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Management forecasts and the cost of equity capital: international evidence

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Abstract We examine international differences in the effect of management forecasts (which we use to proxy for voluntary disclosure) on the cost of equity capital (COC) across 31 countries. We find that the issuance of management forecasts is associated with a lower COC worldwide but that the effect of management forecasts on the COC depends on country-level institutional factors. Specifically, management forecasts have a stronger effect on the COC in countries with stronger investor protection and better information dissemination and a weaker effect in countries with higher mandatory disclosure requirements. Further analyses reveal that these relations are more pronounced when management forecasts are more frequent, more precise, and more disaggregated. Overall, our findings suggest that the ability of management forecasts to reduce firms' COC derives not only from country-level factors that enhance the credibility of their forecasts but also from factors that reflect the quality of the information environment in terms of the distribution of news and the availability and quality of alternative information. Thus, investor protection, media penetration, and mandatory disclosure requirements have an important effect on the ability of management forecasts to lower the COC.

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1 Introduction

Management forecasts are one of the primary ways managers voluntarily disclose private, future-oriented financial information to capital market participants (Healy and Palepu 2001). As such, they represent an important component of a firm's overall information environment (Hirst et al. 2008). Research finds that management forecasts are more informative than other types of financial disclosures, including earnings announcements, filings required by the Securities and Exchange Commission (SEC), and analyst forecasts (Beyer et al. 2010). In this study, we investigate the relation between management forecasts (and the characteristics of those forecasts) and firms' cost of equity capital (COC) in an international setting. We also examine whether these relations are influenced by country-specific institutional factors.

Theory suggests that voluntary disclosure should reduce firms' COC by reducing estimation risk, information asymmetry, or both (Diamond and Verrecchia 1991; Easley and O'Hara 2004; Hughes et al. 2007). Although some evidence using U.S. data supports this idea (Baginski and Rakow 2012; Balakrishnan et al. 2014), little empirical evidence in non-U.S. settings exists.[1] Ex ante, it is unclear whether and how management forecasts affect the COC for international firms because institutional factors that might influence this relation can vary substantially across countries. We examine three institutional factors that we posit should be important for the relation between management forecasts and the COC—namely, investor protection, media penetration, and mandatory disclosure requirements.

Theoretical work demonstrates that disclosure must be credible to be informative and reduce information asymmetry and the COC (Crawford and Sobel 1982; Stocken 2000; Verrecchia 2001), but little direct empirical evidence exists.[2] An international setting provides an advantage when exploring this issue because country-level institutional factors can affect the level of disclosure credibility and the importance of credibility cannot be well understood within a single regime (Ball et al. 2012).[3]

We also examine the impact of media penetration because the media plays a critical role in distributing firm-specific information to investors and hence influences the

[1] The exception is Francis et al. (2005). They use disclosure scores from the Center for International Financial Analysis Research (which represent *both* mandatory and voluntary disclosure) to show that firms from around the world benefit from increased disclosure through a lower COC. In addition, Hope et al. (2013) find that voluntary disclosures made by foreign firms cross-listed in the U.S. are associated with smaller analyst forecast errors and a lower implied COC in the U.S.

[2] Most empirical studies use the U.S. setting to explore factors that influence the credibility of voluntary disclosure or to examine whether short-term market reactions vary with voluntary disclosure credibility (Jennings 1987; Rogers and Stocken 2005; Yang 2012; Ng et al. 2013). Credibility is often measured by past forecast accuracy or is inferred from firm characteristics and management incentives that are likely to influence forecast credibility.

[3] Mercer (2004, 186) defines disclosure credibility as an "investor's perception of the believability of a particular disclosure" and explains that it "refers to the perception held by investors, not an objective condition of a disclosure."

ability of management forecasts to reduce the COC.[4] While prior cross-country studies focus mainly on how media penetration influences the response to mandatory disclosure (Griffin et al. 2011; Cao et al. 2016), we suggest that the effect of the media should be stronger for voluntary disclosure because mandatory disclosure is often required to be publicly distributed through specific channels established by stock exchanges. Thus, mandatory disclosure is typically accessible to investors even when the media is not highly developed. Our findings on the importance of media penetration for the relation between voluntary disclosure and the COC complement findings from previous mandatory disclosure studies and provide support for the critical role that the media plays in the dissemination of voluntary disclosure.

In addition, we study the impact of mandatory disclosure on voluntary disclosure. A growing literature examines the interaction between voluntary and mandatory disclosure (Beyer et al. 2010), but most empirical studies focus on how mandatory disclosure affects voluntary disclosure choices.[5] To our knowledge, Francis et al. (2008) is the only study to examine how mandatory disclosure affects the ability of voluntary disclosure to reduce information asymmetry. In the U.S. setting, they find that the negative relation between management forecasts and the COC disappears once they control for firm-level earnings quality. We differ from Francis et al. (2008) in that we focus on country-level mandatory disclosure requirements, which capture multiple dimensions of the information environment faced by managers. These include the amount and quality of information mandated by rules and regulations; the degree of monitoring and enforcement by professional and regulatory bodies; the timing, format, and distribution of information, etc. In addition, mandatory and voluntary disclosures could reflect the firm's reporting strategy, whereas the information environment as shaped by country-level mandatory disclosure requirements provides a cleaner setting to examine the impact of mandatory disclosure on voluntary disclosure.

Finally, as opposed to mandatory disclosure, management forecasts are voluntary, forward-looking, and not subject to specific reporting guidelines. As a result, disclosure quality can vary across forecasts and firms in ways that the disclosure quality of mandatory earnings releases cannot. Differences across firms in the frequency, precision, and disaggregation of management forecasts provide a particularly rich source of variation in disclosure quality and thus enhance our ability to test for effects of the three country-level institutional variables on the disclosure-cost of capital relation.

Using a sample of 37,856 firm-year observations (15,576 of which make at least one management forecast) from 31 countries from 2004 through 2009,[6] we first document a negative relation between the issuance of management forecasts and the COC. The economic magnitude of the effect is meaningful, at approximately one half of a percentage point reduction in the COC for firms that issue management forecasts. This effect is robust to controlling for industry, year, country, and firm fixed effects. In addition, our results are

[4] Our country-level media penetration measure differs from proxies for the firm-level information environment, which could include the extent of firm-specific media coverage, because firm-level variables are at least partially determined by the firm itself.

[5] See, for example, Bagnoli and Watts (2007), Hui et al. (2009), and Ball et al. (2012).

[6] We collect our sample from Standard & Poor's (S&P) Capital IQ database. Our sample period begins in 2004 because this is the first year for which S&P Capital IQ systematically covers international management earnings forecasts. S&P Capital IQ is a division of S&P that provides web-based information about firms worldwide (see https://www.capitaliq.com/home.aspx). Because the data collection process requires extensive resources and effort, our sample period ends in 2009.

robust to testing at the country-year level, adjusting for analyst forecast errors when computing the COC, using an alternative COC measure based on realized stock returns, alternative measures of management forecasts that capture forecast quality and forecast commitment, controlling for capital market efficiency, and the use of the Heckman two-stage procedure (to account for selection bias in the decision to issue management forecasts).

More importantly, we find that the negative relation between management forecasts and the COC is more prominent in countries characterized by stronger investor protection or with better information dissemination and is weaker in countries with higher mandatory disclosure requirements. These results are consistent with our conjectures that stronger investor protection enhances the credibility of voluntary disclosure and that stronger country-level information dissemination facilitates investors' access to management forecasts, while stronger mandatory disclosure requirements increase the amount and quality of alternative information available to investors.

Finally, for the subsample of firms that make forecasts, we find that more frequent, more precise, and more disaggregated forecasts are associated with a lower COC and that these effects are enhanced by country-level institutional factors identified in the full sample. These findings are consistent with the argument that the negative relation between management forecasts and the COC is more pronounced when management forecasts are of higher quality, more likely to reflect management commitment to regular disclosure, or both. Taken together, our findings suggest that cross-country variation in institutional factors and management forecasts characteristics has an important influence on the capital market effects of voluntary disclosure across countries.

This study makes several contributions. First, it adds to the growing literature on cross-country differences in the economic consequences of financial disclosure. Although prior studies find that higher quality disclosure in annual reports is associated with a lower COC across countries (Leuz and Verrecchia 2000; Bhattacharya et al. 2003; Francis et al. 2005; Daske et al. 2008; Li 2010; Lang et al. 2012), this disclosure is largely mandatory or reflects both mandatory and voluntary disclosure practices so it is often unclear whether the documented associations are attributable to voluntary or mandatory disclosures (Beyer et al. 2010, p.357). We use management forecasts to isolate the effect of voluntary disclosure on the COC in a cross-country setting.

Second, although Francis et al. (2005) conjecture that the capital market consequences of voluntary disclosure should be affected by cross-country variation in the legal and information environments, empirical evidence is scarce. We identify three country-level institutional factors—namely, investor protection, information dissemination, and the extent of mandatory disclosure—and determine how they influence the effect of voluntary disclosure on the COC. Examining the effect of country-level factors on the relation between management forecasts and the COC also addresses calls for the identification of conditions that can affect the informativeness of management forecasts (Hirst et al. 2008)[7] and for research that accounts for the interaction between mandatory and voluntary disclosures (Beyer et al. 2010).

[7] Specifically, Hirst et al. (2008, p. 317) state: "Second, our review of the literature highlights that the typical study focuses on the main effect of one or more forecast antecedents or characteristics on forecast consequences. Because main effect results are unlikely to hold under all conditions, we argue that researchers should identify and test possible interactions among antecedents or characteristics."

We also extend the literature by providing evidence on how management forecast characteristics affect firms' COC using hand-collected data on forecast characteristics for a large sample of firms across countries. Our results support findings in research that emphasizes the role of commitment to voluntary disclosures and the importance of voluntary disclosure quality (Francis et al. 2008; Baginski and Rakow 2012).

Finally, our study complements the work of Lang et al. (2012), who find that greater corporate transparency is associated with greater liquidity and a lower COC around the world and that these associations are stronger in countries with greater overall opacity.[8] In contrast to Lang et al. (2012), we focus on voluntary disclosure as measured using management forecasts. In addition, while they find that corporate transparency and measures of country-level opacity (i.e., investor protection and media penetration) are substitutes, we find that voluntary disclosure and country-level characteristics can be complements. Specifically, the effect of management forecasts on the COC is greater when investor protection is stronger and when the quality of information dissemination is higher. Thus, our study demonstrates the different effects of country-level factors on the effectiveness of various types of corporate disclosure.

The remainder of the paper proceeds as follows. Section 2 develops our hypotheses, and Section 3 discusses our research design. Section 4 describes our data and sample, and Section 5 presents our main empirical results. Section 6 provides robustness checks, and Section 7 concludes.

2 Development of hypotheses

2.1 Investor protection

Differences in investor protection across countries have long been recognized as an important determinant of a country's mandatory financial reporting environment. For example, La Porta et al. (1998) find that common law countries, which tend to provide stronger investor protection, have higher quality accounting standards. Moreover, Leuz et al. (2003) find lower earnings management in countries with stronger investor protection. Consistent with Leuz et al. (2003), DeFond et al. (2007) find that earnings announcements are more informative in countries with stronger investor protection. In general, these studies argue that managers in countries with stronger investor protection have limited ability to accumulate private benefits of control and hence weaker incentives to manage earnings. To the extent that managers in countries with stronger investor protection have weaker incentives to be opportunistic or mislead, earnings forecasts made by managers in these countries should be more credible, and this should increase their effect on the COC.[9] Alternatively, unlike mandatory disclosure, which is subject to specific rules and regulations, earnings forecasts provide forward-looking information that is difficult to verify, increasing the difficulty of monitoring and enforcement. Thus it is not clear whether a country's investor

[8] Lang et al. (2012) measure corporate transparency using earnings management, accounting standards, auditor quality, analyst following, and analyst forecast accuracy.

