjian, Lev, Lewis, & McVay, 2013; Gan, 2019; Koester, Shevlin, & Wangerin, 2016). These findings suggest that managerial ability plays an important role in corporate decision-making, consistent with managerial characteristics being significant determinants of corporate behavior and performance (e.g., Bertrand & Schoar, 2003; Ferris, Javakhadze, & Rajkovic, 2017; Hackbarth, 2008). Despite an active stream of research on how managerial ability affects corporate behaviors, the influence of managerial ability on investors' risk assessments of equity capital has not been thoroughly examined. Prior studies have focused on the debt market and have consistently shown that more capable managers reduce firms' credit risk (e.g., Andreou, Philip, & Robejsek, 2016; Bonsall IV, Holzman, & Miller, 2016; Cornaggia, Krishnan, & Wang, 2017; Francis, Ren, Sun, & Wu, 2016). In this paper, we extend this line of research by examining how managerial ability affects the cost of equity capital.

Addressing this research question is particularly important for the following reasons. First, prior findings on the relation between organization capital and the cost of equity are inconclusive. Eisfeldt and Papanikolaou (2013) argue that firms with more organizational capital embodied in key employees are exposed to additional risks, which leads to a higher cost of equity. However, Attig and Ghoul (2018) find that organizational capital, measured as management quality practices, reduces a firm's cost of equity. A new measure of managerial ability allows us to draw distinct inferences about the relation between organizational capital and the cost of equity. Second, there is mixed evidence on the association between managerial ability and firms' information environments, which could influence the information risk that investors consider in assessing the cost of equity capital (e.g., Easley, Hvidkjaer, & O'Hara, 2002). Some papers show that managerial ability is positively associated with firms' financial reporting quality (e.g., Baik et al., 2018; Demerjian et al., 2013). Another perspective on this issue is that more capable managers may impair firms' information environments through poor disclosure quality due to their incentives to obscure information (e.g., Bebchuk, Fried, & Walker, 2002; Francis, Huang, Rajgopal, & Zang, 2008). Finally, the question of whether investors consider managerial ability in determining the cost of equity capital is essential to understanding the incremental effect of managerial characteristics on investors' overall risk assessments of firms. This argument is consistent with a prevailing view in the literature that top managers are key factors in explaining corporate outcomes (e.g., Bertrand & Schoar, 2003).

To address our question, we focus on a distinct dimension of managerial ability, how efficiently a manager utilizes the firm's resources and makes investment decisions in the creation of revenues. Because more capable managers have a better understanding of firm efficiency in

* Corresponding author.
E-mail addresses: soomijang@hanyang.ac.kr (S. Jang), Heeickchoi@skku.edu (H. Choi), hkim@csufresno.edu (H. Kim).

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generating revenues, we argue that managerial ability can influence potential factors investors consider in determining the cost of equity: the information environment and perceived risk. Specifically, high-ability managers enhance firms' information environments through better financial reporting quality, including higher-quality management forecasts, better earnings quality, and more readable narrative disclosures in 10-Ks. Furthermore, more capable managers attenuate the market-perceived risk of firms by reducing volatility in future earnings and stock returns, uncertainty about firms' credit risk, and the business risk assessed by the auditors. Therefore, we expect that superior managerial ability decreases the cost of equity through an improved information environment and lower perceived risk (Lambert, Leuz, & Verrecchia, 2007; Richardson, Taylor, Obaydin, & Hasan, 2021; Rjiba, Saadi, Boubaker, & Ding, 2021). However, firms might pay abnormally high compensation for more talented managers because they are more competitive in the labor market. High-ability managers could undertake bold and risky projects due to their overconfidence. If retaining more capable managers induces potential costs such as expensive compensation and inefficient investments, managerial ability could be positively associated with the cost of equity capital.

To test this prediction, we proxy for managerial ability following Demerjian, Lev, and McVay (2012), which measures ability based on how well a manager uses the firm's resources, taking into account firm-specific factors. Although there are many definitions of managerial ability, our measure captures the managerial characteristics that contribute to efficiency in generating revenues. To proxy for the cost of equity capital, we first use four measures of the implied cost of equity that are most common in the literature, as well as their composite measure (e.g., Botosan & Plumlee, 2005; Breuer, Müller, Rosenbach, & Salzmann, 2018; Guay, Kothari, & Shu, 2011).[1] These implied measures are estimated from valuation models in which we measure future cash flows using analyst earnings forecasts. We also use return-based measures of the cost of equity, such as expected future excess returns, and realized future excess returns after controlling for unexpected future cash flow shocks (e.g., Barth, Konchitchki, & Landsman, 2013).

Our empirical results indicate that managerial ability is negatively associated with the cost of equity capital after controlling for general accounting quality and attribute measures, as well as firm fundamentals and risk characteristics. This finding suggests that having more talented managers leads to a lower cost of equity. We further find that this effect is stronger when (1) information asymmetry among investors is greater, (2) external monitoring is not strong, and (3) capital intensity is higher. These results suggest that the association between managerial ability and the cost of equity capital varies depending on a firm's information environment, monitoring environment, and capital intensity. Various sensitivity analyses confirm that our findings are robust to using change specifications, an instrumental variable approach, and alternative measures of the cost of equity capital and managerial ability, as well as taking into account CEOs' risk-taking incentives.

This paper contributes to the literature in three ways. First, we add to the growing body of work examining the influence of managerial ability on corporate decisions and outcomes.[2] This study extends this line of literature by showing that managerial ability explains cross-sectional variation in the cost of equity. Relatedly, Mishra (2014) examines the relationship between "general" managerial ability and the cost of equity capital. He finds that investors require a higher cost of equity for generalist managers than specialist managers as the two types of managers have different risk-taking behaviors. In comparison to Mishra's focus on CEOs' general managerial skills, we look at managerial ability from a different perspective: the manager's contribution to firm efficiency in generating revenues. More importantly, we complement Mishra's findings by showing the incremental effect of managerial ability on the determination of the cost of equity. Our results confirm that the negative effect of managerial ability on the cost of equity is unchanged even after controlling for CEOs' general managerial ability and risk-taking incentives.

Second, our study contributes to the literature on the cost of equity capital. Prior studies have attributed variations in the firm-, industry-, and market-level characteristics to heterogeneity in the cost of equity (e.g., Ashbaugh-Skaife, Collins, & LaFond, 2009; Baginski & Hinson, 2016; Barth et al., 2013; Bhattacharya, Ecker, Olsson, & Schipper, 2012; Chen, Truong, & Veeraraghavan, 2015; Dhaliwal, Heitzman, & Li, 2006; Francis, LaFond, Olsson, & Schipper, 2004; Fu, Kraft, & Zhang, 2012; He, Plumlee, & Wen, 2019; Lambert et al., 2007; Lambert, Leuz, & Verrecchia, 2012; Larson & Resutek, 2017; Li, 2015). Different from the extant literature, we provide evidence of specific managerial characteristics that affect the cost of equity. We add to this line of research by demonstrating the effect of managerial ability on the cost of equity capital.

Third, our paper enhances our understanding of three potential channels through which managerial ability affects a firm's implied cost of equity: information environment, institutional ownership, and capital intensity. We find that more capable managers have a greater impact on the cost of equity when information asymmetry is high. They help increase the quantity and quality of information, leading to better communication and lower information asymmetry. We also find that talented managers are less important in affecting the cost of equity when institutional ownership is high because investors' perceived agency risk decreases with more effective external monitoring. Lastly, we find evidence that superior managers have a greater effect on the cost of equity capital for capital-intensive firms. That is, the effect of managerial ability is more pronounced when investors are more focused on efficient investment in assessing a firm's risk.

Our findings are subject to some limitations. First, although we adopt our proxies of managerial ability from Demerjian et al. (2012), we recognize that the ability measures might still capture the effect of factors beyond management's control. Therefore, our findings should be interpreted with some caution. Second, our sensitivity analyses do not completely alleviate endogeneity concerns in our results. We acknowledge that our research design and robustness tests do not provide strong evidence of the causal inferences of our main finding. Despite these limitations, our study provides insight into the determinants of the cost of equity.

The remainder of this paper is organized as follows. Section 2 reviews prior literature related to the cost of equity capital and managerial ability and develops our hypothesis. Section 3 explains our variable measurements, samples, and data. In Section 4, we report our main empirical results and provide the results from cross-sectional validation tests. Section 5 discusses the results of robustness checks. Finally, Section 6 concludes the paper.

2. Background and hypothesis

Researchers primarily focus on two potential factors investors consider when determining the cost of equity: (1) the firm's information environment and (2) the firm's perceived risk in the financial market.

[1] For brevity, we only report results using the composite measure. The results using the individual measures are qualitatively similar to those using the composite measure. Results using the four models of the implied cost of equity are available upon request.

[2] Many researchers investigate the effects of managerial ability on various corporate decisions and outcomes. Examples include Bertrand and Schoar (2003), Adams et al. (2005), Chemmanur and Paeglis (2005), Chemmanur, Paeglis, and Simonyan (2009), Chang et al. (2010), Baik et al. (2011), Baik et al. (2018), Baik et al. (2020), Switzer and Bourdon (2011), Demerjian et al. (2012), Demerjian et al. (2013), Krishnan and Wang (2015), Andreou et al. (2016), Andreou, Karasamani, Louca, and Ehrlich (2017), Bonsall et al. (2016), Francis et al. (2016), Koester et al. (2016), Cornaggia et al. (2017), and Guan et al. (2018).

2.1. Information environment

Several recent studies examine the role that high-ability managers play in a wide range of corporate decision-making (e.g., Baik, Choi, & Farber, 2020; Bonsall IV et al., 2016; Cornaggia et al., 2017; Demerjian et al., 2013). High-ability managers enhance the quantity and quality of firm information and reduce divergence and noise in financial disclosures. For example, Baik, Farber, and Lee (2011) show that firms with more capable managers produce more frequent and accurate forecasts. Demerjian et al. (2013) provide evidence that earnings quality benefits from managerial ability. Specifically, they find that firms with more capable managers have fewer restatements, higher earnings and accruals persistence, lower errors in bad debt provision, and higher quality accruals.[3] Baik et al. (2018) find that more capable managers improve the quality of the firms' information environment. Hasan (2020) finds that more capable managers produce more readable narrative disclosures in 10-Ks. Baik et al. (2020) document a positive relation between managerial ability and income smoothing. Moreover, for firms with more capable managers, current earnings are more informative about future performance. These findings imply that more capable managers enhance a firm's information environment by providing high-quality information.

2.2. Perceived risk

Managerial ability also facilitates investors' analysis of firm risk. Bonsall IV et al. (2016) find that volatility in future earnings and stock returns decreases when managers are more capable. Therefore, capable managers could lower the credit risk of their firms. Similarly, Cornaggia et al. (2017) show that managerial ability reduces debt market participants' uncertainty about a firm's credit risk. Andreou et al. (2016) demonstrate that more talented bank managers tend to deal with higher risks and facilitate greater intermediation. Francis et al. (2016) show that firms with more capable managers secure loan contracts with more favorable terms, such as lower loan spreads, less stringent covenants, and longer-term maturity. Auditors also consider managerial ability when evaluating their engagement risk. Krishnan and Wang (2015) argue that high managerial ability reduces the auditor's engagement risk by mitigating the client's risk of poor firm performance and low earnings quality. Furthermore, Gan (2019) documents that more capable managers alleviate investment risk by reducing investment inefficiencies such as over- and underinvestment. Overall, prior research suggests that high managerial ability attenuates the market-perceived risk (variance) of firms.

2.3. Hypothesis development

We argue that managerial ability is negatively associated with the cost of equity capital for the following reasons. First, high-ability managers enhance a firm's information environment by inducing more frequent and accurate management forecasts, fewer restatements, higher accruals quality, and more readable narrative disclosures in 10-Ks (Baik et al., 2011; Demerjian et al., 2013; Hasan, 2020). Because high-quality information provided by more capable managers improves investors' assessments of the firm's covariance with other firms' cash flows, investors expect a lower cost of equity capital for firms with high managerial ability (Lambert et al., 2007). Second, managerial ability facilitates investors' analysis of the volatility and risk of the firm. More capable managers can lower the volatility in future earnings and stock returns, uncertainty about the firm's credit risk, and the business risk assessed by auditors (Bonsall IV et al., 2016; Cornaggia et al., 2017; Krishnan & Wang, 2015). Because managerial ability mitigates investors' perceived risk (variance) of firms, we expect firms with more able managers to have a lower cost of equity (Lambert et al., 2007; Richardson et al., 2021; Rjiba et al., 2021).