[9] Consistent with investor protection determining forecast credibility, Radhakrishnan et al. (2012) find that the market reaction to management forecasts is stronger in countries with stronger investor protection, presumably because stronger investor protection helps increase management forecast credibility by reducing management's incentives to make self-serving disclosures.

protection rules will be effective in regulating voluntary disclosure. Our first null hypothesis is as follows.

Hypothesis 1: *The level of country-level investor protection does not influence the effect of management forecasts on the cost of equity capital.*

We measure the strength of investor protection using characteristics of the securities market supervisor (i.e., counterparts of the SEC in other countries) and anti-director rights mechanisms. The former, obtained from La Porta et al. (2006), gauges the securities market regulator's independence from political intervention, rule-making power, and enforcement power. The latter, obtained from La Porta et al. (1998), assesses the corporate governance power of minority shareholders. (See Appendix A for more detailed descriptions.)

2.2 Information dissemination

Research finds that the quality of information dissemination within a country, as proxied for by media penetration, helps convey firm-specific information to investors (Bushee et al. 2010; Qi et al. 2010). For example, studies find that media penetration increases the market reaction to news announcements (Griffin et al. 2011), enhances the price informativeness of future earnings (Haw et al. 2012), and improves financial analysts' earnings forecast accuracy (Cao et al. 2016). Because the effect of management forecasts should be greater when these forecasts can reach more investors, we expect management forecasts to have a greater effect on the COC in countries with better information dissemination. In contrast, media penetration can capture the availability of other information, such as information generated by the press itself, which should reduce the usefulness of corporate disclosure (Lang et al. 2012). Thus, our second hypothesis, stated in the null, is as follows.

Hypothesis 2: *The strength of country-level information dissemination does not influence the effect of management forecasts on the cost of equity capital.*

Following prior studies (e.g., Bushman et al. 2004; Qi et al. 2010; Haw et al. 2012), we measure information dissemination using media penetration in a country, computed as the average ranking of (1) the total average circulation of newspapers per 1000 inhabitants, (2) the number of daily newspaper titles per 1 million inhabitants, and (3) the number of internet users per 100 inhabitants.

2.3 Mandatory disclosure requirements

A better information environment arising from higher mandatory disclosure requirements should limit the ability of additional disclosure to reduce information asymmetry (Yohn 1998; Leuz and Verrecchia 2000; DeFond et al. 2007). Consistent with this, Dhaliwal et al. (2012) find that the association between analyst forecast errors and voluntary nonfinancial disclosure (i.e., standalone Corporate Social Responsibility reports) is significantly more negative when financial opacity is high, suggesting that voluntary disclosure can substitute for mandatory financial disclosure. In addition, using

U.S. data from 2001, Francis et al. (2008) find that the effect of disclosure on the COC is substantially reduced or disappears after controlling for earnings quality. To the extent that mandatory disclosure requirements and voluntary disclosures are substitutes, we expect the effect of management forecasts on the COC to be weaker when mandatory disclosure requirements in a country are stronger. Alternatively, voluntary and mandatory disclosure could be complements if more stringent mandatory disclosure requirements lend credibility to voluntary disclosures (Ball et al. 2012). Under this view, mandatory disclosure requirements would strengthen the association between management forecasts and the COC.[10] Thus, our third hypothesis, stated in the null, is as follows.

Hypothesis 3: *Mandatory disclosure requirements do not influence the effect of management forecasts on the cost of equity capital.*

We use disclosure scores from Frost et al. (2006), which measure mandated disclosure requirements and their enforcement, to proxy for the quality of a country's mandatory disclosures. In additional analyses, we use three alternative measures of mandatory disclosure: firm-level earnings quality following Leuz et al. (2003), the adoption of International Financial Reporting Standards (IFRS), and a country-level ranking of annual report quality developed by Lang and Stice-Lawrence (2015).

Finally, other scholars (e.g., Francis et al. 2008; Baginski and Rakow 2012) emphasize the importance of disclosure quality in determining the effect of disclosure on the COC. Management forecast characteristics reflect forecast quality and signal managers' incentives to be transparent (Ajinkya et al. 2005; Karamanou and Vafeas 2005). Therefore, we expect forecasts with more desirable characteristics (that is, more frequent, precise, and disaggregated ones) to be associated with a lower COC and that this association will be affected by our three country-level institutional factors.

3 Research design

To examine whether management forecasts are associated with a lower COC around the world, we estimate the following regression model.

$$COC_{i,t+1} = \alpha_0 + \alpha_1 Forecast_{i,t} + \Sigma_{k=2,K}\alpha_k control(k) + \varepsilon_{i,t+1} \quad (1)$$

where, with subscripts i and t denoting firm i and year t, respectively,

COC = the cost of equity capital, measured as described below;

Forecast = an indicator variable set to 1 if the firm issues at least one management forecast during the year and 0 otherwise;

[10] Mandatory and voluntary disclosures may also have different foci or different degrees of credibility so that one type of disclosure cannot be replaced by the other (Zhang 2011; Cheng et al. 2013). Some studies (e.g., Einhorn 2005; Bagnoli and Watts 2007; Gigler and Hemmer 2001) show that the sign of the relation between voluntary and mandatory disclosures depends on the characteristics of mandatory disclosures.

control(k) = the k^{th} control variable, measured as described below.

Following prior studies (e.g., Hail and Leuz 2006; Cao et al. 2014), we measure the COC using the average of four measures of the implied COC as proposed by Claus and Thomas (2001) (COC_{CT}), Gebhardt et al. (2001) (COC_{GLS}), Easton (2004) (COC_{MPEG}), and Ohlson and Juettner-Nauroth (2005) (COC_{OJN}). Appendix B briefly describes these measures. Because there is no consensus on which model works best (Botosan and Plumlee 2005; Easton and Monahan 2005; Lee et al. 2010), we follow prior studies (e.g., Hail and Leuz 2006; Dhaliwal et al. 2012; Cao et al. 2014) and use the average of the individual measures to reduce the idiosyncratic measurement error across models. Notably, the work of Hail and Leuz (2006) and our empirical results reveal that these measures are systematically correlated with various risk factors (e.g., firm size, book-to-market ratio, and stock price volatility) and with measures of information transparency. Thus, these measures should capture systematic variation in the underlying COC. However, because all of our measures of the implied COC are based on analyst forecasts and because averaging cannot help to reduce measurement errors due to errors in analyst forecasts (Easton and Monahan 2005), we follow Larocque (2013) and re-estimate the COC after adjusting for analyst forecast errors. We also check the robustness of our results using an ex post measure of the COC (namely, one-year-ahead stock returns). We find that our inferences are unchanged in both cases.

Following Hail and Leuz (2006) and Daske et al. (2008), we control for several factors related to firm risk including the firm's Capital Asset Pricing Model beta (*Beta*), size (*Size*), book-to-market ratio (*BM*), stock return volatility (*Std_Ret*), and leverage (*Leverage*). In addition, we control for analyst forecast bias (*FcBias*) to correct for the potential measurement bias in the implied COC caused by systematic differences in analyst forecast behavior across countries (Hail and Leuz 2006; Gode and Mohanram 2013). We include the expected inflation rate (*Inflation*) because analyst forecasts are expressed in nominal terms and inflation indirectly affects the implied COC measures (Hail and Leuz 2006). In addition, Easton et al. (2002) suggest that cross-country differences in accounting conservatism could lead to systematic bias in estimates of the implied COC based on analyst forecasts, so we follow Joos and Lang (1994) and Hail and Leuz (2006) and include accounting return on assets (*ROA*) to control for accounting differences across countries. Furthermore, we control for the industry average COC (*IndustryCOC*) because research finds that the industry effect is an important explanatory factor for the company-level risk premium (Gebhardt et al. 2001; Dhaliwal et al. 2007; Naiker et al. 2013).[11]

Because mandatory and voluntary disclosure could be correlated and prior studies suggest that mandatory disclosure can affect the COC (Aboody et al. 2005; Francis et al. 2008; Kim and Qi 2010; Lang et al. 2012), we include variables intended to capture firms' mandatory financial reporting quality and general information quality. Specifically, we include earnings quality (*Accrual*) measured as absolute value of abnormal accruals derived from the modified Jones model.[12] In addition, during our

[11] The industry-level COC has significant explanatory power for the firm-level COC even after controlling for industry fixed effects. However, our inferences are robust to the omission of this variable.

[12] In alternative specifications, we use signed abnormal accruals and find very similar results. Our inferences are also robust to omitting abnormal accruals from the model.

sample period, a number of firms switched to IFRS either voluntarily or mandatorily. Because studies find that IFRS adoption is associated with a better information environment (Bae et al. 2008) and higher accounting quality (Barth et al. 2008) and because Atwood et al. (2011) find that earnings reported under U.S. Generally Accepted Accounting Principles (GAAP) are at least as persistent as earnings reported under IFRS, we include an indicator variable (*GAAP*), which is set to 1 if the firm reports under IFRS or U.S. GAAP in the year and 0 otherwise. Finally, we include an indicator variable (*Big4*) to control for the impact of Big 4 auditors on financial reporting quality (Becker et al. 1998; Francis and Wang 2008). To reduce the effect of outliers, we winsorize all continuous variables at the 1st and 99th percentiles.

In robustness tests, we also include the proportion of common equity held by institutional investors (*InstituteOwn*) to control for the demand for transparent financial and nonfinancial information. In addition, following Hail and Leuz (2006), we include the country median of the firm-level standard deviation of return on equity over the past five years (*CountryROEstd*) and the growth in annual gross domestic product (*GDPGrowth*) to control for cross-country differences in macroeconomic factors. Furthermore, we include the one-year lag of the COC (*LagCOC*) because Dhaliwal et al. (2012) find that firms with a high cost of COC in the previous year tend to issue more voluntary disclosures. Whenever technically possible, we include industry and year fixed effects, and we calculate standard errors clustering by firm to control for serial correlation and heteroscedasticity. In alternative model specifications, we control for country fixed effects or estimate the regression model at the country level.

To test *H1* through *H3*, we augment Model (1) by interacting management forecasts with country-level institutional factors as follows.

$$\begin{aligned} COC_{i,t+1} = {} & \beta_0 + \beta_1 Forecast_{i,t} + \beta_2 Forecast_{i,t} \times InvestorProtection_{j(i)} \\ & + \beta_3 Forecast_{i,t} \times Media_{j(i)} + \beta_4 Forecast_{i,t} \times Disclosure_{j(i)} + \Sigma_{k=5,K} \beta_k \, control(k) \\ & + \varepsilon_{i,t+1} \end{aligned} \tag{2}$$

where subscripts *i* and *t* denote firm *i* and year *t*, respectively, *j(i)* denotes the country *j* in which firm *i* is headquartered, and details of the $InvestorProtection_{j(i)}$, $Media_{j(i)}$, and $Disclosure_{j(i)}$ measures are provided in Appendix A.

4 Data and sample

We collect a comprehensive, international sample of management forecasts issued from 2004 through 2009 from S&P Capital IQ's Compustat database (Capital IQ hereafter).[13,14] We collect analyst earnings forecasts and stock prices used to calculate the implied COC from the Institutional Brokers' Estimate System (I/B/E/S). The calculation requires at least

[13] S&P Capital IQ collects management forecasts from various sources including firm filings with stock exchanges, major financial news media, and subscriptions to commercial sources of financial information. Starting from 2004, Capital IQ provides the text of performance forecasts issued by firm management in the Key Developments data set under "Corporate Guidance."