On the other hand, it is plausible that managerial ability might be positively associated with the cost of equity capital. The empirical literature shows that more capable managers are frequently strong candidates in executive search firms' databases and have a higher chance of receiving offers from other firms (Dasgupta & Ding, 2010). Since more capable managers have better job market opportunities, they might be less likely to rely on the future of the firm and more likely to be associated with bold, risky, and short-term-oriented projects. More capable managers are also paid more as they are more competitive in the job market. If that is the case, when shareholders want to retain more capable managers, they are likely to distribute more cash flows to the capable managers and keep less for themselves. Consequently, firms with more talented managers might be subject to a higher cost of equity capital (Mishra, 2014).[4] Hence, we construct the following hypothesis, stated in null form:

Hypothesis: Managerial ability is not associated with the cost of equity capital.

3. Research design

3.1. Variable measurement

3.1.1. Measurement of managerial ability

Capable managers better understand their firms, and they allocate resources and make decisions to increase the value of their firms. Thus, several recent studies have attempted to evaluate managerial ability using a variety of measures: prior rank, prior compensation, press coverage, prior performance, and the reporting quality of the executive's prior company (Carter, Franco, & Tuna, 2010; Chang, Dasgupta, & Hilary, 2010; Fee & Hadlock, 2003; Francis et al., 2008; Milbourn, 2003; Rajgopal, Shevlin, & Zamora, 2006). However, these measures are known to contain noise and to be susceptible to manager-irrelevant factors (Francis et al., 2008). For example, large firms are likely to pay higher compensation and attract more media mentions. Also, prior performance might be due to abnormal shocks rather than managerial ability.

As a new approach to measuring managerial ability, Demerjian et al. (2012) estimate manager-specific efficiency (i.e., ability), which gauges how well a manager uses the firm's resources. They apply a two-step procedure in their estimation. In the first step, using data envelopment analysis (DEA), they solve the following optimization problem and measure firm-specific efficiency (*DEA_FE*). Firm efficiency is based on sales revenue conditional on the firm's resources. Resources employed are measured by the cost of goods sold (*COGS*), selling and administrative expenses (*SG&A*), property, plant, and equipment (*PP&E*), operating leases (*OpsLease*), research and development (*R&D*), purchased goodwill (*Goodwill*), and other intangible assets (*OtherIntan*). In other words, efficient firms have greater sales revenue with given resources or the same amount of sales revenue with fewer resources. Demerjian et al. (2012) use the following equation:

[3] Demerjian et al. (2013), using media citations as a proxy for managerial ability, offer conflicting evidence about whether more capable managers are associated with lower accruals quality. Similarly, some papers argue that more capable managers impair the information environment with poor earnings quality (Bebchuk et al., 2002; Francis et al., 2008; Hermalin & Weisbach, 1998).

[4] In addition, prior studies document that more capable managers have incentives to obscure information (e.g., Bebchuk et al., 2002; Francis et al., 2008; Hermalin & Weisbach, 1998). Even though Demerjian et al. (2013), among others (e.g., Baik et al., 2011; Baik et al., 2018; Baik et al., 2020), shows that more capable managers produce superior information, having the ability to provide high-quality information does not necessarily translate to having the incentive to do so.

$$Max_v\theta = \frac{Sales}{v_1COGS + v_2SG\&A + v_3PP\&E + v_4OpsLease + v_5R\&D + v_6Goodwill + v_7OtherIntan}.$$

This firm-specific efficiency (*DEA_FE*) includes managerial ability as well as firm characteristics. To rule out firm-specific effects on efficiency other than managerial ability, Demerjian et al. (2012) run the following Tobit regression model using variable coefficients calculated by industry:

$$DEA\_FE_i = \beta_0 + \beta_1 TA_i + \beta_2 MS_i + \beta_3 Positive\_FCF_i + \beta_4 AGE_i + \beta_5 BSeg\_Con_i + \beta_6 Int\_Opr_i + Year\ Fixed_i + \epsilon_i.$$

This equation includes the following factors: total assets (*TA*), market share (*MS*), a positive free cash flow indicator (*Postive_FCF*), firm age (*AGE*), business segment concentration (*BSeg_Con*), and an international operations indicator (*Int_Opr*). The residual from the regression is a measure of managerial ability (*MA-Score*), which is distinct from the firm and cannot be explained by firm characteristics. Demerjian et al. (2012) run a number of tests to validate MA-Score. These tests overall provide consistent evidence that MA-Score offers an improved measure of manager-specific ability over those used in prior studies. The MA-Score has been widely used in other settings, for example, in research investigating the relation between managerial ability and management earnings forecasts (Baik et al., 2011), earnings quality (Demerjian et al., 2013), the information environment (Baik et al., 2018), income smoothing (Baik et al., 2020), corporate tax avoidance (Koester et al., 2016), and shareholder tax sensitivity of dividends (Guan, Li, & Ma, 2018).

3.1.2. Measurement of the cost of equity

We use the implied cost of equity capital (ICE) as a measure of the cost of equity. ICE is *ex-ante* well-specified as a proxy for expected returns, defined as the internal rate of return that equates the current stock price to the present value of expected future cash flows (Botosan & Plumlee, 2005; Botosan, Plumlee, & Wen, 2011; Gebhardt, Lee, & Swaminathan, 2001; Gode & Mohanram, 2003; Li, Ng, & Swaminathan, 2013; Pástor, Sinha, & Swaminathan, 2008).[5] Pástor et al. (2008) and Chava and Purnanandam (2010) show that ICE is more useful than realized returns in capturing the time-series relation of the risk-return trade-off, supporting the use of ICE. Balakrishnan, Shivakumar, and Taori (2021) also explain that ICE utilizes analysts' forecasts, more reliable proxies of future firm performance that are directly available without any additional assumptions. Furthermore, ICE is a good measure of expected stock returns as it is likely to reflect information related to expected stock returns rather than to stock mispricing. We, therefore, primarily use ICE to measure the cost of equity and further test the pricing of managerial ability.

Prior studies have used various models to estimate ICE, with no consensus on the best measure (Botosan & Plumlee, 2005; Guay et al., 2011). In addition, there is nontrivial variation in the magnitude of the associations between ICE measures and individual risk proxies, which could lead to spurious conclusions. For the validity and credibility of the measure, we estimate four types of specifications (*ICE_GLS*, *ICE_CT*, *ICE_MPEG*, and *ICE_OJN*) most commonly used in the accounting and finance literature.[6] In the four models, analysts' earnings forecasts are primarily used to measure expected future earnings. In the model-based measures of ICE, earnings forecasts are estimated from the pooled cross-sectional model. Appendix B describes the details of the four specifications, along with variable definitions and the assumptions of each model.

In our analyses, we primarily use the composite measure *ICE_AVG*, which is the equal-weighted average of the above four individual measures of the cost of equity, because the four measures build on different valuation models and assumptions of forecast horizons and short- and long-term growth rates (e.g., Botosan & Plumlee, 2005; Breuer et al., 2018; Guay et al., 2011).[7]

3.2. Sample and descriptive statistics

3.2.1. Sample

Our initial sample starts with 307,869 firm-year observations (31,288 unique firms) from COMPUSTAT annual data for the period 1990–2016. Our sample period starts in 1990 due to the availability of operating cash flow data. To estimate the four measures of the implied cost of equity, we obtain analyst earnings and growth forecasts from the I/B/E/S unadjusted detail file, and we collect total assets, dividends, and book values of equity from COMPUSTAT and market values of equity from CRSP monthly data. We obtain MA-scores from Peter Demerjian's website. Other accounting, market, and analyst variables are gathered from COMPUSTAT, CRSP, and I/B/E/S, respectively. The intersection of required variables on the cost of equity, MA-Score, and controls yields 26,975 firm-year observations with 4348 unique firms for the test samples.[8]

3.2.2. Descriptive statistics

Table 1 presents descriptive statistics for the variables used in the empirical analysis over the period of 1990 to 2016. *ICE_AVG* is the average value of *ICE_GLS*, *ICE_CT*, *ICE_MPEG*, and *ICE_OJN*.[9] The mean (median) value of *ICE_AVG* is 11.4% (10.6%). The standard deviation of the implied cost of equity is about one-third of its mean and median values, indicating substantial variation across firm-year observations. Table 1 also shows descriptive statistics for our managerial ability and control variables. The two measures of managerial ability, *MA* and *MA_RANK*, are comparable with those in the literature. For example, the mean and median of *MA* are 0.018 and 0.003, respectively, similar to 0.018 and 0.007 found by Baik et al. (2018). Control variables are also within a similar range to those of prior studies (e.g., Francis et al., 2004; Francis et al., 2008). The mean (median) value of accruals quality (*AQ*) is 0.013 (0.010), similar to 0.016 (0.012) found by Francis et al. (2008). The distributions for innate determinants of earnings attributes are also

[5] As expected returns are not observable, some studies instead have measured the return-based cost of equity capital using ex-post realized returns (Duarte & Young, 2009; Easley et al., 2002; Mohanram & Rajgopal, 2009). However, ex-post realized returns differ from expected returns when information surprises do not cancel out over time or across firms (Easton & Monahan, 2005; Elton, 1999; Lundblad, 2007).

[6] *ICE_GLS, ICE_CT, ICE_MPEG,* and *ICE_OJN* are measured following the GLS model (Gebhardt et al., 2001), CT model (Claus & Thomas, 2001), MPEG model (Easton, 2004), and OJN model (Ohlson & Juettner-Nauroth, 2005), respectively, with some adjustments to improve the original models (see Appendix B).

[7] Alternatively, following Gupta, Raman, & Zhang (2018), we consider the median of the four individual measures as a proxy for the cost of equity and obtain similar results.

[8] Appendix C provides details of our sample selection procedures.

[9] For variable definitions, please see Appendix A.

Table 1
Summary statistics ($N = 26{,}975$).

Variable	Mean	STD	25%	Median	75%
ICE_AVG	0.114	0.039	0.089	0.106	0.129
MA	0.018	0.137	−0.069	0.003	0.091
MA_RANK	0.595	0.268	0.400	0.600	0.800
Beta	1.095	0.511	0.746	1.047	1.388
Size	7.441	1.689	6.246	7.325	8.509
MtB	1.002	0.712	0.531	0.952	1.413
LTD	0.179	0.165	0.015	0.157	0.283
ROA	0.050	0.104	0.024	0.056	0.093
RET	0.224	0.612	−0.108	0.131	0.413
IVOL	0.024	0.012	0.015	0.021	0.030
AQ	0.013	0.015	0.004	0.010	0.018
Std_CFO	0.067	0.075	0.030	0.048	0.076
Std_Sales	0.229	0.211	0.103	0.170	0.279
OPCycle	4.638	0.716	4.261	4.713	5.095
PNEarn	0.182	0.238	0.000	0.100	0.300
Int_Capital	0.285	0.228	0.104	0.216	0.412
Int_Intangible	0.069	0.812	0.000	0.021	0.080
D_Intangible	0.287	0.452	0.000	0.000	1.000
AF_Opt	0.000	0.009	−0.002	0.000	0.001

This table provides the sample distribution of variables used in the analysis. The full sample comprises 26,975 firm-year observations over the period 1990–2016. All variables are defined in Appendix A. All continuous variables are winsorized at the top and bottom 1% level.

similar to the distributions reported by Francis et al. (2004). Except for the market value of equity (*Size*), the standard deviations of all other control variables suggest they vary considerably across firms.

Table 2 presents the correlation matrix. Both Spearman and Pearson correlations of *MA* and *MA_RANK* with *ICE_AVG* are negative and significant. For example, the Spearman correlation indicates that *MA* and *MA_RANK* are negatively correlated with *ICE_AVG* ($\rho = -0.07$ and $\rho = -0.08$). As discussed in Fama and French (1993), the variables related to risk factors, including *Beta, Size,* and *MtB*, are correlated with the measure of the implied cost of equity in the expected directions. Consistent with Bhattacharya et al. (2012), *AQ* is positively correlated with the implied cost of equity.

4. Empirical analysis

4.1. Managerial ability and the cost of equity

We estimate the following regression model with year and industry fixed effects controlled and standard errors clustered at the firm level:

$$\begin{aligned} ICE\_AVG_{i,t} = {} & \beta_0 + \beta_1 MA_{i,t-1} + \beta_2 Beta_{i,t-1} + \beta_3 Size_{i,t-1} + \beta_4 MtB_{i,t-1} \\ & + \beta_5 LTD_{i,t-1} + \beta_6 ROA_{i,t-1} + \beta_7 RET_{i,t-1} + \beta_8 IVOL_{i,t-1} \\ & + \beta_9 AQ_{i,t-1} + \beta_{10} Std\_CFO_{i,t-1} + \beta_{11} Std\_Sales_{i,t-1} \\ & + \beta_{12} OPCycle_{i,t-1} + \beta_{13} PNEarn_{i,t-1} + \beta_{14} Int\_Capital_{i,t-1} \\ & + \beta_{15} Int\_Intangible_{i,t-1} + \beta_{16} D\_Intangible_{i,t-1} + \beta_{17} AF\_Opt_{i,t-1} \\ & + Year\ Fixed + Industy\ Fixed + \varepsilon_{i,t} \end{aligned} \quad (1)$$

The dependent variable, *ICE_AVG*, is the mean value of the implied cost of equity measures, *ICE_GLS, ICE_CT, ICE_MPEG*, and *ICE_OJN*. The variable of interest, *MA* (or *MA_RANK*), represents managerial ability. If firms with more able managers experience a lower cost of equity, the coefficient of *MA* (*MA_RANK*), β_1, should be negative.