[14] If voluntary disclosure rules vary across countries and if this variation is correlated with that of the country-level factors, our results may be confounded. Because we cannot systematically assess the voluntary disclosure rules in each country, we acknowledge this as a limitation of our study.

one analyst forecast of one-year-ahead and two-year-ahead earnings per share (EPS) and at least one forecast of the long-term growth rate. The calculation of two of our implied COC measures (COC_{MPEG} and COC_{OJN}) also requires the two-year-ahead forecasted EPS to be greater than the one-year-ahead forecasted EPS. These requirements result in a sample of 59,094 firm-year observations from 2005 through 2010 from 72 countries.[15] Merging the I/B/E/S data with the Capital IQ data results in a sample of 51,254 firm-year observations. We further require nonmissing data for firm-level variables in our main regression models, reducing the sample to 44,574 firm-year observations from 61 countries.[16] Finally, we remove another 6681 observations from 30 countries because we lack data for the country-level institutional factors.[17] Our final sample consists of 37,856 firm-year observations from 2004 through 2009 from 31 countries. Other than when specifically noted, we obtain all firm-level variables from Capital IQ.

5 Empirical results

5.1 Descriptive statistics

Table 1 presents the distribution of data across countries as well as summary statistics for key variables at the country level. Overall, except for from the U.S., we do not observe a large number of observations from a specific country. Our estimates of the implied COC average 13.2% and are comparable in magnitude to those of prior research (Hail and Leuz 2006; Li 2010).[18] The U.S. (at 10.6%), Switzerland (10.6%), and Spain (11.1%) have the lowest average COC over our sample period, and Turkey (16.6%), Argentina (16.3%), Singapore (15.9%), and Brazil (15.8%) have the highest. *Forecast* reflects the average rate at which management forecasts are issued in each country. Denmark (at 84% of firms forecasting each year), Finland (71%), and Germany (65%) have the greatest forecasting activity, while Turkey, Argentina, Norway, Hong Kong, and Singapore have the lowest (ranging between 6 and 13%, inclusive). Firms from most countries issue approximately two forecasts per year on average, with U.S. firms issuing the most forecasts (at 3.42 per year), followed by Denmark (2.97), and Germany (2.64). The average forecast precision (of between one and two in 19 of 31 counties and between two and three in 12 of 31 countries) suggests that forecasts are often imprecise (e.g., range forecasts are often issued). Finally, *MF_Disagg* (i.e., forecasts containing multiple forecast items such as sales, operating earnings before interest, income taxes, depreciation, and amortization (EBITDA), operating income, pre-tax earnings, etc.) reveals that, although firms from most countries tend to forecast only one line item (typically bottom-line earnings) per forecast, firms from several

[15] We use I/B/E/S data from 2005 through 2010 to estimate the COC because we estimate the COC in year $t+1$ as a function of voluntary disclosure in year t and we have management forecast data from 2004 through 2009.

[16] We remove all firms from Japan because they are effectively required to make management forecasts (Skinner 1994; Kato et al. 2009).

[17] Specifically, 18, 24, and 6 countries lack information about investor protection, mandatory disclosure requirements, and information dissemination, respectively.

[18] Hail and Leuz (2006) report an average COC of 13.0% across 40 countries and Li (2010) finds an average COC of 11% across 18 European Union (E.U.) countries.

Table 1 The cost of equity capital, management forecasts, and institutional factors by country

	Country	Firm-years	COC		Forecast	MF_Freq	MF_Prec	MF_Disagg	Investor protection	Media	Disclosure
			Mean %	Median %							
1	Argentina	35	16.3	15.4	0.09	2.00	1.56	2.00	0.69	0.56	0.19
2	Australia	1782	13.3	11.5	0.52	2.19	2.28	1.38	0.85	0.72	0.04
3	Austria	180	11.7	10.6	0.61	2.35	1.90	1.53	0.28	0.75	0.10
4	Belgium	329	11.5	10.5	0.35	2.09	2.23	1.45	0.07	0.73	-0.18
5	Brazil	463	15.8	14.4	0.14	1.27	1.71	1.43	0.59	0.54	-0.37
6	Canada	2261	13.4	11.4	0.27	2.38	2.36	1.49	0.90	0.79	0.05
7	Chile	23	12.1	11.0	0.22	1.40	1.80	0.80	0.80	0.61	-0.68
8	Denmark	273	11.9	10.8	0.84	2.97	2.50	1.78	0.38	0.88	-0.19
9	Finland	432	12.1	11.4	0.71	2.29	1.83	1.74	0.46	0.92	0.26
10	France	1639	11.8	10.6	0.43	2.14	1.96	1.43	0.68	0.66	-0.35
11	Germany	1600	12.5	11.2	0.65	2.64	2.10	1.81	0.21	0.84	-0.39
12	Hong Kong	1973	15.6	14.6	0.13	1.33	1.60	1.16	0.93	0.85	0.16
13	Indonesia	304	14.1	13.6	0.47	1.73	1.45	1.57	0.51	0.42	0.36
14	Ireland	128	12.3	11.0	0.43	2.16	1.90	1.35	0.58	0.66	-0.31
15	Italy	758	12.2	10.9	0.39	1.87	1.99	1.64	0.34	0.62	0.35
16	Malaysia	1256	14.3	13.2	0.16	1.31	1.76	1.16	0.78	0.60	0.98
17	Mexico	154	12.5	11.8	0.14	1.59	2.21	1.55	0.27	0.58	0.09
18	Netherlands	444	12.5	11.2	0.43	2.02	2.07	1.51	0.43	0.79	0.68
19	New Zealand	304	11.9	11.1	0.45	1.91	2.37	1.33	0.57	0.83	0.53
20	Norway	592	15.4	14.1	0.13	1.46	2.13	1.35	0.56	0.97	0.38
21	Philippines	166	13.6	12.4	0.43	2.23	1.67	1.31	0.72	0.37	-0.30
22	Portugal	127	12.3	10.8	0.35	1.23	1.74	2.38	0.59	0.63	-0.47

Table 1 (continued)

	Country	Firm-years	COC		Forecast	MF_Freq	MF_Prec	MF_Disagg	Investor protection	Media	Disclosure
			Mean %	Median %							
23	Singapore	861	15.9	14.8	0.13	1.40	1.81	1.06	0.83	0.79	0.32
24	South Africa	635	15.0	14.1	0.25	1.37	2.49	1.36	0.63	0.28	0.63
25	South Korea	392	13.6	12.5	0.33	1.77	1.35	1.91	0.33	0.71	0.40
26	Spain	405	11.1	10.2	0.39	1.65	1.86	1.87	0.57	0.72	-0.32
27	Sweden	711	12.6	11.4	0.18	1.83	1.78	1.41	0.55	0.94	0.51
28	Switzerland	769	10.6	9.8	0.45	1.90	2.08	1.64	0.37	0.94	0.14
29	Turkey	298	16.6	15.8	0.06	1.32	1.39	1.26	0.52	0.76	-0.06
30	United Kingdom	3823	13.0	11.3	0.25	1.53	1.85	1.25	0.84	0.76	0.35
31	United States	14,739	10.6	9.6	0.54	3.42	2.83	1.81	0.95	0.82	0.51
	Total	37,856									
	Mean		13.2	12.0	0.35	1.89	1.95	1.50	0.57	0.71	0.12

Table 1 reports summary statistics for key variables in our analyses. *MF_Freq*, *MF_Prec*, and *MF_Disagg* are based on a sample of firm-years that make at least one management forecast. *Forecast* reflects the proportion of firms in a country that issue at least one management forecast during the year. All variables are defined in Appendix A

countries (e.g., Portugal, Argentina, South Korea, Spain, and the U.S.) tend to include other line items in their forecasts.

In terms of country-level institutional factors, the U.S., Hong Kong, and Canada provide the highest levels of investor protection (*InvestorProtection*), while Belgium, Germany, and Mexico provide the lowest. Norway, Sweden, and Switzerland rank highest in terms of media penetration (*Media*), and South Africa, Philippines, and Indonesia rank lowest. Finally, in terms of mandatory disclosure requirements (*Disclosure*), Malaysia, the Netherlands, and South Africa rank highest, and Chile, Portugal, and Germany rank lowest.

Table 2, Panel A, provides descriptive statistics for our main variables. Our sample firms are profitable on average, with a mean *ROA* of 0.07, and the mean book-to-market ratio is 0.65. Sample firms vary significantly in size but are large on average; the mean (median) market value is $3.6 (0.6) billion. Sample firms have mean (median) leverage ratios of 21 (18) percent and mean (median) betas of 0.82 (0.74). Outside of the U.S., 71% of observations use IFRS for financial reporting purposes, and the Big 4 audit approximately 83% of sample firms, consistent with their dominant role in the global auditing market.

Table 2, Panel B, reports correlations between the main variables. The four measures of the implied COC are significantly correlated with one another and with the average COC. The issuance of management forecasts (*Forecast*) is significantly negatively correlated with all of the COC measures, providing preliminary evidence that the issuance of management forecasts is associated with a lower COC in our international sample. Untabulated results reveal that none of the correlations between the country-level institutional factors are significant at conventional levels, indicating that they capture distinct country-level institutional characteristics.[19]

5.2 Regression analysis—the effect of management forecasts on the cost of equity capital

Table 3, Panel A, reports the results from estimating Model (1) for our full sample. Column (I) displays results for the base model. Column (II) includes institutional ownership (*InstituteOwn*), controls for macroeconomic variability (*CountryROEstd* and *GDPGrowth*), and the lagged COC (*lagCOC*). We control for country fixed effects in Column (III) and firm fixed effects in Column (IV). Finally, to ensure that the unbalanced distribution of observations across countries does not confound our results, in Column (V), we estimate the model at the country-year level using the mean value of all firm-year observations in that country-year. In all specifications, the coefficient estimate on our main variable of interest, *Forecast*, is negative and significant, and the coefficient estimates in Columns (I) through (IV) suggest that, on average, the COC is 0.3 to 0.6 percentage points lower for firms that issue management forecasts.

The coefficient estimates on our control variables are consistent with those in prior research (e.g., Hail and Leuz 2006; Daske et al. 2008; Francis et al. 2008) and with the underlying economic rationale. For example, the COC is higher for smaller firms (*SIZE*), for firms with higher book-to-market ratios (*BM*), and for firms with higher

[19] The Pearson correlations calculated at the country level are ρ(investor protection, media) = −0.10, ρ(investor protection, disclosure) = 0.16, and ρ(media, disclosure) = 0.14, but none of these correlations are statistically significant. Correlations at the firm level are ρ(investor protection, media) = 0.18, ρ(investor protection, disclosure) = 0.60, and ρ(media, disclosure) = 0.22, and all are statistically significant at conventional levels.