We control for various factors that prior research identifies as being related to the cost of equity. First, we control for three well-documented risk factors (*Beta, Size*, and *MtB*) that are known to affect the cost of equity (Fama & French, 1992; Lintner, 1965; Sharpe, 1964). *Beta* is estimated from a regression of daily stock returns on value-weighted market returns over 250 trading days (a minimum of 200 trading days are required), ending at the end of year *t-1*. *Size* and *MtB* are the firm size and market-to-book ratio, respectively, at the beginning of the fiscal

Table 2
Spearman (Pearson) correlation coefficients.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) ICE_AVG	1.00	−0.07***	−0.08***	0.04***	−0.27***	−0.29***	0.10***	−0.19***	−0.07***	0.25***	0.05***	0.12***	0.11***	0.04***	0.20***	0.14***	−0.11***	0.08***	0.03***
(2) MA	−0.07***	1.00	0.94***	0.02***	0.14***	0.18***	−0.09***	0.29***	0.03***	−0.05***	0.01*	0.05***	0.06***	−0.03***	−0.15***	−0.09***	−0.03***	0.02***	−0.03***
(3) MA_RANK	−0.09***	0.89***	1.00	0.00	0.13***	0.20***	−0.10***	0.29***	0.03***	−0.03***	0.01	0.07***	0.06***	−0.00	−0.15***	−0.10***	−0.01	0.01**	−0.02***
(4) Beta	0.03***	0.03***	0.00	1.00	0.02**	0.02***	−0.13***	−0.10***	0.03***	0.22***	0.09***	0.19***	0.09***	0.05***	0.20***	−0.14***	0.17***	−0.12***	−0.04***
(5) Size	−0.26***	0.13***	0.12***	0.01**	1.00	0.34***	0.18***	0.35***	0.09***	−0.58***	−0.04***	−0.37***	−0.34***	−0.03***	−0.32***	0.11***	0.04***	−0.08***	0.02***
(6) MtB	−0.25***	0.17***	0.19***	0.03***	0.33***	1.00	−0.04***	0.51***	0.33***	−0.13***	−0.02***	0.09***	0.00	0.02***	−0.10***	−0.12***	0.22***	−0.14***	−0.01
(7) LTD	0.08***	−0.05***	−0.05***	−0.03***	0.02***	0.26***	1.00	0.04***	−0.03***	−0.21***	−0.04***	−0.33***	−0.16***	−0.11***	−0.01	0.32***	−0.29***	0.16***	0.04***
(8) ROA	−0.10***	0.10***	0.11***	−0.06***	0.15***	0.20***	0.15***	1.00	0.14***	−0.31***	−0.02***	−0.11***	−0.09***	−0.05***	−0.40***	0.06***	−0.06***	−0.04***	−0.06***
(9) RET	−0.04***	0.01	0.02***	0.06***	0.00	0.30***	−0.02***	0.04***	1.00	−0.08***	0.00	0.03***	0.02***	0.01	0.01**	−0.03***	0.00	−0.01	−0.15***
(10) IVOL	0.23***	−0.06***	−0.04***	0.24***	−0.52***	−0.10***	−0.03***	−0.19***	0.11***	1.00	0.03***	0.49***	0.35***	0.05***	0.40***	−0.11***	0.11***	0.01*	−0.04***
(11) AQ	0.08***	0.02***	0.02***	0.09***	−0.13***	0.03***	−0.02***	−0.03***	0.04***	0.14***	1.00	0.17***	0.07***	0.14***	0.24***	−0.10***	0.12***	−0.09***	−0.02**
(12) Std_CFO	0.09***	0.06***	0.05***	0.14***	−0.26***	0.15***	−0.08***	−0.07***	0.11***	0.38***	0.21***	1.00	0.49***	0.07***	0.37***	−0.27***	0.20***	−0.05***	−0.06***
(13) Std_Sales	0.08***	0.09***	0.08***	0.05***	−0.26***	0.00	−0.04***	−0.03***	0.06***	0.27***	0.12***	0.32***	1.00	−0.12***	0.20***	−0.26***	0.01	0.01*	−0.04***
(14) OPCycle	0.03***	−0.03***	−0.01*	0.05***	0.00	0.02***	−0.09***	−0.00	0.02***	0.03***	0.12***	0.04***	−0.18***	1.00	0.03***	−0.26***	0.38***	−0.30***	0.02**
(15) PNEarn	0.18***	−0.12***	−0.14***	0.20***	−0.31***	0.00	0.05***	−0.19***	0.11***	0.41***	0.28***	0.45***	0.15***	0.03***	1.00	−0.18***	0.18***	−0.06***	−0.06***
(16) Int_Capital	0.14***	−0.08***	−0.08***	−0.13***	0.09***	−0.14***	0.12***	0.01	−0.05***	−0.10***	−0.16***	−0.23***	−0.20***	−0.36***	−0.16***	1.00	−0.40***	0.24***	0.08***
(17) Int_Intangible	0.01**	−0.01*	−0.02***	0.02***	−0.01*	0.03***	−0.02***	−0.03***	0.00	0.03***	0.03***	0.07***	−0.00	0.05***	0.08***	−0.05***	1.00	−0.79***	−0.06***
(18) D_Intangible	0.09***	0.02***	0.01**	−0.12***	−0.09***	−0.14***	0.05***	−0.01	−0.02***	−0.01*	−0.09***	−0.10***	0.07***	−0.25***	−0.08***	0.31***	−0.05***	1.00	0.06***
(19) AF_Opt	0.07***	−0.04***	−0.04***	−0.04***	−0.03***	−0.04***	0.03***	−0.07***	−0.11***	0.01**	−0.00	−0.02***	−0.01	0.01**	0.01**	0.04***	−0.00	0.05***	1.00

This table shows the Spearman (Pearson) correlation coefficient above (below) the diagonal for the variables used in the multivariate tests. All variables are defined in Appendix A. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

year. Following Balakrishnan et al. (2021), to control for other risk proxies, we include leverage (*LTD*), profitability (*ROA*), past firm performance (*RET*), and idiosyncratic volatility (*IVOL*). We also control for accruals quality (*AQ*), which can be related to a firm's cost of equity (Francis et al., 2004; Kim & Qi, 2010; Ogneva, 2012).[10] *AQ* is measured as in Dechow and Dichev (2002) and McNichols (2002).

We view managerial ability as a distinct dimension of the corporate information environment. One might argue, however, that the effect of managerial ability on the cost of equity is subsumed by the effects of other attributes because firms with more favorable earnings attributes, could have a lower cost of equity than firms with less favorable characteristics. To address this issue, following Francis et al. (2004), we include the following innate determinants of earnings attributes to ensure that the effect of managerial ability on the cost of equity is distinct from the effects of other accounting attributes: cash flow volatility (*Std_CFO*), sales volatility (*Std_Sales*), operating cycle (*OPCycle*), historical losses (*PNEarn*), capital intensity (*Int_Capital*), intangible intensity (*Int_Intangible*), and an intangible indicator (*D_Intangible*).[11] We also include a variable to represent analyst forecast properties. Prior studies on the cost of equity document that the optimism bias in earnings forecasts could lead to imprecise computations of the implied cost of equity (Ding, Ni, Rahman, & Saadi, 2015; Hou, Van Dijk, & Zhang, 2012; McInnis, 2010; Mohanram & Gode, 2013). We, therefore, control for analyst forecast optimism (*AF_Opt*), i.e., signed analyst forecast error. Further, we include year-fixed effects in our analyses to control for market-wide macroeconomic effects on the cost of capital (Ding et al., 2015). Finally, we include industry fixed effects, which take into account the effect of industry competition on the cost of capital. We cluster-adjust standard errors across firms (Armstrong, Core, Taylor, & Verrecchia, 2011; Lambert et al., 2012). The definitions and measurements of the control variables are detailed in Appendix A.

Table 3 presents the results from estimating Eq. (1), which examines the effect of managerial ability on the cost of equity. Column 1 (Column 4) reports the results when *MA* (*MA_RANK*) is used as the variable of interest without the control variables. Specifically, the estimated coefficients on *MA* and *MA_RANK* are −0.0227 and − 0.0144, respectively, both significant at the 1% level. Column 2 (Column 5) shows the results with the control variables and industry fixed effects, and Column 3 (Column 6) shows the results with the control variables and year and industry fixed effects. In Column 3 (Column 6), the effect of capable managers on the cost of equity is economically significant since a one-standard-deviation increase in *MA* (*MA_RANK*) is associated with a 9-(16)-basis-point decrease in the cost of equity for *ICE_AVG*.[12] Collectively, these results provide strong evidence that the cost of equity declines as a firm's management becomes more capable.

Regarding the control variables, the results are generally consistent with evidence from prior studies. For example, the cost of equity is positively related to the market beta (*Beta*) when year fixed effects are included, but negatively related to firm size (*Size*) and the market-to-book ratio (*MtB*). The results on accounting attributes are generally consistent with Francis et al. (2004). For example, *AQ* and *Std_Sales* are positively and significantly related to the implied cost of equity,

[10] Using a time-series asset pricing model, Francis, LaFond, Olsson, and Schipper (2005) show that accruals quality is a priced risk factor, but Core, Guay, and Verdi (2008) suggest that accruals quality is not a priced risk factor when a two-stage cross-sectional regression is used. However, several subsequent studies show that accruals quality is priced under the two-stage cross-sectional regression framework after controlling for penny stocks (Kim & Qi, 2010) or cash flow shocks (Ogneva, 2012).

[11] Following Francis et al. (2004), we include an intangible indicator (*D_Intangible*) to control for the zero values of R&D expenses and advertising expenses.

[12] We compute these basis point changes by multiplying the estimated coefficient on *MA* (*MA_RANK*) by the standard deviation (see Table 1) of *MA* (*MA_RANK*).

Table 3
Effects of managerial ability on the cost of equity.

	ICE_AVG											
	(1)		(2)		(3)		(4)		(5)		(6)	
MA	**−0.0227*****	**(−8.39)**	**−0.0052****	**(−2.20)**	**−0.0064*****	**(−2.75)**						
MA_RANK							**−0.0144*****	**(−10.93)**	**−0.0051*****	**(−4.35)**	**−0.0060*****	**(−5.31)**
Beta			−0.0008	(−1.27)	0.0017**	(2.43)			−0.0009	(−1.33)	0.0017**	(2.46)
Size			−0.0037***	(−14.99)	−0.0029***	(−11.19)			−0.0036***	(−14.89)	−0.0028***	(−11.09)
MtB			−0.0021*	(−1.82)	−0.0022	(−1.63)			−0.0021*	(−1.83)	−0.0021	(−1.63)
LTD			0.0080***	(6.32)	0.0088***	(6.93)			0.0080***	(6.28)	0.0087***	(6.89)
ROA			−0.0049***	(−3.22)	−0.0057***	(−3.84)			−0.0047***	(−3.11)	−0.0055***	(−3.72)
RET			−0.0040***	(−9.17)	−0.0059***	(−12.23)			−0.0040***	(−9.16)	−0.0059***	(−12.24)
IVOL			0.4758***	(14.73)	0.5803***	(13.91)			0.4799***	(14.84)	0.5797***	(13.93)
AQ			0.0763***	(3.74)	0.0805***	(4.17)			0.0776***	(3.80)	0.0821***	(4.25)
Std_CFO			0.0048	(0.85)	0.0047	(0.85)			0.0055	(0.99)	0.0057	(1.02)
Std_Sales			0.0086***	(4.62)	0.0074***	(4.19)			0.0089***	(4.73)	0.0077***	(4.33)
OPCycle			0.0043***	(7.09)	0.0026***	(4.49)			0.0043***	(7.05)	0.0026***	(4.40)
PNEarn			0.0160***	(9.27)	0.0171***	(10.13)			0.0154***	(8.93)	0.0165***	(9.78)
Int_Capital			0.0251***	(11.19)	0.0169***	(7.53)			0.0243***	(10.87)	0.0159***	(7.10)
Int_Intangible			0.0004	(0.61)	0.0003	(0.55)			0.0004	(0.59)	0.0003	(0.53)
D_Intangible			0.0015*	(1.83)	0.0018**	(2.30)			0.0016*	(1.96)	0.0019**	(2.44)
AF_Opt			0.1539***	(4.50)	0.1525***	(4.69)			0.1521***	(4.45)	0.1503***	(4.63)
Year Fixed	Yes		No		Yes		Yes		No		Yes	
Industry Fixed	Yes		Yes		Yes		Yes		Yes		Yes	
# of obs (N)	26,975		26,975		26,975		26,975		26,975		26,975	
Adj. R^2	0.2047		0.1989		0.3210		0.2081		0.1996		0.3220	

This table reports the results from the regression of managerial ability on the cost of equity. All variables are defined as in Appendix A. T-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

indicating that the implied cost of equity is higher for firms with low accruals quality and high sales revenue volatility. *OPCycle*, *PNEarn*, and *Int_Capital* also have positive coefficients, meaning that the implied cost of equity is higher for firms with a longer operating cycle, more frequent negative earnings, and higher capital intensity. Overall, the findings in Table 3 show that managerial ability is negatively associated with the implied cost of equity beyond previously identified risk factors, other firm fundamentals, and earnings attributes.

4.2. Cross-sectional validation

4.2.1. The effect of the information environment on the relation between managerial ability and the cost of equity

Assuming imperfect market competition, Armstrong et al. (2011) and Lambert et al. (2012) find that information asymmetry among investors is positively associated with the cost of equity capital. Therefore, given our hypothesis, it is reasonable to ask whether the firm's information environment affects the impact of managerial ability on the cost of equity. The estimation risk literature (e.g., Barry & Brown, 1985; Coles, Loewenstein, & Suay, 1995) provides evidence that heterogeneous information among investors enlarges estimation risk, raising the cost of equity. Li (2015) and He et al. (2019) show that the information environment, proxied by accounting conservatism, mandatory disclosures, and voluntary disclosures, is closely related to the cost of equity capital. These studies suggest that the relationship between estimation risk and the cost of equity varies with the level of information asymmetry. If a more capable manager reduces investors' information uncertainty by revealing clear signals about future performance and disseminating higher quality information, the level of information asymmetry about the firm may influence the relation between managerial ability and the cost of equity. As investors' information acquisition costs increase with the level of information asymmetry, the incremental benefit of managerial ability in reducing information risk would be greater for firms with greater information asymmetry. We, therefore, predict that the impact of managerial ability on the cost of equity is more pronounced for firms facing high information asymmetry among investors. We assess a firm's level of information asymmetry across investors using the bid-ask spread (*BASPR*), which is calculated as the average bid-ask spread over the prior 12 months (e.g., Healy, Hutton, & Palepu, 1999; Lang & Lundholm, 1993). We classify firms into two groups: (1) firms in the top (4th) quartile of the distribution of *BASPR*, considered to be firms facing high information asymmetry ($HBASPR = 1$), and (2) firms in the 1st to 3rd quartiles of the *BASPR* distribution, defined as firms facing less severe information asymmetry ($HBASPR = 0$).[13] We estimate the following regression model:

$$ICE\_AVG_{i,t} = \beta_0 + \beta_1 MA_{i,t-1} + \beta_2 HBASPR_{i,t-1} + \beta_3 HBASPR_{i,t-1} \times MA_{i,t-1} + \sum_i \beta_i \times Controls_{i,t-1} + Year\ Fixed + Industy\ Fixed + \varepsilon_{i,t}. \quad (2)$$

As defined above, the same controls, as well as the year and industry fixed effects, are included as in Eq. (1), while standard errors are cluster-adjusted across firms. The variable of interest is *HBASPR*×*MA* (*HBASPR*×*MA_RANK*), which reflects the extent to which the effect of managerial ability on the cost of equity differs depending on the level of information asymmetry. We expect the coefficient on *HBASPR*×*MA* (*HBASPR*×*MA_RANK*) to be negative, capturing the negative moderation effect of information asymmetry.

Table 4 presents regression results for the effect of information asymmetry on the relation between managerial ability and the cost of equity. Consistent with our expectation, we find a more pronounced negative association of managerial ability with the cost of equity for firms with high information asymmetry ($HBASPR = 1$) than for other firms ($HBASPR = 0$). The estimated coefficients on *HBASPR*×*MA* and *HBASPR*×*MA_RANK* are negative and statistically significant. On average, the effect of *MA* (*MA_RANK*) on the cost of equity is 5.10 (2.93) times larger for firms with high information asymmetry ($HBASPR = 1$) than for other firms ($HBASPR = 0$). The difference in this effect between the groups with high and nonhigh information asymmetry is also economically significant. For example, increasing *MA* (*MA_RANK*) by one standard deviation in firms with high information asymmetry reduces the cost of equity by 22 (23) basis points more than for other firms. Overall, the evidence from Table 4 suggests that managerial ability is more important in evaluating the cost of equity when information asymmetry is high. Under more talented managers, the quantity and quality of information increase, leading to better communication and lower information asymmetry.[14]

4.2.2. The effect of institutional ownership on the relation between managerial ability and the cost of equity

Information asymmetry between management and shareholders arises when ownership and management are separated, creating an agency problem between managers and shareholders (e.g., Jensen & Meckling, 1976). Many studies have found that institutional investors, free from the influence of the CEO, can enhance external monitoring and reduce this agency problem (e.g., Ajinkya, Bhojraj, & Sengupta, 2005; Bhojraj & Sengupta, 2003; Cornett, Marcus, & Tehranian, 2008). A solid monitoring system with institutional investors reduces agency costs by decreasing information asymmetry and overseeing managers' activities, and restricting their opportunistic behaviors. For example, Bhojraj and Sengupta (2003) find that institutional investors monitor both the information environment and managers' self-interested actions, leading to lower interest rates and higher credit ratings. In line with this finding, we examine whether institutional investors influence the impact of managerial ability on the cost of equity. Strong external monitoring could make talented managers a less important factor in determining the cost of equity. In other words, as investors' perceived risk decreases with more effective external monitoring, the incremental benefit of managerial ability in reducing business risk would be limited for firms with stronger corporate governance. Thus, we anticipate that the effect of managerial ability on the cost of equity is less pronounced for firms with strong external monitoring. We assess external monitoring using institutional shareholdings (*INSTHOLD*), calculated as the number of shares held by institutional investors divided by the total number of shares outstanding. We then classify firms into two groups: (1) those in the top (4th) quartile of the distribution of *INSTHOLD*, considered to have strong monitoring ($HINSTHOLD = 1$), and (2) all other firms, in the 1st to 3rd quartiles of the *INSTHOLD* distribution, which face weak monitoring ($HINSTHOLD = 0$).[15] We estimate the following regression model:

$$ICE\_AVG_{i,t} = \beta_0 + \beta_1 MA_{i,t-1} + \beta_2 HINSTHOLD_{i,t-1} + \beta_3 HINSTHOLD_{i,t-1} \times MA_{i,t-1} + \sum_i \beta_i \times Controls_{i,t-1} + Year\ Fixed + Industy\ Fixed + \varepsilon_{i,t}. \quad (3)$$

As defined above, the same controls, as well as the year and industry fixed effects, are included as in Eq. (1), while standard errors are cluster-adjusted across firms. The variable of interest is *HINSTHOLD*×*MA* (*HINSTHOLD*×*MA_RANK*), which reflects the extent to which the effect of managerial ability on the cost of equity differs depending on the level

[13] As an alternative definition of high information asymmetry, we use the tercile and decile ranks of the bid-ask spread. The results using these alternative specifications are similar to our main results.

[14] Alternatively, when we use accruals quality as a proxy for the information environment, the results are consistent with those reported in Table 4.

[15] As an alternative definition of strong external monitoring, we use the tercile and decile ranks of institutional shareholdings. The results using the alternative specifications are similar to our main results.

Table 4
Effects of the information environment on the relation between managerial ability and the cost of equity.

	ICE_AVG			
	(1)		(2)	
MA	−0.0039*	(−1.68)		
MA_RANK			−0.0044***	(−3.94)
HBASPR×MA	**−0.0160****	**(−2.44)**		
HBASPR×MA_RANK			**−0.0085*****	**(−2.74)**
HBASPR	0.0121***	(12.19)	0.0169***	(7.75)
Beta	0.0027***	(3.91)	0.0027***	(3.95)
Size	−0.0025***	(−9.89)	−0.0025***	(−9.79)
MtB	−0.0021	(−1.63)	−0.0021	(−1.63)
LTD	0.0085***	(6.80)	0.0084***	(6.75)
ROA	−0.0057***	(−3.86)	−0.0055***	(−3.74)
RET	−0.0056***	(−11.61)	−0.0056***	(−11.62)
IVOL	0.5395***	(13.17)	0.5384***	(13.18)
AQ	0.0798***	(4.16)	0.0815***	(4.25)
Std_CFO	0.0056	(1.01)	0.0065	(1.18)
Std_Sales	0.0075***	(4.28)	0.0077***	(4.39)
OPCycle	0.0025***	(4.26)	0.0024***	(4.16)
PNEarn	0.0172***	(10.27)	0.0166***	(9.95)
Int_Capital	0.0166***	(7.49)	0.0157***	(7.07)
Int_Intangible	0.0003	(0.58)	0.0003	(0.56)
D_Intangible	0.0016**	(2.09)	0.0018**	(2.25)
AF_Opt	0.1405***	(4.39)	0.1375***	(4.30)
Year Fixed	Yes		Yes	
Industry Fixed	Yes		Yes	
# of obs (N)	26,975		26,975	
Adj. R^2	0.3279		0.3289	

This table reports regression results for the effect of information asymmetry on the relation between managerial ability and the cost of equity. *HBASPR* is an indicator variable that equals 1 if a firm is in the top (4th) quartile of the average bid-ask spread over prior 12 months (*BASPR*) and 0 otherwise. All variables are defined as in Appendix A. T-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Table 5
Effects of institutional ownership on the relation between managerial ability and the cost of equity.

	ICE_AVG			
	(1)		(2)	
MA	−0.0093***	(−3.35)		
MA_RANK			−0.0076***	(−5.62)
HINSTHOLD×MA	**0.0083****	**(2.00)**		
HINSTHOLD×MA_RANK			**0.0052****	**(2.43)**
HINSTHOLD	−0.0046***	(−7.26)	−0.0074***	(−5.09)
Beta	0.0017**	(2.29)	0.0017**	(2.31)
Size	−0.0030***	(−11.14)	−0.0030***	(−11.07)
MtB	−0.0019	(−1.57)	−0.0019	(−1.57)
LTD	0.0087***	(6.64)	0.0086***	(6.60)
ROA	−0.0050***	(−3.06)	−0.0048***	(−2.96)
RET	−0.0060***	(−11.57)	−0.0059***	(−11.55)
IVOL	0.5518***	(12.49)	0.5509***	(12.52)
AQ	0.0782***	(3.77)	0.0798***	(3.85)
Std_CFO	0.0010	(0.18)	0.0019	(0.32)
Std_Sales	0.0065***	(3.27)	0.0067***	(3.37)
OPCycle	0.0024***	(3.71)	0.0023***	(3.63)
PNEarn	0.0184***	(10.22)	0.0178***	(9.89)
Int_Capital	0.0167***	(6.93)	0.0157***	(6.51)
Int_Intangible	0.0003	(0.53)	0.0003	(0.52)
D_Intangible	0.0019**	(2.27)	0.0020**	(2.40)
AF_Opt	0.1510***	(4.31)	0.1484***	(4.24)
Year Fixed	Yes		Yes	
Industry Fixed	Yes		Yes	
# of obs (N)	22,986		22,986	
Adj. R^2	0.3231		0.3243	

This table reports regression results for the effect of corporate governance on the relation between managerial ability and the cost of equity. *HINSTHOLD* is an indicator variable that equals 1 if a firm is in the top (4th) quartile of institutional holding and 0 otherwise. Institutional holding is computed as the number of shares held by institutional investors divided by the total number of outstanding shares. All variables are defined as in Appendix A. T-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

of institutional ownership. We expect the coefficient on *HINSTHOLD×MA* (*HINSTHOLD×MA_RANK*) to be positive, indicating the positive moderation effect of institutional ownership.