Table 2 Descriptive statistics

Panel A: Variable distributions

Variable	N	Mean	Std	Min	Q1	Median	Q3	Max
COC	37,856	0.12	0.05	0.05	0.09	0.11	0.14	0.35
COC_{MPEG}	37,856	0.13	0.06	0.04	0.09	0.12	0.16	0.37
COC_{OJN}	37,856	0.13	0.05	0.05	0.10	0.12	0.15	0.34
COC_{GLS}	37,856	0.10	0.05	0.02	0.07	0.10	0.13	0.29
COC_{CT}	37,856	0.12	0.08	0.03	0.08	0.10	0.13	0.55
Forecast	37,856	0.41	0.49	0.00	0.00	0.00	1.00	1.00
Beta	37,856	0.82	0.64	-0.53	0.37	0.74	1.17	2.84
Size†	37,856	3622.07	9366.00	15.98	196.21	644.51	2329.80	65,982.60
BM†	37,856	0.65	0.57	0.04	0.29	0.50	0.82	3.43
Std_Ret	37,856	0.11	0.06	0.03	0.07	0.10	0.14	0.37
Leverage	37,856	0.21	0.18	0.00	0.05	0.18	0.32	0.72
FcBias	37,856	0.01	0.06	-0.12	-0.01	0.00	0.02	0.37
Inflation	37,856	1.02	0.02	0.96	1.02	1.02	1.03	1.13
ROA	37,856	0.07	0.10	-0.25	0.02	0.05	0.11	0.53
Accrual	37,856	0.07	0.08	-0.00	0.02	0.04	0.08	0.48
GAAP (non-US countries)	23,117	0.71	0.46	0.00	0.00	0.00	1.00	1.00
Big4	37,856	0.83	0.37	0.00	1.00	1.00	1.00	1.00
MF_Freq	15,576	2.74	1.48	1.00	1.00	3.00	4.00	5.00
MF_Prec	15,576	2.44	1.12	1.00	1.33	2.40	3.40	4.00
MF_Disagg	15,576	1.66	0.93	0.00	1.00	1.50	2.00	7.00

Panel B: Pearson correlations

Variable	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) COC	0.85	0.92	0.70	0.89	-0.15	-0.02	-0.31	0.26	0.33	0.06	0.34	0.00	-0.09	0.10	-0.12	-0.16
(2) COC_{MPEG}		0.92	0.43	0.59	-0.10	0.04	-0.29	0.17	0.32	0.05	0.32	-0.02	-0.13	0.07	-0.10	-0.10
(3) COC_{OJN}			0.47	0.73	-0.13	0.01	-0.32	0.16	0.31	0.04	0.32	0.01	-0.10	0.09	-0.12	-0.13
(4) COC_{GLS}				0.57	-0.14	-0.10	-0.17	0.30	0.24	0.05	0.24	0.04	0.03	0.11	-0.07	-0.22
(5) COC_{CT}					-0.13	-0.04	-0.26	0.25	0.25	0.06	0.29	-0.01	-0.09	0.08	-0.10	-0.13

Table 2 (continued)

(6) Forecast	0.26	-0.07	-0.01	-0.00	-0.06	-0.10	-0.02	-0.06	0.10	0.17
(7) Beta	0.22	-0.05	0.21	-0.03	0.01	-0.08	-0.03	0.02	0.08	0.20
(8) Size		-0.11	-0.15	0.11	-0.13	-0.04	0.03	-0.06	0.33	0.15
(9) BM			-0.03	0.07	0.04	0.00	-0.31	0.03	-0.04	-0.05
(10) Std_Ret				-0.01	0.22	-0.19	-0.01	0.03	-0.08	0.00
(11) Leverage					0.03	-0.01	-0.22	0.00	0.09	0.00
(12) FcBias						-0.09	-0.08	0.03	-0.09	-0.02
(13) Inflation							0.04	0.05	-0.03	-0.22
(14) ROA								0.32	-0.02	-0.12
(15) Accrual									-0.05	-0.09
(16) Big4										0.05
(17) GAAP										

Table 2 reports univariate statistics for variables in Model (1) and Model (2) in Panel A and the Pearson correlations for these variables in Panel B. † indicates that the variable is presented before taking the logarithm. All continuous variables are winsorized at the 1st and 99th percentiles. The COC (COC, COC_{MPEG}, COC_{OJN}, COC_{GLS}, and COC_{CT}) is measured in year $t + 1$, and other firm-level variables, including management forecasts, *Forecast*, are measured in year t. Correlation coefficients significant at better than the 10% level are in boldface

Table 3 The effect of management forecasts on the cost of equity capital

	Column (I) base model		Column (II) with additional control variables		Column (III) with country fixed effects		Column (IV) with firm fixed effects		Column (V) country-level regressions	
Variable	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Panel A: Full sample										
Intercept	-0.289***	*-10.52*	-0.236***	*-9.32*	-0.395***	*-12.47*			-0.102	-1.43
Forecast	-0.005***	*-8.84*	-0.003***	*-6.14*	-0.004***	*-6.30*	-0.006***	*-6.08*	-0.025***	*-4.51*
Beta	-0.001	*-1.35*	-0.001***	*-2.87*	0.000	*0.30*	0.000	*-0.56*	0.007	*1.20*
Size	-0.006***	*-27.92*	-0.002***	*-11.52*	-0.006***	*-28.10*	-0.005***	*-19.56*	-0.003*	*-1.77*
BM	0.013***	*27.62*	0.008***	*18.75*	0.013***	*27.67*	0.012***	*18.80*	0.023***	*3.79*
Std_Ret	0.141***	*23.90*	0.096***	*15.58*	0.142***	*23.95*	0.146***	*17.37*	0.247***	*3.59*
Leverage	0.018***	*9.46*	0.011***	*7.53*	0.017***	*8.93*	0.016***	*6.18*	0.047**	*2.00*
FcBias	0.210***	*33.90*	0.185***	*28.04*	0.209***	*33.86*	0.190***	*25.72*	0.404***	*4.14*
Inflation	0.385***	*16.94*	0.237***	*11.99*	0.492***	*17.66*	0.358***	*10.54*	0.251***	*4.64*
ROA	-0.010***	*-3.03*	0.004	*1.25*	-0.010***	*-3.02*	-0.015***	*-3.18*	0.175***	*3.03*
IndustryCOC	0.559***	*16.53*	0.453***	*14.98*	0.549***	*16.37*	0.605***	*17.95*	-0.328	*-0.80*
Accrual	0.047***	*12.53*	0.009**	*2.25*	0.045***	*11.86*	0.048***	*8.42*	0.014	*0.17*
GAAP	-0.013***	*-15.33*	-0.007***	*-9.86*	-0.018***	*-17.26*	-0.015***	*-11.87*	-0.003	*-0.93*
Big4	-0.001	*-0.66*	0.000	*0.22*	-0.001	*-1.64*	-0.001	*-0.95*	0.013	*1.13*
InstituteOwn			0.001	*1.18*						
CountryROEstd			0.040***	*5.37*						
GDPGrowth			0.005**	*1.09*						
lagCOC			0.426***	*38.74*						
Industry fixed effects	yes		yes		yes		no		no	
Year fixed effects	yes		yes		yes		yes		yes	
Clustered	by firm		by firm		by firm		n.a.		n.a.	
N	37,856		28,903		37,856		37,856		181	
Adj. R^2	0.382		0.524		0.389		0.860		0.651	
Panel B: Excluding U.S. firms										
Non-U.S. sample										
Intercept	-0.230***	*-7.42*	*-0.206****	*-7.37*	-0.272***	*-7.86*			-0.073	*-1.02*
Forecast	-0.004***	*-5.62*	-0.002***	*-3.33*	-0.003***	*-4.36*	-0.005***	*-3.45*	-0.024***	*-4.27*

Table 3 (continued)

	Column (I) base model		Column (II) with additional control variables		Column (III) with country fixed effects		Column (IV) with firm fixed effects		Column (V) country-level regressions	
Variable	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Beta	0.008***	*10.54*	0.004***	*4.30*	0.008***	*9.95*	0.009***	*6.91*	0.015**	*2.30*
Size	-0.007***	*-26.46*	-0.003***	*-12.42*	-0.007***	*-27.36*	-0.006***	*-16.56*	-0.004**	*-2.06*
BM	0.013***	*22.20*	0.009***	*14.78*	0.013***	*22.18*	0.013***	*14.98*	0.020***	*3.25*
Std_Ret	0.161***	*19.89*	0.112***	*12.61*	0.156***	*19.28*	0.148***	*11.90*	0.262***	*3.70*
Leverage	0.015***	*5.60*	0.011***	*5.11*	0.014***	*5.39*	0.018***	*4.52*	0.044*	*1.90*
FcBias	0.200***	*27.81*	0.175***	*22.47*	0.199***	*27.74*	0.198***	*19.61*	0.359***	*3.64*
Inflation	0.334***	*13.93*	0.220***	*9.87*	0.382***	*13.31*	0.388***	*9.19*	0.244***	*4.50*
ROA	-0.023***	*-5.26*	-0.002	*-0.40*	-0.025***	*-5.71*	-0.018***	*-2.75*	0.173***	*3.00*
IndustryCOC	0.502***	*11.37*	0.437***	*10.74*	0.494***	*11.31*	0.482***	*10.00*	-0.503	*-1.22*
Accrual	0.042***	*8.56*	0.006	*1.10*	0.038***	*7,.72*	0.042***	*5.20*	-0.004	*-0.05*
GAAP	-0.007***	*-7.73*	-0.005***	*-6.56*	-0.008***	*-7.32*	-0.005***	*-3.23*	-0.003	*-0.83*
Big4	-0.002**	*-2.17*	-0.000	*-0.29*	-0.003***	*-2.60*	-0.004**	*-2.26*	0.009	*0.79*
InstituteOwn			0.002*	*1.69*						
CountryROEstd			0.030***	*3.98*						
GDPGrowth			-0.028***	*-5.02*						
lagCOC			0.406***	*30.46*						
Industry fixed effects	yes		yes		yes		no		no	
Year fixed effects	yes		yes		yes		yes		yes	
Clustered	by firm		by firm		by firm		n.a.		n.a.	
N	23,117		16,987		23,117		23,117		175	
Adj. R^2	0.371		0.507		0.379		0.861		0.653	

Table 3 reports the results from estimating Model (1). The dependent variable is the aggregate measure of the implied COC (*COC*). Column (I) is the base model. Column (II) includes several additional control variables including the lagged *COC*. Columns (III) and (IV) include country fixed effects and firm fixed effects, respectively. Column (V) is a country-level regression, where all variables (except for the country-level institutional factors) are measured at the mean of all observations in the country-year. All variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively

stock return volatility (*Std_Ret*) and financial leverage (*Leverage*). Better financial performance (*ROA*) and the use of IFRS or U.S. GAAP (*GAAP*) are negatively associated with the COC. Furthermore, consistent with prior studies, the magnitudes of accruals (*Accrual*), analyst forecast bias (*FcBias*), inflation (*Inflation*), and the industry-level COC (*IndustryCOC*) are all positively associated with the COC. Overall, the evidence in Table 3, Panel A, reveals a negative association between voluntary disclosure and the COC across countries.

Next, we estimate the model for non-U.S. firms only. Results in Columns (I) through (V) of Table 3, Panel B, reveal that our main finding regarding the negative relation between voluntary disclosure and the COC also holds in non-U.S. countries.

5.3 Country-level institutional factors and the effect of management forecasts on the cost of equity capital

Before we estimate a full version of Model (2), we study the effects of individual interactions between our three country-level institutional factors and management forecasts. Table 4, Panel A, presents the results. Column (I) reveals that the coefficient estimate on the interaction term *Forecast* × *InvestorProtection* is negative and significant ($\beta = -0.007$, $p < 0.01$), consistent with the argument that stronger investor protection enhances the effect of management forecasts on the COC. Column (II) reveals that the coefficient estimate on *Forecast* × *Media* is also negative and significant ($\beta = -0.016$, $p < 0.01$), suggesting that better information dissemination in a country increases the effect of management forecasts on the COC.[20] In Column (III), the coefficient estimate on *Forecast* × *Disclosure* is positive and significant ($\beta = 0.004$, $p < 0.01$), supporting a substitution effect, rather than a complementary relation, between management forecasts and mandatory disclosures.