Table 5 reports the results for the effect of institutional ownership on the relation between managerial ability and the cost of equity. The estimated coefficients in Columns 1 and 2 on both interaction terms, *HINSTHOLD×MA* and *HINSTHOLD×MA_RANK*, are positive and statistically significant, suggesting that the effect of managerial ability on the cost of equity is less pronounced for firms with high institutional ownership (*HINSTHOLD* = 1) than for other firms (*HINSTHOLD* = 0). The negative effects of *MA* and *MA_RANK* on the cost of equity are weaker when external monitoring is strong, and the differences are economically significant.[16] This finding suggests that superior managerial ability can compensate for deficient corporate governance, such as weak external monitoring. Overall, the results are consistent with our conjecture that talented managers are less important in determining the cost of equity when the firm has strong external monitoring by institutional owners. In other words, institutional investors reduce agency costs, and the effect of managerial ability on the cost of equity is more important for firms with weak external monitoring.[17]

4.2.3. The effect of capital intensity on the relation between managerial ability and the cost of equity

Thus far, our results suggest that the cost of equity decreases with superior managerial ability. This finding is consistent with the conjecture that managerial ability conveys signals about investment efficiency, the information environment, and perceived risk, and thus investors require a lower cost of equity when managers are more capable. If managerial ability indeed provides information on investment efficiency, the effect of managerial ability should be more pronounced when investment efficiency is more important to investors in assessing a firm's risk. To test this prediction, we conduct an additional cross-sectional analysis using firms' capital intensity. We expect to see stronger effects of managerial ability on the cost of equity among firms with high capital intensity because the role of capable managers is more important for efficient investment and asset allocation. Specifically, we estimate the effect of managerial ability by comparing the cost of equity between firms with high and low capital intensity. We measure a firm's level of capital intensity (*Int_Capital*) using the ratio of the net book value of property, plant, and equipment to total assets (e.g., Francis et al., 2004). We classify firms into two groups: (1) those in the top (4th) quartile of the distribution of *Int_Capital*, considered to have high capital intensity (*HCAPINT* = 1), and (2) all other firms in the 1st to 3rd quartiles of the *Int_Capital* distribution, defined as firms with nonhigh capital intensity (*HCAPINT* = 0). The regression model is defined as follows:

$$ICE\_AVG_{i,t} = \beta_0 + \beta_1 MA_{i,t-1} + \beta_2 HCAPINT_{i,t-1} + \beta_3 HCAPINT_{i,t-1} \times MA_{i,t-1} + \sum_i \beta_i \times Controls_{i,t-1} + Year\ Fixed + Industy\ Fixed + \varepsilon_{i,t}. \quad (4)$$

Table 6 provides evidence of the effect of capital intensity on the association between managerial ability and the cost of equity. As expected, we find that the impact of managerial ability on the cost of equity is stronger for firms with high capital intensity (*HCAPINT* = 1) than for other firms (*HCAPINT* = 0). Specifically, in Columns 1 and 2, the coefficients on *HCAPINT×MA* and *HCAPINT×MA_RANK* are negative and significant, indicating that the negative effect of managerial ability on the cost of equity is more pronounced when a firm's business is capital intensive. Furthermore, the difference in the effect of managerial ability between high and nonhigh capital intensity groups is economically significant.[18] Overall, these results suggest that investors perceive firm risk to be lower when managerial ability is strong, as the effect of managerial ability is more pronounced when investment efficiency is more important for investors in assessing a firm's risk.

5. Robustness checks

5.1. Change specifications

In Section 4, we provide consistent results that managerial ability is negatively associated with the cost of capital. However, it is plausible that a firm with lower business risk could be more attractive to a risk-averse manager with higher ability. That is, a firm with a lower cost of equity could easily hire management with higher ability. In that case, reverse causality would be an issue. In addition, our main findings may be biased if the negative relation between managerial ability and the cost of capital is endogenously determined by any omitted variables. Specifically, one could argue that if unobserved firm and manager characteristics influence both managerial ability and the cost of equity, the association between the two would be endogenous due to omitted variables.

To address the possibility of reverse causality and omitted variable bias, we estimate the original models using change specifications. Specifically, if a change in managerial ability leads to the change in the cost of equity in the predicted direction, then it is likely that managerial ability induces the cost of equity to decrease. The results of the change specifications are reported in Table 7. In Columns 1 and 2, we find that the change in managerial ability is negatively (−0.0088 and − 0.0084) associated with the change in the cost of capital, supporting the negative effect of managerial ability on the cost of capital.

5.2. Instrumental variable approach using Lewbel (2012)'s methodology

To alleviate endogeneity concerns and further support the association between managerial ability and the cost of equity, we perform two-stage least squares (2SLS) regression analysis using an instrumental variable approach. It is a challenge to identify appropriate instrumental variables and prove their quality. To overcome these challenges of the instrumental variable approach, Lewbel (2012) suggests a methodology using heteroscedasticity to estimate endogenous regression models when instrumental variables are not available. Following Lewbel (2012), we generate heteroscedasticity-based instruments from our data and then use the generated instruments in the analysis.

Table 8 reports the results of the 2SLS regression analysis. First, to check the validity of the generated instruments, we conduct weak instrument and overidentification tests. Specifically, we find that the test statistics for weak instruments (F-statistics, 72.26 and 54.53 for *MA* and *MA_RANK*, respectively) exceed the thresholds suggested by Stock and Yogo (2005) (10% critical value, 52.77), rejecting the null hypothesis that the generated instruments are weak. Furthermore, the Hansen J statistics on the overidentification test are 20.04 and 9.42 and insignificant (p-value = 0.17 and 0.85) for *MA* and *MA_RANK*, respectively, which ensures the exclusion criteria are satisfied and the instruments are exogenous.[19]

[16] As *MA* (*MA_RANK*) increases by one standard deviation, firms with strong monitoring experience a decrease in the cost of equity that is 11 (14) basis points less than that of other firms.

[17] In a robustness check, we use analyst following, calculated as the number of analysts who follow the firm over the prior 12 months, as an alternative measure of external monitoring. We find consistent inferences with those reported in Table 5.

[18] A one-standard-deviation increase in *MA* (*MA_RANK*) is associated with a 15- (15)-basis-point decrease in the cost of equity for firms with high capital intensity.

[19] We also perform Hausman specification test for endogeneity. We find that F-statistics for *MA* and *MA_RANK* are 1.69 and 2.54 (p-value = 0.19 and 0.11), which suggests that our regressors are marginally endogenous.

Table 6
Effects of capital intensity on the relation between managerial ability and the cost of equity.

	ICE_AVG			
	(1)		(2)	
MA	−0.0044*	(−1.82)		
MA_RANK			−0.0049***	(−4.10)
HCAPINT×MA	−0.0111**	(−1.99)		
HCAPINT×MA_RANK			−0.0057**	(−2.18)
HCAPINT	0.0016*	(1.94)	0.0049***	(2.84)
Beta	0.0017**	(2.46)	0.0017**	(2.48)
Size	−0.0028***	(−11.08)	−0.0028***	(−10.98)
MtB	−0.0022	(−1.63)	−0.0021	(−1.63)
LTD	0.0088***	(6.92)	0.0088***	(6.88)
ROA	−0.0057***	(−3.87)	−0.0056***	(−3.75)
RET	−0.0059***	(−12.20)	−0.0059***	(−12.20)
IVOL	0.5811***	(13.92)	0.5801***	(13.93)
AQ	0.0802***	(4.16)	0.0818***	(4.24)
Std_CFO	0.0045	(0.81)	0.0055	(0.98)
Std_Sales	0.0074***	(4.18)	0.0077***	(4.30)
OPCycle	0.0026***	(4.50)	0.0026***	(4.40)
PNEarn	0.0172***	(10.18)	0.0165***	(9.83)
Int_Capital	0.0145***	(5.45)	0.0134***	(5.03)
Int_Intangible	0.0003	(0.56)	0.0003	(0.54)
D_Intangible	0.0018**	(2.29)	0.0019**	(2.43)
AF_Opt	0.1521***	(4.69)	0.1498***	(4.63)
Year Fixed	Yes		Yes	
Industry Fixed	Yes		Yes	
# of obs (N)	26,975		26,975	
Adj. R^2	0.3213		0.3224	

This table reports regression results for the effect of capital intensity on the relation between managerial ability and the cost of equity. *HCAPINT* is an indicator variable that equals 1 if a firm is in the top (4th) quartile of capital intensity and 0 otherwise. Capital intensity is computed as the ratio of the net book value of property, plant, and equipment to total assets. All variables are defined as in Appendix A. T-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Table 7
Change specifications.

	ΔICE_AVG			
	(1)	(2)		
ΔMA	**−0.0088*** **	**(−2.59)**		
ΔMA_RANK			**−0.0084*** **	**(−5.15)**
ΔBeta	0.0004	(0.46)	0.0004	(0.49)
ΔSize	0.0083***	(7.86)	0.0084***	(7.94)
ΔMtB	−0.0001	(−0.40)	−0.0001	(−0.35)
ΔLTD	−0.0040***	(−3.84)	−0.0040***	(−3.83)
ΔROA	−0.0015	(−1.18)	−0.0015	(−1.14)
ΔRET	−0.0017***	(−3.52)	−0.0016***	(−3.39)
ΔIVOL	−0.1729***	(−3.17)	−0.1718***	(−3.15)
ΔAQ	−0.0427**	(−2.12)	−0.0422**	(−2.10)
ΔStd_CFO	0.0031	(0.45)	0.0033	(0.48)
ΔStd_Sales	−0.0016	(−0.55)	−0.0016	(−0.56)
ΔOPCycle	0.0014	(1.04)	0.0012	(0.88)
ΔPNEarn	−0.0104*	(−1.89)	−0.0099*	(−1.81)
ΔInt_Capital	−0.0067	(−0.85)	−0.0084	(−1.07)
ΔInt_Intangible	0.0076	(1.63)	0.0076	(1.63)
ΔD_Intangible	−0.0008	(−0.48)	−0.0007	(−0.43)
ΔAF_Opt	−0.0001	(−0.08)	−0.0001	(−0.07)
Year Fixed	Yes		Yes	
Industry Fixed	No		No	
# of obs (N)	18,317		18,317	
Adj. R^2	0.2551		0.2563	

This table reports regression results for the change specifications on the relation between managerial ability and the cost of equity. All variables are defined as in Appendix A. T-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Consistent with the results reported in Table 3, Table 8 shows that managerial ability is negatively associated with the cost of equity after controlling for potential endogeneity issues. However, despite our validity checks for the generated instrumental variables, we are not able to rule out that our generated instrumental variables might be weak and endogenous, and potential endogeneity issues might affect our findings.

Table 8
Instrumental variable approach using Lewbel (2012)'s methodology.

	ICE_AVG			
	(1)		(2)	
MA	**−0.0177** **	**(−1.99)**		
MA_ RANK			**−0.0801*** **	**(−5.33)**
Beta	0.0017**	(2.52)	0.0023***	(2.86)
Size	−0.0028***	(−10.56)	−0.0016***	(−3.58)
MtB	−0.0021	(−1.61)	−0.0011	(−1.46)
LTD	0.0087***	(6.76)	0.0065***	(4.87)
ROA	−0.0053***	(−3.55)	−0.0002	(−0.11)
RET	−0.0059***	(−12.30)	−0.0056***	(−11.19)
IVOL	0.5801***	(13.92)	0.5718***	(12.29)
AQ	0.0833***	(4.30)	0.1230***	(4.91)
Std_CFO	0.0069	(1.17)	0.0323***	(3.77)
Std_Sales	0.0081***	(4.40)	0.0156***	(5.69)
OPCycle	0.0025***	(4.22)	0.0010	(1.18)
PNEarn	0.0159***	(8.44)	0.0007	(0.19)
Int_Capital	0.0151***	(5.74)	−0.0084	(−1.50)
Int_Intangible	0.0003	(0.52)	−0.0000	(−0.01)
D_Intangible	0.0020**	(2.52)	0.0047***	(4.12)
AF_Opt	0.1490***	(4.60)	0.0986***	(2.77)
Year & Industry Fixed	Yes		Yes	
# of obs (N)	26,975		26,975	
Adj. R^2	0.3196		0.0980	
Weak instrument test: F statistics	72.26		54.53	
Overidentification test: Hansen J statistics	20.04		9.42	

This table reports the results from the second-stage regression of managerial ability on the cost of equity using an instrumental variable approach developed by Lewbel (2012). All variables are defined as in Appendix A. *Z*-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Therefore, readers should be careful in interpreting our empirical results with this limitation in mind.

5.3. Alternative measures of the cost of equity

Up to this point, our analysis has primarily used the implied cost of equity as a proxy for the cost of equity. Because realized returns are affected by information surprises (e.g., Elton, 1999), such as unexpected cash flows and discount rate news (Vuolteenaho, 2002), many prior studies have documented that realized returns are a noisy measure of expected returns. To reduce such noise and ensure the robustness of our results, following Barth et al. (2013), we examine the effect of managerial ability on two alternative return-based measures of the cost of equity: (1) the expected cost of equity, measured based on expected future excess returns, and (2) realized future excess returns after controlling for unexpected future cash flow shocks and risk.

First, in the spirit of Fama and French (1997), Bhattacharya et al. (2012), Fu et al. (2012), and Barth et al. (2013), we use expected future excess returns, which is a return-based *ex-ante* measure of the cost of equity. We augment the model of Barth et al. (2013) by estimating the following equation using both pooled and Fama and MacBeth (1973) regressions:

$$ECC_{i,t} = \beta_0 + \beta_1 MA_{i,t} + \beta_2 LTD_{i,t} + \beta_3 Size_{i,t} + \beta_4 BtM_{i,t} + \beta_5 Beta_{i,t} + \beta_6\, MOM_{i,t} + Year\ Fixed + Industy\ Fixed + \varepsilon_{i,t.} \quad (5)$$

The dependent variable, $ECC_{i,t}$, represents annualized expected excess returns for year $t + 1$, which are estimated based on information available at the end of year t using the four-factor model (the three Fama and French *(*1993*)* factors, *plus momentum*). $ECC_{i,t}$ is calculated as expected annual four-factor returns that are estimated by first calculating each factor's average monthly return over the past 60 months and then compounding the resulting average monthly returns over the 12 months prior to the beginning of firm *i*'s fiscal year. This result is then multiplied by estimated firm-specific factor loadings on each of the four-factor returns, which are obtained from firm-specific monthly time-series regressions of excess returns on the four-factor returns over the most recent 60-month returns prior to the beginning of each firm-year (*i*, *t*). We control for leverage (*LTD*), which is the ratio of long-term debt to total assets. We also control for firm size (*Size*), the book-to-market ratio (*BtM*), beta (*Beta*), and return momentum (*MOM*). *MOM* is computed as returns over 10 months, starting the prior fiscal year-end and ending two months prior to the fiscal year-end. If more capable managers reduce the expected cost of equity (*ECC*), the coefficient of *MA* (*MA_RANK*), β_1, should be negative.

Second, we examine whether managerial ability predicts *ex post* future excess returns after controlling for cash flow shocks and risk. If managerial ability is negatively related to the cost of equity, the association between managerial ability and subsequent excess returns should be negative. To test this, we estimate the following equation:

$$FERET_{i,t+1} = \beta_0 + \beta_1 MA_{i,t} + \beta_2 LTD_{i,t+1} + \beta_3 LOSS_{i,t+1} + \beta_4 Diff\_OCF_{i,t+1} + \beta_5 Var\_OCF_{i,t+1} + Year\ Fixed + Industy\ Fixed + \varepsilon_{i,t}. \quad (6)$$

The dependent variable, $FERET_{i,t+1}$, is annualized (using compounded monthly returns) future excess returns for the following year's ($t + 1$) realized excess returns minus predicted excess returns estimated from the four-factor model. Specifically, *FERET* for month *m* is the firm's month *m* realized return in excess of the risk-free rate minus the firm's month *m* predicted return. The firm's month *m* predicted return is based on the month *m* realized factor returns, multiplied by the factor betas obtained from firm-specific monthly time-series regressions of excess returns on the four-factor returns over the most recent 60-month returns.

We control for variables expected to affect *FERET*. As noted above, because unlike expected future excess returns ($ECC_{i,t}$), *FERET* can be influenced by new information, subsequent excess returns tests can be biased if the new information is correlated with our variable of interest, e.g., managerial ability (Easton & Monahan, 2005; Elton, 1999; Ogneva, 2012; Vuolteenaho, 2002). To address this concern, we control for information surprises using three variables that reflect cash flow shocks or risk: *LOSS*, *Diff_OCF*, and *Var_OCF*. *LOSS* is a loss indicator that equals one if earnings <0 in year $t + 1$ and 0 otherwise. *Diff_OCF* is the change in annual operating cash flows, deflated by total assets, between year $t + 1$ and year *t*. *Var_OCF* is the coefficient of variation in quarterly operating cash flows over the prior six years. If the managerial ability has predictive power for future excess returns (*FERET*), β_1 should be negative.

Table 9 presents regression results for the effect of managerial ability on the two return-based measures of the cost of equity. Columns 1 and 2 reveal that both measures of managerial ability are negatively and significantly associated with expected future excess returns (*ECC*). The estimated coefficients on *MA* and *MA_RANK* (−0.0129 and − 0.0054, respectively) are significantly negative. These findings indicate that firms' cost of equity is decreasing in managerial ability. Columns 3 and 4 also show a negative relation between managerial ability and future excess returns (*FERET*) after controlling for information surprises. Specifically, we find that the coefficients of *MA* and *MA_RANK* (−0.3947 and − 0.1998, respectively) are significant and negative, supporting the predictive power of managerial ability on future excess returns. Overall, the findings in Table 9 suggest that our main finding of the role of managerial ability in decreasing the cost of equity is robust to using expected future excess returns and cash flow shock-adjusted realized future excess returns.[20]

5.4. Alternative measures of managerial ability

We also examine the robustness of our findings to alternative measures of managerial ability. Following Fee and Hadlock (2003), we construct two alternative proxies of managerial ability, *MA_ALT* and *MA_ALT_RANK*, using buy-and-hold stock returns over the prior five years. *MA_ALT* is the raw value of five-year buy-and-hold returns, while *MA_ALT_RANK* is a scaled decile rank of five-year buy-and-hold returns by industry and year.[21] Table 10 reports results from the regression of these alternative measures of managerial ability on the cost of equity. We find that the coefficients on *MA_ALT* and *MA_ALT_RANK* are significantly negative, supporting our main results.

5.5. Different aspects of managerial ability

Although prior studies suggest that managers' heterogeneous abilities matter to firm performance (e.g., Adams, Almeida, & Ferreira, 2005; Custódio, Ferreira, & Matos, 2013; Kaplan, Klebanov, & Sorensen, 2012), there has been limited research linking managerial ability to the cost of equity. The notable exception is Mishra (2014), which finds that investors require a higher cost of equity for generalist managers than for specialist managers. Mishra (2014) argues that generalist CEOs are willing to take more risks than specialist CEOs.

So far, we have attributed the impact of managerial ability on the cost of equity to managerial efficiency in generating revenues. Specifically, among various perspectives of managerial ability, we focus on managers' relative efficiency in turning their firms' economic resources into sales (Demerjian et al., 2012). We assume that managerial

[20] In additional analyses, we include the same control variables as in Table 3 for the alternative measures of the cost of equity; the results are consistent with our main findings.

[21] The correlation coefficient between *MA* and *MA_ALT (MA_RANK* and *MA_ALT_RANK)* is 0.12 (0.13). Because the two measures are not highly correlated, we believe that these two measures cover different aspects of managerial ability.

Table 9
Alternative measures of the cost of equity.

	ECC			*FERET*	
	(1)	(2)		(3)	(4)
MA	**−0.0129****		***MA***	**−0.3947*****	
	(−2.47)			**(−15.20)**	
MA_RANK		**−0.0054****	***MA_RANK***		**−0.1998*****
		(−2.06)			**(−15.24)**
LTD	−0.0128***	−0.0127***	*LTD*	0.0308	0.0269
	(−2.63)	(−2.62)		(1.51)	(1.32)
Size	−0.0092***	−0.0093***	*LOSS*	−0.1316***	−0.1323***
	(−22.41)	(−22.48)		(−15.23)	(−15.24)
BtM	−0.0063***	−0.0063***	*Diff_OCF*	−0.0547	−0.0541
	(−5.28)	(−5.28)		(−1.20)	(−1.19)
Beta	0.0354***	0.0354***	*Var_OCF*	0.0000	0.0000
	(28.18)	(28.22)		(0.16)	(0.15)
MOM	−0.0040***	−0.0041***			
	(−3.39)	(−3.43)			
Year Fixed	Yes	Yes	Year Fixed	Yes	Yes
Industry Fixed	Yes	Yes	Industry Fixed	Yes	Yes
# of obs (N)	39,273	39,273	# of obs (N)	38,163	38,163
Adj. R^2	0.3507	0.3506	Adj. R^2	0.1041	0.1042

This table reports the results from the regression of managerial ability on the cost of equity using the alternative measures of the cost of equity. *ECC* is the expected cost of equity, measured based on expected future excess returns, and *FERET* is the realized future excess returns after controlling for unexpected future cash flow shocks and risk. All variables are defined as in Appendix A. T-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Table 10
Alternative measures of managerial ability.

	ICE_AVG			
	(1)		(2)	
MA_ALT	**−0.0048*****	**(−3.50)**		
MA_ALT_RANK			**−0.0055*****	**(−6.01)**
Beta	0.0022***	(2.78)	0.0021***	(2.60)
Size	−0.0014***	(−5.07)	−0.0014***	(−5.15)
MtB	−0.0133***	(−11.03)	−0.0130***	(−11.03)
LTD	0.0152***	(9.44)	0.0150***	(9.38)
ROA	−0.0025	(−1.27)	−0.0022	(−1.17)
RET	−0.0040***	(−6.61)	−0.0038***	(−6.32)
IVOL	0.7410***	(14.63)	0.7411***	(14.77)
AQ	0.0950***	(3.97)	0.0964***	(4.03)
Std_CFO	0.0062	(1.03)	0.0061	(1.01)
Std_Sales	0.0068***	(3.64)	0.0068***	(3.70)
OPCycle	0.0021***	(3.21)	0.0021***	(3.25)
PNEarn	0.0145***	(7.17)	0.0145***	(7.17)
Int_Capital	0.0152***	(6.41)	0.0151***	(6.39)
Int_Intangible	−0.0045	(−1.00)	−0.0045	(−0.98)
D_Intangible	0.0006	(0.65)	0.0006	(0.74)
AF_Opt	0.1517***	(3.54)	0.1520***	(3.56)
Year Fixed	Yes		Yes	
Industry Fixed	Yes		Yes	
# of obs (N)	18,378		18,378	
Adj. R^2	0.3530		0.3542	

This table reports the results from the regression of managerial ability on the cost of equity using the alternative measures of managerial ability. *MA_ALT* is an alternative measure of managerial ability, computed as buy-and-hold stock returns over the prior five years. *MA_ALT_RANK* is a scaled decile rank of *MA_ALT* by industry and year. The decile rank is scaled to range from 0 to 1. All variables are defined as in Appendix A. T-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

efficiency and general managerial skills capture different aspects of managerial ability. To validate this assumption, we perform two sets of additional tests. First, following Mishra (2014), we include the index for general managerial skills from Custódio et al. (2013) (*GS* and *GS_RANK*) in the main regression. Table 11 shows the results. Consistent with Mishra (2014), *GS* and *GS_RANK* are positively and, in most of our tests, significantly related to the cost of equity. More importantly, we still find negative and significant coefficients on *MA* and *MA_RANK*, supporting our assumption that managerial efficiency is distinct from general managerial skills in determining the cost of equity.

In a test to rule out generalist CEOs' risk-taking incentives, we split our sample into (1) strong and (2) weak risk-taking incentives (*VEGA*) groups and then estimate Eq. (1) for each group. The results in Table 12 show that the association between managerial ability and the cost of equity is significant in both groups, implying that a manager's risk-taking behavior does not affect the negative association between managerial ability and the cost of equity.

5.6. Firm-level and CEO-level fixed effects with other CEO characteristics

It is possible that some individual characteristics of CEOs other than managerial ability might explain the observed relationship between managerial ability and the cost of equity. Demerjian et al. (2012) acknowledge that their residual-based measures could capture the effects of other factors not related to managerial ability. Therefore, we include CEO individual characteristics (age and tenure) and CEO-level fixed effects to control for time-invariant CEO characteristics. Furthermore, we include firm-level fixed effects to avoid confounding effects from unobserved firm characteristics. In Table 13, we find that the estimated coefficients on *MA* and *MA_RANK* are significantly negative after controlling for the firm- and CEO-level fixed effects and other CEO characteristics, suggesting that our results are robust to alternative specifications that control for unobservable time-invariant firm and manager characteristics.

5.7. Robustness to CEOs with short tenures

Demerjian et al. (2012) observe that their ability measures might not be appropriate for managers with short tenures. Some input variables, such as PP&E, goodwill, and other intangible assets, used in the estimation of managerial ability could be influenced by both the prior and current managers. To address this concern, we rerun our main analyses, excluding from the sample CEOs whose tenure is less than five years. Table 14 provides evidence that the negative association between managerial ability and the cost of equity remains unchanged after controlling for CEOs with short tenures.

Table 11
Managerial efficiency and general skills.