In Table 4, Panel B, we estimate the full version of Model (2) by simultaneously considering interactions between management forecasts and all three county-level institutional factors. We estimate a base model using the full sample in Column (I) and exclude U.S. firms in Column (II). In Column (III), we include additional control variables, and in Column (IV), we estimate the regression model at the country level. Overall, the findings in Panel B are consistent with those reported in Panel A.[21] Thus, results in Table 4 reject all three null hypotheses—that investor protection, information dissemination, and mandatory disclosure requirements do not affect the ability of voluntary disclosure in reducing firms' COC.[22]

[20] If greater media penetration induces more and better quality management forecasts, we could also observe a negative coefficient estimate on the interaction term. However, we find that the untabulated Pearson and Spearman correlations between *Forecast* and *Media* are −0.14 and −0.09, respectively, suggesting that the effect of *Media* on the relation between management forecasts and the COC is unlikely to be driven by the media's impact on management forecast quality.

[21] The only exception is *Forecast* × *Media*, which becomes marginally significant ($\beta = 0.008$, $p = 0.11$) in the country-level regression. Note, however, that this country-level regression result may be less informative than results from other specifications because it ignores all firm-level variables that affect the COC.

[22] The coefficient on *Forecast* becomes positive after we include all institutional factors, but this does not imply that *Forecast* has a positive effect on the COC because the institutional factors have limited degrees of freedom and the hypothetical case that holds these factors constant (in order to examine the effect of *Forecast*) is not feasible. Using the coefficient estimates on *Forecast* and on the three interaction terms from Column I of Table 4, Panel B, as well as the values of the three institutional factors as reported in Table 1, we can calculate the net effect of *Forecast* on the COC for each country. Here we find that the effect is negative for 24 of the 31 countries (77.4%), representing 89.6% of all firms in our sample.

Table 4 The effect of management forecasts on the cost of equity capital conditional on country-level institutional factors

Panel A: Regressions including individual country-level institutional factors

	Column (I)		Column (II)		Column (III)	
Variable	***Coef.***	***t***	***Coef.***	***t***	***Coef.***	***t***
Intercept	-0.286***	*-10.33*	-0.235***	*-7.83*	-0.287***	*-10.33*
Forecast	0.000	*-0.29*	0.009***	*2.67*	-0.006***	*-7.80*
Beta	0.000	*0.70*	0.001	*1.36*	0.002***	*4.06*
Size	-0.006***	*-28.06*	-0.008***	*-37.54*	-0.006***	*-29.91*
BM	0.012***	*27.17*	0.011***	*22.66*	0.012***	*27.22*
Std_Ret	0.145***	*24.46*	0.131***	*22.99*	0.143***	*24.38*
Leverage	0.017***	*9.00*	0.021***	*11.11*	0.017***	*8.97*
FcBias	0.209***	*33.65*	0.192***	*31.54*	0.207***	*33.47*
Inflation	0.387***	*17.03*	0.356***	*14.37*	0.389***	*16.91*
ROA	-0.010***	*-3.11*	-0.008***	*-2.59*	-0.011***	*-3.42*
IndustryCOC	0.552***	*16.35*	0.515***	*15.41*	0.535***	*15.91*
Accrual	0.047***	*12.36*	0.043***	*11.68*	0.044***	*11.61*
GAAP	-0.013***	*-15.21*	-0.012***	*-14.11*	-0.011***	*-13.75*
Big4	-0.001	*-0.66*	0.003***	*3.29*	-0.001	*-14.01*
InvestorProtection	-0.007***	*-3.56*				
Media			-0.005	*-1.34*		
Disclosure					-0.014***	*-15.14*
Forecast × InvestorProtection	-0.007***	*-3.33*				
Forecast × Media			-0.016***	*-3.65*		
Forecast × Disclosure					0.004***	*3.37*
Industry fixed effects	yes		yes		yes	
Year fixed effects	yes		yes		yes	
Clustered	by firm		by firm		by firm	
N	37,856		37,856		37,856	
Adj. R^2	0.384		0.407		0.391	

Table 4 (continued)

Panel B: Regressions including all country-level institutional factors

	Column (I) full sample		Column (II) excluding U.S. firms		Column (III) the full sample and additional controls		Column (IV) country-level regression	
Variable	***Coef.***	***t***	***Coef.***	***t***	***Coef.***	***t***	***Coef.***	***t***
Intercept	-0.333***	*-10.10*	-0.256***	*-7.17*	-0.258***	*-8.08*	-0.126	*-1.60*
Forecast	0.015***	*3.89*	0.017***	*4.17*	0.012***	*3.72*	0.074***	*2.59*
Beta	0.002***	*4.50*	0.008***	*10.47*	0.000	*0.32*	0.008	*1.37*
Size	-0.006***	*-28.80*	-0.007***	*-27.12*	-0.002***	*-11.88*	-0.005*	*-1.94*
BM	0.012***	*26.87*	0.013***	*22.77*	0.008***	*18.19*	0.005	*0.77*
Std_Ret	0.144***	*24.32*	0.155***	*18.92*	0.097***	*15.73*	0.293***	*4.10*
Leverage	0.017***	*9,24*	0.016***	*6.05*	0.011***	*7.41*	0.033	*1.14*
FcBias	0.206***	*33.56*	0.200***	*28.08*	0.186***	*27.96*	0.383***	*3.73*
Inflation	0.429***	*15.83*	0.345***	*12.19*	0.270***	*9.53*	0.281***	*4.38*
ROA	-0.012***	*-3.65*	-0.024***	*-5.58*	0.003	*0.97*	0.145***	*2.67*
IndustryCOC	0.531***	*15.80*	0.494***	*12.26*	0.436***	*14.29*	-0.502	*-1.25*
Accrual	0.043***	*11.42*	0.039***	*7.98*	0.007*	*1.89*	-0.100	*-1.28*
GAAP	-0.011***	*-11.50*	-0.006***	*-6.05*	-0.007***	*-9.62*	-0.009***	*-2.33*
Big4	-0.001*	*-1.74*	-0.004***	*-3.36*	-0.000	*-0.14*	0.024	*1.59*
InstituteOwn					0.001	*0.60*		
CountryROEstd					0.096***	*3.08*		
GDPGrowth					-0.018***	*-3.68*		
lagCOC					0.417***	*37.15*		
InvestorProtection	0.005**	*2.12*	0.016***	*6.49*	-0.001***	*3.27*	0.041***	*3.74*
Media	0.002	*0.45*	0.005	*1.26*	0.004	*1.10*	0.000	*0.51*
Disclosure	-0.019***	*-13.52*	0.001	*1.01*	-0.009***	*-10.30*	-0.004	*-1.11*
Forecast × InvestorProtection	-0.010***	*-3.49*	-0.012***	*-4.19*	-0.010***	*-4.54*	-0.111***	*-4.24*

Table 4 (continued)

Forecast × Media	-0.019***	*-4.29*	-0.016***	*-3.43*	-0.012***	*-3.12*	-0.053**	*-2.09*
Forecast × Disclosure	0.008***	*5.60*	0.007***	*3.42*	0.005***	*3.94*	0.008	*1.61*
Industry fixed effects	yes		yes		yes		no	
Year fixed effects	yes		yes		yes		yes	
Clustered	by firm		by firm		by firm		n.a.	
N	37,856		23,117		28,370		181	
Adj. R^2	0.395		0.379		0.528		0.742	

Table 4 reports the results from estimating Model (2). The dependent variable is the aggregate measure of the implied COC (*COC*). In Panel B, Column (I) is based on the full sample. Column (II) is based on a subsample without U.S. firms. Column (III) is based on the full sample with several additional control variables, including the lagged COC. Column (IV) is a country-level regression, where all variables (except for the country-level institutional factors) are measured at the mean of all observations in the country-year. All variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively

5.4 Effects of management forecast characteristics on the cost of equity capital

Prior studies suggest that managers have considerable discretion over their forecasting practices (Choi et al. 2011) and can use this discretion opportunistically (Rogers and Stocken 2005). Hirst et al. (2008) argue that committing to better forecast characteristics can constrain management incentives for making opportunistic forecasts,[23] and Francis et al. (2008) and Baginski and Rakow (2012) suggest that committing to better disclosure practices should make disclosures more credible. These arguments suggest that management forecast characteristics are an important determinant of the effect of management forecasts on information asymmetry and hence the COC.

We focus on three forecast characteristics that prior studies have identified as desired by investors—namely, forecast frequency, forecast precision, and forecast disaggregation (Waymire 1985; Ajinkya et al. 2005; Karamanou and Vafeas 2005; Hirst et al. 2007; Choi et al. 2010).[24] We define forecast frequency (*MF_Freq*) as the total number of management forecasts issued by the firm in the year, forecast precision (*MF_Prec*) as the mean precision score for all forecasts issued in the year (where the precision score takes a value of 1, 2, 3, or 4 when a forecast is qualitative, a minimum or maximum, a range, or a point estimate, respectively), and forecast disaggregation (*MF_Disagg*) as the total number of unique line items forecasted in each management forecast. To measure forecast disaggregation, following Barton et al. (2010), we identify a total of 10 different items commonly forecasted by management across all countries in our sample; these are sales, EBITDA, operating income, income before taxes, income before extraordinary items and discontinued operations, net income, capital expenditures, operating cash flow, expenses, and other balance sheet items.

We perform two tests related to management forecast characteristics. First, we repeat our regression analyses (Models (1) and (2)) using the subsample of firms that issue management forecasts and examine the effect of each management forecast property on the COC. Second, we develop measures of forecast quality and forecast commitment using the individual forecast characteristics and examine whether the effect of management forecasts on the COC varies with forecast quality and forecast commitment.

Table 5 presents the results from the first set of tests. In all models in Panel A, the coefficient estimates on the forecast characteristics are negative and significant. Thus, more frequent, precise, and disaggregated forecasts are better at reducing the COC. The bottom rows of Panel A present the results of various robustness tests, including adding additional control variables, controlling for country fixed effects or firm fixed effects, and estimating country-level regressions. The inferences are generally robust to these additional specifications.[25]

[23] In addition, economic theory suggests that a pre-commitment to disclosure can reduce the cost of capital (Leuz and Verrecchia 2000) and that managers can credibly signal such commitment by providing more frequent disclosures (Botosan and Harris 2000).

[24] Untabulated analyses reveal that the three forecast characteristics are positively correlated with one another, with correlation coefficients ranging between 0.16 and 0.32. In addition, the three forecast characteristics are negatively correlated with the COC, with coefficients ranging between −0.21 and −0.11.

[25] The only exception is for the regression estimated at the country level, but the small sample size and lower statistical power could be responsible for this loss of significance.