	ICE_AVG											
	(1)		(2)		(3)		(4)		(5)		(6)	
MA	**−0.012*****	**(−3.46)**			**−0.012*****	**(−3.30)**						
GS			**0.001***	**(1.81)**	**0.001**	**(1.48)**						
MA_RANK							**−0.009*****	**(−5.36)**			**−0.009*****	**(−5.13)**
GS_RANK									**0.004****	**(2.56)**	**0.003****	**(2.11)**
Beta	0.001	(0.75)	0.001	(0.69)	0.001	(0.82)	0.001	(0.73)	0.001	(0.69)	0.001	(0.81)
Size	−0.003***	(−8.26)	−0.003***	(−8.52)	−0.003***	(−8.46)	−0.003***	(−8.22)	−0.003***	(−8.77)	−0.003***	(−8.65)
MtB	−0.001	(−0.92)	−0.001	(−0.93)	−0.001	(−0.92)	−0.001	(−0.90)	−0.001	(−0.94)	−0.001	(−0.90)
LTD	0.011***	(3.45)	0.011***	(3.48)	0.011***	(3.41)	0.011***	(3.39)	0.011***	(3.48)	0.011***	(3.35)
ROA	−0.011***	(−2.83)	−0.012***	(−2.95)	−0.011***	(−2.81)	−0.011***	(−2.74)	−0.012***	(−2.94)	−0.011***	(−2.71)
RET	−0.006***	(−7.29)	−0.006***	(−7.21)	−0.006***	(−7.25)	−0.006***	(−7.32)	−0.006***	(−7.20)	−0.006***	(−7.27)
IVOL	0.470***	(6.78)	0.475***	(6.83)	0.471***	(6.81)	0.468***	(6.79)	0.479***	(6.89)	0.473***	(6.87)
AQ	0.097***	(3.05)	0.092***	(2.83)	0.094***	(2.93)	0.100***	(3.16)	0.091***	(2.84)	0.097***	(3.05)
Std_CFO	−0.010	(−1.07)	−0.012	(−1.33)	−0.009	(−1.03)	−0.008	(−0.88)	−0.012	(−1.31)	−0.007	(−0.84)
Std_Sales	0.008**	(2.24)	0.007**	(2.08)	0.008**	(2.23)	0.008**	(2.23)	0.007**	(2.07)	0.008**	(2.21)
OPCycle	0.003***	(2.88)	0.003***	(3.00)	0.003***	(2.86)	0.003***	(2.80)	0.003***	(3.01)	0.003***	(2.79)
PNEarn	0.021***	(6.88)	0.022***	(7.16)	0.021***	(6.69)	0.020***	(6.60)	0.022***	(7.08)	0.020***	(6.35)
Int_Capital	0.013***	(3.61)	0.015***	(4.27)	0.013***	(3.71)	0.011***	(3.21)	0.015***	(4.29)	0.012***	(3.33)
Int_Intangible	−0.020***	(−2.68)	−0.021***	(−2.74)	−0.020***	(−2.69)	−0.021***	(−2.75)	−0.021***	(−2.74)	−0.021***	(−2.75)
D_Intangible	0.002*	(1.84)	0.002	(1.57)	0.002*	(1.82)	0.003**	(1.97)	0.002	(1.61)	0.003**	(1.98)
AF_Opt	0.132	(1.53)	0.129	(1.50)	0.132	(1.54)	0.130	(1.52)	0.128	(1.49)	0.129	(1.52)
Year Fixed	Yes		Yes		Yes		Yes		Yes		Yes	
Industry Fixed	Yes		Yes		Yes		Yes		Yes		Yes	
# of obs (N)	8961		8961		8961		8961		8961		8961	
Adj. R-sq	0.3076		0.3062		0.3079		0.3100		0.3067		0.3106	

This table reports the results from the regression of managerial ability on the cost of equity including additional variables to capture general managerial skills. *GS* is the CEO general managerial skill index from Custódio et al. (2013), computed from principal components analysis for five measures based on the CEO's employment history (number of previous positions, number of previous firms, number of previous industries, CEO experience, and conglomerate experience). *GS_RANK* is a scaled decile rank of the CEO general skill index (GS) by industry and year. The decile rank is scaled to range from 0 to 1. The sample includes firm-year observations from the period 1993–2007. All variables are defined as in Appendix A. T-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Table 12
CEO risk-taking incentives.

	ICE_AVG							
	Strong CEO Risk-Taking Incentives (*HVEGA* = 1)				Weak CEO Risk-Taking Incentives (*HVEGA* = 0)			
	(1)		(2)		(3)		(4)	
MA	**−0.0090*****	**(−2.94)**			**−0.0087****	**(−2.13)**		
MA_RANK			**−0.0072*****	**(−4.71)**			**−0.0074*****	**(−3.97)**
Beta	0.0026**	(2.39)	0.0025**	(2.37)	0.0047***	(4.13)	0.0047***	(4.13)
Size	−0.0017***	(−4.73)	−0.0017***	(−4.84)	−0.0024***	(−5.04)	−0.0024***	(−4.90)
MtB	−0.0007	(−1.34)	−0.0006	(−1.35)	−0.0123***	(−4.84)	−0.0120***	(−4.76)
LTD	0.0066***	(4.00)	0.0065***	(3.92)	0.0145***	(6.59)	0.0143***	(6.50)
ROA	−0.0054***	(−2.99)	−0.0051***	(−2.86)	−0.0061*	(−1.81)	−0.0059*	(−1.74)
RET	−0.0063***	(−8.54)	−0.0063***	(−8.51)	−0.0048***	(−5.59)	−0.0049***	(−5.62)
IVOL	0.3673***	(5.32)	0.3656***	(5.33)	0.4694***	(6.18)	0.4681***	(6.18)
AQ	0.1431***	(4.16)	0.1457***	(4.25)	0.1155***	(3.62)	0.1185***	(3.72)
Std_CFO	−0.0012	(−0.14)	0.0004	(0.05)	−0.0118	(−1.30)	−0.0107	(−1.18)
Std_Sales	0.0140***	(3.33)	0.0138***	(3.30)	0.0046*	(1.96)	0.0048**	(2.07)
OPCycle	0.0033***	(3.63)	0.0033***	(3.65)	0.0019**	(2.00)	0.0018*	(1.90)
PNEarn	0.0168***	(5.70)	0.0159***	(5.44)	0.0244***	(8.62)	0.0236***	(8.34)
Int_Capital	0.0102***	(2.90)	0.0093***	(2.66)	0.0117***	(3.31)	0.0103***	(2.89)
Int_Intangible	−0.0250***	(−4.63)	−0.0251***	(−4.67)	0.0042***	(19.76)	0.0041***	(19.55)
D_Intangible	0.0022*	(1.75)	0.0022*	(1.81)	0.0022*	(1.88)	0.0023**	(2.04)
AF_Opt	0.1375	(1.61)	0.1339	(1.57)	0.0825	(1.31)	0.0808	(1.28)
Year Fixed	Yes		Yes		Yes		Yes	
Industry Fixed	Yes		Yes		Yes		Yes	
# of obs (N)	8377		8377		8342		8342	
Adj. R^2	0.3451		0.3471		0.3326		0.3340	

This table reports the results from the regression of managerial ability on the cost of equity after controlling for CEO risk-taking incentives (*VEGA*). *VEGA* is the natural logarithm of the change in the value of a CEO's stocks and options to a 1% change in stock return volatility. *HVEGA* is an indicator variable that equals 1 if a firm's *VEGA* is greater than the industry median and 0 otherwise. All variables are defined as in Appendix A. T-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

5.8. Untabulated results

We also conduct other untabulated tests. First, we use Fama-MacBeth regressions to confirm that our results are not driven by any cross-sectional correlations. In annual regressions as well as in aggregate, we find significant negative coefficients for managerial ability.

Second, we run Eq. (1) separately using our four measures of the implied cost of equity—*ICE_GLS*, *ICE_CT*, *ICE_MPEG*, and *ICE_OJN*—to investigate whether the negative relation between managerial ability and the cost of equity varies with different assumptions in computing the

Table 13
Firm-level and CEO-level fixed effects with other CEO characteristics.

	ICE_AVG							
	Firm-Level Fixed Effects				CEO-Level Fixed Effects			
	(1)		(2)		(3)		(4)	
MA	**−0.0055****	**(−2.07)**			**−0.0078*****	**(−2.59)**		
MA_RANK			**−0.0063*****	**(−4.69)**			**−0.0064*****	**(−3.93)**
CEO_Age	−0.0001	(−1.09)	−0.0001	(−1.12)	0.0001	(0.12)	0.0001	(0.16)
CEO_Tenure	0.0000	(0.64)	0.0000	(0.66)	−0.0002	(−0.74)	−0.0002	(−0.71)
Beta	0.0004	(0.44)	0.0004	(0.45)	−0.0005	(−0.52)	−0.0006	(−0.55)
Size	−0.0031***	(−4.89)	−0.0029***	(−4.52)	−0.0024***	(−2.97)	−0.0022***	(−2.73)
MtB	−0.0000	(−0.08)	−0.0000	(−0.04)	0.0001	(0.42)	0.0001	(0.51)
LTD	0.0039***	(3.14)	0.0039***	(3.12)	0.0012	(1.00)	0.0012	(0.98)
ROA	−0.0064***	(−3.30)	−0.0063***	(−3.21)	−0.0044***	(−2.65)	−0.0043***	(−2.59)
RET	−0.0036***	(−5.78)	−0.0037***	(−5.86)	−0.0030***	(−4.32)	−0.0030***	(−4.40)
IVOL	0.1728***	(2.63)	0.1749***	(2.67)	0.1561**	(2.44)	0.1567**	(2.45)
AQ	0.0167	(0.56)	0.0169	(0.56)	0.0454	(1.22)	0.0459	(1.24)
Std_CFO	−0.0063	(−0.66)	−0.0047	(−0.50)	−0.0090	(−0.83)	−0.0078	(−0.72)
Std_Sales	0.0036	(1.29)	0.0035	(1.26)	0.0025	(0.84)	0.0024	(0.78)
OPCycle	0.0052***	(4.08)	0.0052***	(4.03)	0.0044***	(2.73)	0.0044***	(2.71)
PNEarn	−0.0012	(−0.37)	−0.0014	(−0.42)	−0.0025	(−0.61)	−0.0025	(−0.61)
Int_Capital	0.0065	(1.21)	0.0060	(1.11)	−0.0091	(−1.37)	−0.0093	(−1.40)
Int_Intangible	0.0066	(0.97)	0.0065	(0.94)	0.0090	(1.25)	0.0087	(1.21)
D_Intangible	−0.0020	(−1.42)	−0.0019	(−1.31)	−0.0034**	(−2.11)	−0.0033**	(−2.05)
AF_Opt	0.0975*	(1.85)	0.0941*	(1.79)	0.0574	(0.98)	0.0544	(0.93)
Firm Fixed	Yes		Yes		No		No	
CEO Fixed	No		No		Yes		Yes	
Year Fixed	Yes		Yes		Yes		Yes	
Industry Fixed	No		No		Yes		Yes	
# of obs (N)	17,159		17,159		17,159		17,159	
Adj. R^2	0.5048		0.5057		0.5491		0.5497	

This table reports the results from the regression of managerial ability on the cost of equity including firm- and CEO-level fixed effects, along with other CEO characteristics. CEO_Age is the age of a CEO. CEO_Tenure is the number of years a CEO has held the CEO position. All variables are defined as in Appendix A. T-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Table 14
Subsample with CEOs having >5-year tenures.

	ICE_AVG			
	(1)		(2)	
MA	**−0.0117*****	**(−3.74)**		
MA_RANK			**−0.0085*****	**(−5.84)**
Beta	0.0035***	(3.50)	0.0034***	(3.47)
Size	−0.0021***	(−6.38)	−0.0020***	(−6.33)
MtB	−0.0018	(−1.15)	−0.0017	(−1.15)
LTD	0.0064***	(4.00)	0.0063***	(3.91)
ROA	−0.0036	(−1.58)	−0.0033	(−1.48)
RET	−0.0056***	(−7.20)	−0.0056***	(−7.19)
IVOL	0.4554***	(7.32)	0.4570***	(7.37)
AQ	0.1591***	(5.07)	0.1613***	(5.15)
Std_CFO	−0.0186**	(−2.26)	−0.0176**	(−2.16)
Std_Sales	0.0083***	(3.06)	0.0083***	(3.10)
OPCycle	0.0025***	(3.17)	0.0025***	(3.10)
PNEarn	0.0190***	(7.88)	0.0183***	(7.60)
Int_Capital	0.0126***	(4.20)	0.0115***	(3.82)
Int_Intangible	−0.0078	(−1.18)	−0.0078	(−1.17)
D_Intangible	0.0020*	(1.91)	0.0021**	(2.01)
AF_Opt	0.0387	(0.60)	0.0364	(0.57)
Year Fixed	Yes		Yes	
Industry Fixed	Yes		Yes	
# of obs (N)	11,059		11,059	
Adj. R^2	0.3457		0.3478	

This table reports the results from the regression of managerial ability on the cost of equity using the subsample of CEOs with tenures longer than 5 years. All variables are defined as in Appendix A. T-statistics in parentheses are based on standard errors clustered at the firm level. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

implied cost of equity. We find negative and significant coefficients in all four models, suggesting that our results are robust across the four models of the implied cost of equity.

Lastly, following Armstrong, Blouin, and Jagolinzer (2015), we use quantile regressions to examine whether the negative association between managerial ability and the cost of equity holds over the distribution of the cost of equity. This test explores whether the effect of managerial ability varies across firms with different levels of the cost of equity. In all quantile regressions from Quantile = 0.1 to Quantile = 0.9, the estimated coefficients on *MA* and *MA_RANK* are significantly negative. These findings imply that managerial ability contributes to the determination of the cost of equity across the entire distribution of the cost of equity, even for firms with low or high costs of equity.