Table 5 Management forecast characteristics, the cost of equity capital, and country-level institutional factors

Panel A: The effect of forecast characteristics on the cost of equity capital

	Column (I) forecast frequency (*MF_Freq*)		Column (II) forecast precision (*MF_Prec*)		Column (III) forecast disaggregation (*MF_Disagg*)	
Variable	***Coef.***	***t***	***Coef.***	***t***	***Coef.***	***t***
Intercept	-0.321***	*-8.99*	-0.326***	*-8.81*	-0.324***	*-8.85*
Forecast characteristic	-0.002***	*-11.19*	-0.003***	*-10.17*	-0.003***	*-7.87*
Beta	-0.002***	*-4.16*	-0.003***	*-4.78*	-0.003***	*-5.65*
Size	-0.004***	*-16.18*	-0.004***	*-18.22*	-0.004***	*-17.78*
BM	0.013***	*18.93*	0.013***	*18.96*	0.013***	*18.97*
Std_Ret	0.132***	*15.42*	0.131***	*15.24*	0.131***	*15.29*
Leverage	0.020***	*8.57*	0.021***	*8.69*	0.021***	*8.80*
FcBias	0.184***	*16.46*	0.184***	*16.36*	0.185***	*16.47*
Inflation	0.384***	*11.79*	0.395***	*11.84*	0.390***	*11.80*
ROA	-0.014***	*-2.82*	-0.014***	*-2.70*	-0.013***	*-2.57*
IndustryCOC	0.539***	*10.61*	0.533***	*10.42*	0.540***	*10.55*
Accrual	0.036***	*6.48*	0.037***	*6.71*	0.037***	*6.64*
GAAP	-0.007***	*-5.58*	-0.008***	*-5.95*	-0.008***	*-6.45*
Big4	-0.003***	*-2.75*	-0.003**	*-2.40*	-0.004***	*-2.89*
Industry fixed effects	yes		yes		yes	
Year fixed effects	yes		yes		yes	
Clustered	by firm		by firm		by firm	
N	15,576		15,576		15,576	
Adj. R^2	0.393		0.392		0.390	

Robustness check: Regression coefficients on *Forecast characteristic* in alternative specifications as in Table 4, Panel B

With additional control variables	-0.002***	*-8.96*	-0.002***	*-6.76*	-0.002***	*-4.85*
Controlling for country fixed effects	-0.002***	*-6.81*	-0.002***	*-7.23*	-0.002***	*-6.61*
Controlling for firm fixed effects	-0.003***	*-2.83*	-0.003**	*-2.20*	-0.004***	*-2.65*
Country-level regression	-0.007***	*-3.03*	-0.003	*-0.92*	-0.001	*-0.29*

Panel B: the effect of forecast characteristics on the cost of equity capital, conditional on country-level institutional factors

	Column (I) forecast frequency (*MF_Freq*)		Column (II) forecast precision (*MF_Prec*)		Column (III) forecast disaggregation (*MF_Disagg*)	
Variable	***Coef.***	***t***	***Coef.***	***t***	***Coef.***	***t***
Intercept	-0.390***	*-8.56*	-0.373***	*-7.99*	-0.428***	*-8.79*
Forecast characteristic	0.009***	*3.97*	0.009***	*3.14*	0.012***	*4.08*
Beta	-0.001**	*-2.10*	-0.002***	*-3.69*	-0.001	*-0.98*
Size	-0.004***	*-15.18*	-0.004***	*-18.16*	-0.004***	*-17.32*
BM	0.020***	*28.28*	0.013***	*18.83*	0.012***	*17.61*
Std_Ret	0.133***	*16.57*	0.133***	*15.48*	0.137***	*15.75*
Leverage	0.022***	*9.46*	0.020***	*8.55*	0.019***	*8.26*
FcBias	0.145***	*13.25*	0.182***	*16.22*	0.183***	*16.11*
Inflation	0.462***	*11.17*	0.422***	*10.300*	0.459***	*10.75*
ROA	0.005	*0.97*	-0.014***	*-2.82*	-0.014***	*-2.87*
IndustryCOC	0.405***	*8.60*	0.529***	*10.36*	0.514***	*10.09*

Table 5 (continued)

Accrual	0.044***	*8.11*	0.037***	*6.69*	0.033***	*5.99*
GAAP	-0.008***	*-5.72*	-0.007***	*-5.21*	-0.007***	*-5.11*
Big4	-0.004***	*-3.10*	-0.003**	*-2.46*	-0.004***	*-2.76*
InvestorProtection	0.001	*0.34*	0.001*	*1.67*	0.003***	*5.65*
Media	0.019***	*3.07*	0.014*	*1.83*	0.026***	*3.54*
Disclosure	-0.003	*-1.42*	-0.010***	*-2.73*	-0.016***	*-8.02*
Forecast characteristic × InvestorProtection	-0.004***	*-3.09*	-0.001***	*-3.91*	-0.005***	*-3.93*
Forecast characteristic × Media	-0.010***	*-4.20*	-0.007**	*-2.25*	-0.014***	*-4.22*
Forecast characteristic × Disclosure	0.002*	*1.94*	0.005***	*3.01*	0.003***	*2.58*
Industry fixed effects	yes		yes		yes	
Year fixed effects	yes		yes		yes	
Clustered	by firm		by firm		by firm	
N	15,576		15,576		15,576	
Adj. R^2	0.456		0.394		0.404	

Table 5 Panel A reports the results from estimating Model (1) for firms that issue at least one management forecast the year. The independent variable of interest is forecast frequency (*MF_Freq*) forecast precision (*MF_Prec*), and forecast disaggregation (*MF_Disagg*) in Columns (I) through (III), respectively. Panel B reports the results from estimating Model (2) for firms that issue at least one management forecast the year. All variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively

We also investigate whether our country-level institutional factors affect the relation between forecast characteristics and the COC. The results, presented in Table 5, Panel B, are consistent with those reported in Table 4. Specifically, stronger investor protection and better information dissemination strengthen the negative relation between forecast characteristics and the COC, while higher mandatory disclosure requirements weaken this relation.[26]

In the second set of tests, we construct a variable that captures the overall quality of management forecasts and a second variable that captures firm commitment to management forecasts, and we repeat our main analyses. Following Baginski and Rakow (2012), we measure forecast quality (*MF_Quality*) as *log* (*1 + ave_frequency*ave_precision*), where *ave_frequency* is the firm's mean forecast frequency per year over the sample period and *ave_precision* is the mean value of precision for all forecasts made by the firm over the sample period.[27] Thus, each firm has only one value of *MF_Quality* in our test. Following Baginski and Rakow (2012), we use the last observation for each sample firm in the regression analyses because perceptions of management forecast quality are built over time and the last observation should better reflect the capital market consequences of higher quality management forecasts.

To perform the analyses, we partition all forecasting firms into terciles based on the value of *MF_Quality*, and we classify those in the top (bottom) tercile as making high

[26] The results for tests in Panel A and Panel B are qualitatively similar when we exclude U.S. firms.

[27] Our inferences are unchanged if we use the sum of forecast frequency over the sample period (rather than the average), as do Baginski and Rakow (2012), but the sum is a noisy measure in our setting because firms appear in our sample for different numbers of years.

(low) quality forecasts. We then combine the top tercile of forecasting firms with a control group that never makes forecasts (here *MF_Quality* is set to zero), and we re-estimate Models (1) and (2) to determine how high quality forecasts affect the COC. We perform these procedures for the bottom tercile of firms as well.[28]

Table 6 reports regression results for the high and low quality subsamples. The coefficient estimate on *MF_Quality* is negative and significant in the basic model for the high quality subsample (Column (I)) but is insignificant for the low quality subsample (Column (III)). In addition, the interactions between *MF_Quality* and the three country-level institutional factors are all significant and have the predicted signs for the high quality subsample (Column (II)) but are all insignificant for the low quality subsample (Column (IV)). These results suggest that high quality forecasts, but not low quality forecasts, reduce information asymmetry and hence the COC.

Because managers have incentives to make forecasts for reasons other than reducing information asymmetry (e.g., opportunism), a *commitment* to disclosure should be more likely to affect the COC (Francis et al. 2008; Baginski and Rakow 2012). Because a commitment to disclose takes the form of 'a stable set of disclosure practices' (Francis et al. 2008), we measure management forecasts over time rather than in a single year. We construct a firm-year variable, *MF_Comm*, by dividing the cumulative number of years to date in which the firm has provided a management forecast by the cumulative number of years to date in which the firm has appeared in our sample. Thus, *MF_Comm* is updated each year, and a higher value for *MF_Comm* suggests that the firm issues management forecasts more regularly, thereby reflecting its commitment to better voluntary disclosure. In Table 6, we find results consistent with expectations. Specifically, the coefficient estimate on *MF_Comm* is negative and significant in the base regression (Column (V)), and its interactions with the institutional factors exhibit similar patterns as in the main analysis (Column (VI)).

6 Robustness checks and additional tests

6.1 Endogeneity

A potential concern with our results is that they can be confounded by variables that are correlated with both management forecasts and the COC. We include an array of control variables in our main model but to further address this concern, we follow Larcker and Rusticus (2010) and estimate a two-stage least squares regression. Based on Hirst et al. (2008), which summarizes the determinants of management forecast issuance, we identify four instrumental variables (IVs), for which data are available, that are likely to influence management forecast practices but are unlikely to influence the COC. (See Appendix A for detailed definitions.)

The first IV is firm age (*Age*). Because older firms have longer performance histories and more stable business models, it should be easier for their managers to forecast earnings. The

[28] This research design allows us to provide direct evidence that low quality voluntary disclosure does not help to lower a firm's COC, while high quality does. We also estimate the regression using the full sample. Here, untabulated results reveal that the main effect of *MF_Quality* in Model (1) and the interaction effects for the three country-level factors in Model (2) all remain significant.

Table 6 The effect of forecast quality and forecast commitment on the cost of equity capital

	High Forecast Quality				Low Forecast Quality				Forecast Commitment			
	Column (I)		Column (II)		Column (III)		Column (IV)		Column (V)		Column (VI)	
Variable	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Intercept	-0.278***	*-4.44*	-0.326***	*-4.63*	-0.270***	*-4.33*	-0.313***	*-4.49*	-0.289***	*-10.53*	-0.268***	*-8.88*
MF_Quality	-0.005 ***	*-9.64*	0.022***	*2.62*	0.001	*1.01*	0.004	*0.53*				
MF_Comm									-0.006***	*-9.09*	0.010**	*2.07*
Beta	0.001	*1.40*	0.002*	*1.78*	0.003***	*3.06*	0.004***	*3.14*	0.001	*-1.19*	0.002***	*4.08*
Size	-0.007 ***	*-19.06*	-0.008***	*-19.78*	-0.008***	*-20.03*	-0.008***	*-20.79*	-0.006***	*-27.55*	-0.006***	*-28.67*
BM	0.014***	*15.92*	0.014***	*15.60*	0.015***	*17.00*	0.015***	*16.78*	0.013***	*27.60*	0.012***	*27.28*
Std_Ret	0.158***	*12.38*	0.161***	*12.53*	0.170***	*12.98*	0.173***	*13.10*	0.141***	*23.92*	0.142***	*24.11*
Leverage	0.019***	*5.57*	0.018***	*5.52*	0.021***	*5.96*	0.020***	*5.66*	0.018***	*9.45*	0.017***	*9.10*
FcBias	0.203***	*20.72*	0.203***	*20.65*	0.198***	*21.09*	0.197***	*20.96*	0.210***	*33.90*	0.207***	*33.54*
Inflation	0.376***	*7.60*	0.423***	*7.52*	0.383***	*8.36*	0.428***	*8.13*	0.384***	*15.97*	0.368***	*14.88*
ROA	-0.004	*-0.60*	-0.005	*-0.74*	-0.007	*-1.02*	-0.008	*-1.18*	-0.010***	*-3.08*	-0.011***	*-3.49*
IndustryCOC	0.664***	*8.94*	0.662***	*8.93*	0.644***	*8.56*	0.639***	*8.51*	0.560***	*16.55*	0.536***	*15.95*
Accrual	0.059***	*7.31*	0.059***	*7.29*	0.065***	*7.88*	0.065***	*7.83*	0.048***	*12.56*	0.044***	*11.64*
GAAP	-0.012 ***	*-6.56*	-0.011***	*-5.68*	-0.013***	*-7.38*	-0.011***	*-6.06*	-0.013***	*-15.26*	-0.011***	*-13.18*
Big4	-0.000	*-0.13*	-0.001	*-0.46*	0.001	*0.46*	0.000	*0.03*	-0.001	*-0.74*	-0.001	*-1.39*
InvestorProtection			-0.006**	*-2.00*			-0.006**	*-1.98*			0.007***	*3.34*
Media			0.003	*0.45*			-0.000	*-0.07*			-0.003	*-0.88*
Disclosure			-0.007***	*-3.83*			-0.008***	*-4.25*			-0.015***	*-14.32*
MF_Quality × InvestorProtection			-0.008***	*-2.72*			0.002	*0.36*			-0.010***	*-3.01*
MF_Quality × Media			-0.024**	*-2.51*			-0.005	*-0.54*			-0.013**	*-2.46*
MF_Quality × Disclosure			0.006 **	*2.11*			-0.002	*-0.64*			0.008***	*4.69*
Industry fixed effects	yes		yes		yes		yes		yes		yes	

Table 6 (continued)

	High Forecast Quality				Low Forecast Quality				Forecast Commitment			
	Column (I)		Column (II)		Column (III)		Column (IV)		Column (V)		Column (VI)	
Variable	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Year fixed effects	yes		yes		yes		yes		yes		yes	
Clustered	by firm		by firm		by firm		by firm		by firm		by firm	
N	8496		8496		8469		8469		37,856		37,856	
Adj. R^2	0.378		0.380		0.355		0.358		0.382		0.392	

Table 6 reports the results from estimating Model (1) and Model (2) for firms with high vs. low forecast quality (*MF_Quality*) in Columns (I) to (IV) and for a measure of forecast commitment (*MF_Comm*) for the full sample in Columns (V) and (VI). In the first four columns, we classify all forecasters into terciles based on the value of forecast quality (*MF_Quality*) and treat those in the top (bottom) tercile as firms with high (low) quality forecasts. In Columns (I) and (II) (Columns (III) and (IV)) the tests compare forecasters with high (low) forecast quality to firms that never made a forecast over the sample period (nonforecasters). Tests in the first four columns include only the last observation for each firm (forecasters and nonforecasters). All variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively

second IV is an indicator variable (*MBE*) set to 1 if the firm met or beat the consensus analyst earnings forecast in each of the past three years and 0 otherwise. Managers with better records of meeting or beating expectations should be more likely to make forecasts because this allows them to signal their superior forecasting abilities (Healy and Palepu 2001). In contrast, Houston et al. (2012) find that firms that fail to meet or beat analyst forecasts are more likely to stop issuing management earnings forecasts. Membership in a high-tech industry (*HighTech*) is our third IV. Firms in high-tech industries may need more capital for growth and hence may have stronger incentives to be transparent to potential investors. Finally, we use the number of financial analysts following the firm (*NumAnalysts*) as an IV. Financial analysts can pressure firms for more disclosure, especially regarding future performance, and Healy et al. (1999) find that analyst following increases after firms increase voluntary disclosure.

In the first stage, we regress the indicator variable *Forecast* on the four IVs and all control variables from Model (1). In the second stage, the dependent variable is the COC, and the variable of interest is the predicted value of *Forecast* (*Predicted forecast*) from the first-stage regression. We report the results in Table 7, Panel A. Column (I) reveals that in the first-stage regression, the coefficient estimates on all four IVs are positive and significant as predicted. The partial F-statistic ($F = 186.68$, $p < 0.001$) suggests that the four IVs together contribute significant incremental explanatory power to the model. Column (II) reveals that the predicated value of *Forecast* is negative and significant ($\beta = -0.068$, $p < 0.001$) in the second-stage regression, supporting the main results from our prior regressions.[29]

Table 7, Panel B, reports statistics from the over-identifying restrictions test, which examines whether the IVs are indeed exogenous and do not affect the dependent variable other than through their effects on the independent variable being instrumented. The Chi-square test rejects the null hypothesis that the IVs are jointly significant in explaining the second-stage residuals ($p = 0.258$), suggesting that the IVs are exogenous.[30] Panel C presents the coefficient estimates on the instrumental variables in the two-stage regressions and reveals that they are comparable in magnitude (ranging between 0.039 and 0.073), again supporting the validity of these IVs.[31]

6.2 Re-estimating the cost of equity capital after adjusting for analyst forecast errors

Our main analyses use measures of the implied COC that are widely used in accounting and finance research. However, a significant source of measurement error in the implied COC measures comes from errors in analyst forecasts (Easton and Monahan 2005). To the extent that analyst forecast errors are correlated with our country-specific institutional factors, our results may be confounded. Therefore, we follow Larocque

[29] Because *Predicted forecast* is a continuous variable, its coefficient estimate (−0.068) indicates that the COC falls by approximately 1.38% for a one standard deviation increase (0.20, not tabulated) in value.

[30] Specifically, the test results are based on a regression of the second-stage residuals on all exogenous variables including the IVs. If the IVs are valid (i.e., exogenous), their coefficients should be close to zero, and, in particular, n*Rsquare should follow a Chi-square distribution, where n is the number of observations (Larcker and Rusticus 2010, p.192). Untabulated results also reveal that, consistent with the IVs being exogenous, none of the individual IVs are significantly associated with the residuals from the second-stage regression.

[31] The idea here is that if the IVs are valid, the coefficient estimates on the IVs should be similar in magnitude and sign (Larcker and Rusticus 2010, p. 201).

Table 7 Endogeneity and heckman two-stage regressions

Panel A: First-stage and second-stage regressions

	Column (I) First Stage		Column (II) Second Stage	
Variable	***Coef.***	***t***	***Coef.***	***t***
Intercept	1.804***	*7.84*	-0.128***	*-4.07*
Age	0.034***	*5.87*		
MBE	0.055***	*7.55*		
HighTech	0.061***	*5.06*		
NumAnalysts	0.082***	*21.31*		
Predicted forecast			-0.068***	*-13.81*
Beta	0.049***	*11.50*	0.003***	*5.16*
Size	0.036***	*17.00*	-0.001**	*-2.38*
BM	-0.001	*-0.19*	0.012***	*22.80*
Std_Ret	0.121**	*2.46*	0.142***	*22.70*
Leverage	0.001	*0.07*	0.018***	*8.89*
FcBias	-0.118***	*-2.63*	0.201***	*28.61*
Inflation	-2.020***	*-10.13*	0.215***	*8.09*
ROA	-0.162***	*-5.91*	-0.020***	*-5.15*
IndustryCOC	0.025	*0.07*	0.594***	*15.88*
Accrual	-0.026***	*-0.75*	0.040***	*9.84*
GAAP	0.085***	*11.43*	-0.008***	*-8.13*
Big4	-0.013*	*-1.78*	0.000	*0.07*
Industry fixed effects	yes		yes	
Year fixed effects	yes		yes	
Clustered	by firm		by firm	
N	32,725		32,725	
Adj. R^2	0.189		0.386	
Partial F and *p*-value	186.68	<0.001		

Panel B: Test statistics for the over-identifying restrictions

N	32,725
Adj. R^2	0.00012
Chisqr value = nR2	4.04
p-value	0.258

Panel C: The unconstrained second-stage regression to test the validity of the IVs

Variable	***Coef.***	***T-statistic***
Intercept	-0.252***	*-11.39*
Age × coef(Age)	-0.050***	*-3.29*
MBE × coef(MBE)	-0.056***	*-4.84*
HighTech × coef(HighTech)	-0.039**	*-2.24*
NumAnalysts × coef(NumAnalysts)	-0.073***	*-17.47*
Beta	-0.001*	*-1.68*
Size	-0.003***	*-17.54*
BM	0.012***	*34.00*

Table 7 (continued)

Std_Ret	0.135***	*30.63*
Leverage	0.018***	*12.67*
FcBias	0.209***	*51.78*
Inflation	0.354***	*19.19*
ROA	-0.008***	*-3.36*
IndustryCOC	0.590***	*19.72*
Accrual	0.042***	*13.71*
GAAP	-0.014***	*-21.34*
Big4	0.001	*1.48*
Industry fixed effects	yes	
Year fixed effects	yes	
Clustered	by firm	
N	32,725	
Adj. R^2	0.387	

Table 7 reports results from re-estimating a two-stage regression of Model (1), which controls for endogeneity in management forecasts. Panel A reports the first-stage and second-stage regression results. In the first stage, the dependent variable is *Forecast*. The independent variables include all variables in Model (1) and four IVs—*Age*, *MBE*, *HighTech*, and *NumAnalyst*. In the second stage, the dependent variable is *COC*, and the independent variables are the predicted value of management forecasts from the first-stage regression and all other control variables from Model (1). We multiply the coefficient estimate on *Age* by 100 to display the coefficient estimate. Panel B reports the statistics from testing the over-identifying restrictions. The dependent variable is the residual from the second-stage regression, and the independent variables include all those from Model (1). The residual from this regression follows a Chi-square distribution under the null hypothesis that the IVs are exogenous and are uncorrelated with the COC. In Panel C, the dependent variable is *COC*, and the IVs are presented as the product of their original value multiplied by the corresponding estimated coefficient from the first-stage regression. All variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively

(2013) to correct for errors in analyst forecasts.[32] Basically, we use past analyst forecast errors and other variables to predict future analyst forecast errors, and we subtract the predicted analyst forecast error from the observed analyst forecast. We then re-estimate the COC using the adjusted analyst forecasts, and we use the re-estimated COC in our main analyses. We report these results in Table 8.

As shown in Panel A, this technique removes the majority of the error in analyst forecasts for years t and $t + 1$. The magnitude of the adjustment is comparable to that of Larocque (2013); for example, in our test, the raw forecast error and the adjustment for year t are 0.014 and 0.012, respectively, compared to Larocque's 0.014 and 0.017. Panel A also reveals that the COC estimated using adjusted analyst forecasts is 1.50% lower than the unadjusted value, which is comparable to Larocque's.[33] Panel B reports the main regression results using the adjusted COC. In Column (I), the coefficient estimate on *Forecast* (−0.007) remains negative and significant, and it is slightly larger

[32] In untabulated analyses, we find that our main inferences are also robust to the use of an alternative method to adjust analyst forecast errors developed by Gode and Mohanram (2013).

[33] According to Tables 4 through 6 from Larocque (2013), for the measures that we use, the COC falls by an average of 2.03% from 2004 through 2006 (which are the three years that overlap with our sample period).