6. Conclusion

Our study explores whether investors incorporate the implications of managerial ability when determining the cost of equity capital. We hypothesize that the cost of equity capital should be lower for firms with more capable managers if investors understand that managerial ability conveys signals about investment efficiency, the information environment, and perceived risk. That is, more capable managers can contribute to more efficient investment, a better information environment, and less perceived risk; thus, investors require a lower cost of equity for firms with superior managerial ability. Using a composite measure of the implied cost of equity capital, we provide evidence that the cost of equity capital and managerial ability are negatively related. Specifically, higher managerial ability results in a decrease in the cost of equity capital, suggesting that investors fully recognize the effect of managerial ability. Further, we find that managerial ability has a greater influence on investors for firms with higher information asymmetry, weak external monitoring, and greater capital intensity.

Because managerial ability is unobservable, results from our study should be interpreted with some caution. Nonetheless, our findings contribute to two streams of literature. First, we expand the literature on managerial characteristics, particularly managerial ability. We show that managerial ability plays a significant role in determining the cost of equity capital. Second, our study contributes to the literature on the cost of equity capital. Beyond firm-, industry-, and market-level characteristics, specific manager-level characteristics can explain cross-sectional variation in the cost of equity. We add to this line of research by showing that the effect of managerial ability on the cost of equity capital is pronounced for firms with more asymmetric information environments, with weaker external monitoring, and with higher capital intensity.

Declaration of Competing Interest

None

Data availability

The authors do not have permission to share data.

Appendix A. Variable definitions

Variable name	Variable explanation
Cost of equity capital (*ICE*)	
ICE_GLS	Implied cost of equity capital estimated using the GLS Model (Gebhardt et al., 2001). See Appendix B.
ICE_CT	Implied cost of equity capital estimated using the CT Model (Claus & Thomas, 2001). See Appendix B.
ICE_MPEG	Implied cost of equity capital estimated using the MPEG Model (Easton, 2004). See Appendix B.
ICE_OJN	Implied cost of equity capital estimated using the OJN Model (Ohlson & Juettner-Nauroth, 2005). See Appendix B.
ICE_AVG	The average of *ICE_GLS, ICE_CT, ICE_MPEG,* and *ICE_OJN*.
ECC	The expected cost of equity measured based on expected future excess returns.
FERET	Realized future excess returns after controlling for unexpected future cash flow shock and risk.
Managerial ability (*MA*)	
MA	Demerjian et al. (2012)'s managerial ability scores from two-stage estimation regressions. First, each firm's efficiency score is estimated using data envelopment analysis. In the second stage, the portion of firm efficiency that cannot be explained by firm characteristics is estimated. The residuals from the second regression are managerial ability scores.
MA_RANK	A scaled decile rank of managerial ability scores (*MA*) by industry and year. The decile rank is scaled to range from 0 to 1.
MA_ALT	An alternative measure of managerial ability computed as buy-and-hold stock returns over the prior five years.
MA_ALT_RANK	A scaled decile rank of *MA_ALT* by industry and year. The decile rank is scaled to range from 0 to 1.
Other explanatory variables	
Beta	Market model's beta, which is estimated from a regression of daily stock returns on value-weighted market returns over 250 trading days (minimum 200 trading days are required), ending at the end of year *t-1*.
Size	Natural logarithm of the market value of equity at the beginning of the fiscal year.
MtB	Market-to-book ratio, which is measured as the natural logarithm of the ratio of the market value of equity to the book value of equity at the beginning of the fiscal year.
LTD	Leverage, which is measured as long-term debt divided by total assets.
ROA	Return on assets, which is measured as income before extraordinary items, divided by total assets.
RET	Stock returns of the prior 12 months.
Other explanatory variables, continued	
IVOL	Idiosyncratic volatility, which is measured as the standard deviation of the residuals of a regression of daily stock returns on market factors over 250 trading days (minimum 200 trading days are required), ending at the end of year *t-1*.
AQ	Accruals quality calculated, using a modification of the Dechow and Dichev (2002) model, as the standard deviation of residuals from firm-specific regressions of total current accruals (TCA) on the current-, lag-, and lead-period cash flows from operations; changes in revenues (REV); and property, plant, and equipment (PPE) over the last 10 years (at least prior three years data required).
Std_CFO	The standard deviation of cash flows from operations over the last ten years (at least prior three years data required).
Std_Sales	The standard deviation of sales over the last ten years (at least prior three years data required).
OPCycle	Operating cycle, measured as the logarithm of the sum of days inventory and days accounts receivable.
PNEarn	The proportion of negative earnings over the previous 10 years.
Int_Capital	Capital intensity, calculated as the ratio of the net book value of property, plant, and equipment to total assets.
Int_Intangible	Intangibles intensity, which is measured as the sum of R&D expenses and advertising expenses, deflated by sales.
D_Intangible	Intangibles indicator, which equals 1 if *Int_Intangible* = 0, and 0 otherwise.
AF_Opt	Analyst earnings forecast optimism, calculated as the median consensus annual earnings forecast issued prior to the annual earnings announcement minus actual earnings, scaled by the stock price at the beginning of the fiscal year.
BASPR	Average bid-ask spread over the prior 12 months.
HBASPR	Indicator variable of high information asymmetry, which equals 1 if a firm is in the top (4th) quartile of *BASPR* and 0 otherwise.
INSTHOLD	Institutional holding, computed as the number of shares held by institutional investors divided by the total number of outstanding shares.
HINSTHOLD	Indicator variable of strong external monitoring, which equals 1 if a firm is in the top (4th) quartile of *INSTHOLD* and 0 otherwise.
HCAPINT	Indicator variable of high capital intensity, which equals 1 if a firm is in the top (4th) quartile of *Int_Capital* and 0 otherwise.
MOM	Stock returns over 10 months, starting the prior fiscal year-end and ending two months prior to the fiscal year-end.
Other explanatory variables, continued	
LOSS	Loss indicator, which equals 1 if income before extraordinary items <0 in year t and 0 otherwise.
Diff_OCF	Change in annual operating cash flows, deflated by total assets, between year $t + 1$ and year t
Var_OCF	Coefficient of variation in quarterly operating cash flows over the prior six years.
GS	CEO general managerial skill index from Custódio et al. (2013), computed from principal components analysis for five measures from the CEO's employment history (number of previous positions, number of previous firms, number of previous industries, CEO experience, and conglomerate experience).
GS_RANK	A scaled decile rank of the CEO general skill index (GS) by industry and year. The decile rank is scaled to range from 0 to 1.
VEGA	Natural logarithm of the change in the value of a CEO's stocks and options to a 1% change in stock return volatility.
CEO_Age	CEO's age.
CEO_Tenure	Number of years a CEO has held the CEO position.

Appendix B. Models for implied cost of equity estimation

Variables	Valuation models	Descriptions
ICE_GLS (= estimated *R_GLS*)	$P_{it} = BPS_{it} + \sum_{\tau=1}^{11} \frac{(ROE_{it+\tau} - R\_GLS) \times BPS_{it+\tau-1}}{(1+R\_GLS)^{\tau}} + \frac{(ROE_{it+12} - R\_GLS) \times BPS_{it+11}}{R\_GLS \times (1+R\_GLS)^{11}}$	Basic model: Gebhardt et al. (2001). $ROE_{it+\tau} = EPS_{it+\tau}/BPS_{it+\tau-1}$ for $\tau = 1, 2$. $ROE_{it+\tau} = ROE_{it+\tau-1}$ – fade for $\tau > 2$, where fade = $(ROE_{it+\tau-2} - HIROE_t)/10$, and $HIROE_t$ is the industry-median *ROE* (excluding loss firms) from year *t*-4 to year *t* (Gebhardt et al., 2001). $BPS_{it+\tau} = BPS_{it+\tau-1} \times (1 + ROE_{it+\tau} \times (1-K))$, where $K = \max(0, \min(DPS_{it}/EPS_{it}, 1))$ for profit firms and $K = \max(0, \min(DPS_{it}/(0.06 \times BPS_{it}), 1))$ for loss firms (Easton & Monahan, 2005).
ICE_CT (= estimated *R_CT*)	$P_{it} = BPS_{it} + \sum_{\tau=1}^{5} \frac{(ROE_{it+\tau} - R\_CT) \times BPS_{it+\tau-1}}{(1+R\_CT)^{\tau}} + \frac{(ROE_{it+5} - R\_CT) \times BPS \times (1+ltg)}{(R\_CT - ltg) \times (1+R\_CT)^{5}}$	Basic model: Claus and Thomas (2001). $ROE_{it+\tau} = EPS_{it+\tau}/BPS_{it+\tau-1}$. $BPS_{it+\tau} = BPS_{it+\tau-1} + EPS_{it+\tau} \times 0.5$. $EPS_{it+\tau} = EPS_{it+2} \times (1+ltg)^{\tau-2}$ for $\tau > 2$, where ltg = US 10-year bond yield – 3% (Claus & Thomas, 2001; Dhaliwal et al., 2006).
ICE_MPEG (= estimated *R_MPEG*)	$P_{it} = \frac{EPS_{it+2} + R\_MPEG \times DPS_{it+1} - EPS_{it+1}}{R\_MPEG^2}$	Basic model: Easton (2004). $DPS_{it+1} = DPS_{it}$ (Easton, 2004; Easton & Monahan, 2005). $EPS_{it+1} > 0$ and $EPS_{it+2} > 0$. (Dhaliwal et al., 2006). The growth rate is assumed to be 0.
ICE_OJN (= estimated *R_OJN*)	$P_{it} = \frac{EPS_{it+1}}{R\_OJN} + \frac{EPS_{it+2} + R\_OJN \times DPS_{it+1} - (1+R\_OJN) \times EPS_{it+1}}{R\_OJN \times (R\_OJN - ltg)}$	Basic model: Ohlson and Juettner-Nauroth (2005) and Easton (2004). $DPS_{it+1} = DPS_{it}$ (Easton, 2004; Easton & Monahan, 2005). ltg is simultaneously estimated with implied cost of equity measures following Easton (2004).

The first two measures, *ICE_GLS* and *ICE_CT*, are estimated from the following residual income valuation model but differ in assumptions about the terminal horizon and earnings growth rates:

$$P_{i,t} = BPS_{i,t} + \sum_{\tau=1}^{q} \frac{(ROE_{i,t+\tau} - R) \times BPS_{i,t+\tau-1}}{(1+R)^{\tau}} + \frac{(ROE_{i,t+q} - R) \times BPS \times (1+growth)}{(R - growth) \times (1+R)^{q}}.$$

In this equation, $P_{i,t}$ is the stock price at the year-end, *ROE* denotes return on equity, *BPS* represents the book value of equity per share, *growth* is the expected growth rate of earnings, and *R* denotes the implied cost of equity to be estimated. *ICE_GLS* is estimated following Gebhardt et al. (2001), which assumes that *ROE* mean-reverts toward the historical industry-median *ROE* from year $t+3$ to year $t+11$ and becomes uniform (i.e., $growth = 0$) thereafter, such that $q = 11$ and $q = 12$ in the second and third terms, respectively. In estimating *ICE_CT*, following Claus and Thomas (2001), we assume that earnings will expand at a rate of forecasted earnings until year $t+5$ ($q = 5$) and grow at an inflation rate (i.e., *growth* = U.S. 10-year bond yield – 3%) thereafter.

The second two measures, *ICE_MPEG* and *ICE_OJN*, are based on the following abnormal earnings growth valuation model but differ in assumptions on dividend and earnings growth patterns:

$$P_{i,t} = \frac{EPS_{i,t+1}}{R} + \frac{EPS_{i,t+2} + R \times DPS_{i,t+1} - (1+R) \times EPS_{i,t+1}}{R \times (R - growth)}.$$

In this equation, $EPS_{i,t+\tau}$ ($DPS_{i,t+\tau}$) is forecasted earnings per share (dividend per share) of year $t+\tau$ at year *t*. From this equation, we derive *ICE_MPEG* from the modified price-earnings growth model (Easton, 2004; Easton & Monahan, 2005), assuming a zero growth rate ($growth = 0$). *ICE_OJN* is derived by Ohlson and Juettner-Nauroth (2005) and implemented by Gode and Mohanram (2003). Following Easton (2004), we extend this model by simultaneously estimating the implied cost of equity and the growth rate (*growth*), which is similar in spirit to Easton, Taylor, Shroff, and Sougiannis (2002), Easton (2004), Nekrasov and Ogneva (2011), and Ashton and Wang (2013).

Appendix C. Sample selection

Selection procedures	Total firm-years	Unique firms
Firm-year observations from COMPUSTAT Annual, 1990–2016	307,869	31,288
Less:		
Firm-years without measures of cost of equity	(263,054)	(23,757)
Firm-years missing the measure of managerial ability	(10,105)	(1675)
Firm-years missing the variables related to firm characteristics	(7735)	(1508)
Final sample	26,975	4348

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