Table 8 Re-estimating the cost of equity using adjusted analyst forecasts following Larocque (2013)

Panel A: Adjusted analyst forecast errors and the re-estimated cost of equity

Raw error in analyst forecasts for year *t*	0.014
Error adjustment for analyst forecasts for year *t*	-0.012
Remaining error in analyst forecasts for year *t*	0.002
Raw error in analyst forecasts for year *t* + 1	0.019
Error adjustment for analyst forecasts for year *t* + 1	-0.019
Remaining error in analyst forecasts for year *t* + 1	0.000
Original COC in the reduced sample	12.6%
COC based on adjusted analyst forecasts	11.1%
Adjustment in the COC	-1.5%

Panel B: Regression results using the re-estimated cost of equity

	Column (I)			**Column (II)**		
Variable	***Coef.***		***t***	***Coef.***		***t***
Intercept	-0.357	***	*-9.61*	-0.312	***	*-7.83*
Forecast	-0.007	***	*-9.30*	0.013	***	*2.68*
Beta	-0.004	***	*-6.89*	-0.001		*-1.55*
Size	0.001	***	*4.45*	0.001	***	*3.96*
BM	0.017	***	*21.00*	0.016	***	*20.25*
Std_Ret	0.133	***	*17.00*	0.137	***	*17.36*
Leverage	0.022	***	*8.20*	0.020	***	*7.92*
FcBias	0.184	***	*23.01*	0.182	***	*22.82*
Inflation	0.422	***	*13.33*	0.381	***	*11.51*
ROA	0.009		*1.38*	0.007		*1.16*
IndustryCOC	0.492	***	*11.92*	0.477	***	*11.61*
Accrual	0.021	***	*2.63*	0.018	**	*2.30*
GAAP	-0.011	***	*-9.15*	-0.008	***	*-6.11*
Big4	-0.001		*-0.88*	-0.001		*-1.07*
InvestorProtection				0.003		*0.79*
Media				-0.002		*-0.43*
Disclosure				-0.017	***	*-10.63*
Forecast × InvestorProtection				-0.013	***	*-3.27*
Forecast × Media				-0.018	***	*-3.17*
Forecast × Disclosure				0.011	***	*4.94*
Industry fixed effects	yes			yes		
Year fixed effects	yes			yes		

Table 8 (continued)

Clustered	by firm	by firm
N	25,591	25,591
Adj. R^2	0.387	0.400

Table 8 reports the regression results from re-estimating Models (1) and (2). The dependent variable is the aggregate measure of the four individual implied COC measures after adjusting for predicted forecast errors following Larocque (2013). Specifically, we predict analyst forecast errors for year *t* and year *t* + 1 based on the following models

$$Error_t = a_0 + a_1 Error_{t-1} + a_2 RET\_LAG_t + a_3 Ln(MV)_t + a_4 RET\_EZ_t + e_t \quad (1A)$$

$$Error_{t+1} = a_0 + a_1 Error_{t-1} + a_2 RET\_LAG_t + a_3 Ln(MV)_t + a_4 RET\_EZ_{t+1} + e_{t+1} \quad (1B)$$

where $Error_t$ ($Error_{t+1}$) is the ex post analyst forecast error, measured as the mean consensus analyst forecast for year *t* (*t* + 1) minus reported *EPS* for year *t* (*t* + 1), scaled by lagged price. $Error_{t-1}$ is lagged analyst forecast error. RET_LAG_t is the raw stock return for the 12 months before measurement of the analyst forecast. $Ln(MV)_t$ is the natural logarithm of the market value of equity at the end of year *t*, and RET_EZ_t (RET_EZ_{t+1}) is the stock return between the analyst forecast date and the year *t* (*t* + 1) earnings announcement date

We estimate regressions based on (1A) and (1B) for the full sample annually and use the mean of the coefficient estimates in years *t*-3, *t*-2, and *t*-1 to predict analyst forecast errors in year *t* and year *t* + 1. Following Larocque (2013), we exclude *RET_EZ* when predicting analyst forecast errors because it is not observable to analysts at the time that they issue their forecasts. Next, we subtract predicted analyst forecast errors from the raw analyst forecasts to obtain adjusted analyst forecasts. Finally, we use the adjusted analyst forecasts to re-estimate the four individual implied COC measures and use the average of the four measures as the dependent variable in our regression analyses

Panel A reports the raw analyst forecast errors, the adjustment to these forecast errors, and the remaining forecast errors, all at their mean values. The last three rows of Panel A report the raw COC for the reduced sample, the new COC estimated from adjusted analyst forecasts, and their difference. Panel B reports the regression results using the adjusted COC as the dependent variable. All variables are defined in Appendix A in the manuscript. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively

in absolute value than in the original test (−0.005). Similarly, in Column (II), the coefficient estimates on the interaction terms all remain highly significant, and their magnitudes are comparable to those in Table 4.[34]

6.3 Controlling for market efficiency

The degree of market efficiency could confound our results if it is correlated with our country-level institutional factors. For example, if the estimated implied COC is more accurate in more efficient markets and if these markets also have stronger investor protection, then we could observe a negative coefficient estimate on *Forecast*Investor Protection* because investor protection proxies for the degree of market efficiency. In addition, if the degree to which analyst forecasts reflect market expectations is

[34] Although we can remove most of the error in analyst forecasts, we still do not observe a positive and significant association between the COC and future realized returns after controlling for cash flow news. This is a common problem for research using the implied COC, and we acknowledge this as a caveat of this study.

correlated with our country-level institutional factors, a similar problem can occur. We conjecture that market efficiency serves as a reasonable proxy for this degree so we use measures of market efficiency to perform additional tests.

We identify three measures of market efficiency—the size of the country's stock market relative to its total GDP (*EquityMarket*), the R^2 of the relative co-movement of individual stock returns with the market within the country (Jin and Myers 2006; Bris et al. 2007), and the ability to make short sales (which is critical to obtain market efficiency) in the country (Bris et al. 2007; Saffi and Sigurdsson 2011). We partition the full sample into subsamples based on the degree of market efficiency and estimate our main regression for each subsample. Results are reported in Table 9.[35] In Panel A, our inferences hold for the subsample with high market efficiency; all interaction terms are highly significant (at $p < 0.01$) using each market efficiency measure. In Panel B, our inferences hold for the subsample with low market efficiency but are somewhat weaker when market efficiency is measured by R^2 or by the ability to sell short. This could be because the COC estimate based on analyst forecasts and stock prices is noisier when the market is less efficient. Overall, the results in Table 9 reduce the concern that our primary results are driven by the correlation between country-level institutional factors and market efficiency or by an inconsistency between analyst forecasts and market expectations.

6.4 Using one-year-ahead returns to proxy for the cost of equity capital

To further check the robustness of our results, we follow prior studies (e.g., Fu et al. 2012; Naiker et al. 2013) and use one-year-ahead stock returns as an alternative measure of the COC because this measure does not rely on analyst forecasts.[36] In addition, we control for cash flow news following Easton and Monahan (2005) and Baginski and Rakow (2012) because cash flow news is a key determinant of future returns. Table 10 reveals that the coefficient estimate on *Forecast* remains significant using this alternative measure ($\beta = -0.023$, $p < 0.01$), and inferences from its interactions with the three country-level institutional factors are consistent with those in the main analyses.

In untabulated analyses, we also follow Hail and Leuz (2006) and use the one-year-ahead dividend yield, measured as dividends paid divided by total equity, to proxy for the COC. Again, our inferences are consistent with those from tabulated results.

6.5 The effect of management forecasts conditional on the magnitude of earnings news

Although management forecasts in our sample are voluntary, some could be characterized as more mandatory in nature if the underlying earnings news is material.

[35] In untabulated analyses, we include these different measures of market efficiency in the original regression models and find that our inferences hold.

[36] Realized returns are a noisy and biased measure of the expected COC (Elton 1999; Pastor and Stambaugh 1999), but in an international setting, this measure is preferable to an alternative based on the Fama-French three-factor model because the latter does not perform well in developed countries in Europe and Asia (Fama and French 2012), nor does it explain stock returns in emerging markets (Hou et al. 2011).

Table 9 Regression Analyses after Controlling for Market Efficiency

Panel A: Regressions for subsamples with high market efficiency						
	Column (I)		Column (II)		Column (III)	
	EquityMarket		R^2		*Short-sales*	
Variable	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Intercept	-0.496***	*-14.80*	-0.395***	*-7.75*	-0.200***	*-3.03*
Forecast	0.025***	*5.59*	0.022***	*4.41*	0.048***	*3.69*
Beta	0.002***	*3.94*	0.002***	*3.55*	0.002***	*3.93*
Size	-0.006***	*-27.18*	-0.005***	*-24.20*	-0.004***	*-19.45*
BM	0.012***	*25.12*	0.010***	*19.77*	0.011***	*20.52*
Std_Ret	0.140***	*22.07*	0.146***	*21.13*	0.118***	*16.66*
Leverage	0.015***	*7.90*	0.016***	*8.02*	0.022***	*10.57*
FcBias	0.224***	*32.06*	0.212***	*26.94*	0.199***	*25.64*
Inflation	0.583***	*19.61*	0.484***	*11.12*	0.144**	*2.24*
ROA	-0.011***	*-3.13*	-0.021***	*-5.62*	-0.011***	*-2.68*
IndustryCOC	0.521***	*14.55*	0.538***	*13.85*	0.533***	*13.32*
Accrual	0.044***	*10.80*	0.044***	*10.06*	0.041***	*9.21*
GAAP	-0.013***	*-14.29*	-0.004***	*-2.70*	-0.009***	*-4.81*
Big4	-0.002***	*-2.57*	-0.005***	*-4.72*	-0.002***	*-2.57*
InvestorProtection	0.003***	*5.92*	0.004**	*2.13*	0.054***	*11.56*
Media	0.001***	*5.95*	0.002***	*3.92*	0.139***	*12.11*
Disclosure	-0.019***	*-16.75*	-0.031***	*-11.72*	-0.043***	*-17.29*
Forecast × InvestorProtection	-0.014***	*-3.95*	-0.017***	*-3.93*	-0.018***	*-3.07*
Forecast × Media	-0.025***	*-5.28*	-0.019***	*-3.04*	-0.052***	*-3.86*
Forecast × Disclosure	0.007***	*4.71*	0.010***	*4.34*	0.014***	*4.19*
Industry fixed effects	Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
Clustered	by firm		by firm		by firm	
N	31,984		25,195		23,458	
Adj. R^2	0.401		0.413		0.412	
Panel B: Regressions for subsamples with low market efficiency						
Intercept	-0.132***	*-2.96*	-0.426***	*-10.11*	-0.263***	*-8.84*
Forecast	0.019**	*2.32*	0.013**	*2.34*	0.011**	*2.09*
Beta	0.006***	*4.22*	0.010***	*8.53*	0.007***	*7.02*
Size	-0.006***	*-11.52*	-0.006***	*-17.15*	-0.008***	*-23.43*
BM	0.014	*12.09*	0.014***	*15.80*	0.012***	*16.47*
Std_Ret	0.130***	*8.21*	0.132***	*10.95*	0.177***	*17.01*
Leverage	0.025***	*4.98*	0.019***	*4.96*	0.009***	*2.77*
FcBias	0.141***	*11.95*	0.183***	*19.01*	0.204***	*21.11*

Table 9 (continued)

Panel A: Regressions for subsamples with high market efficiency

	Column (I)		Column (II)		Column (III)	
	EquityMarket		R^2		*Short-sales*	
Variable	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Inflation	0.158***	*3.83*	0.470***	*13.46*	0.381***	*13.97*
ROA	-0.033***	*-3.77*	-0.014**	*-2.06*	-0.029***	*-5.42*
IndustryCOC	0.540***	*6.36*	0.463***	*7.50*	0.457***	*8.13*
Accrual	0.037***	*4.11*	0.032***	*4.46*	0.040***	*6.45*
GAAP	-0.012***	*-5.30*	-0.002	*-1.10*	-0.005***	*-3.99*
Big4	-0.003	*-1.31*	-0.003*	*-1.88*	-0.006***	*-4.32*
InvestorProtection	0.030***	*4.28*	0.032***	*9.56*	0.007*	*1.74*
Media	0.034***	*4.97*	0.018***	*3.80*	-0.002***	*-4.15*
Disclosure	-0.011***	*-3.44*	0.003	*1.62*	-0.007***	*-3.72*
Forecast × InvestorProtection	-0.018**	*-2.07*	-0.015***	*-3.29*	-0.008**	*-2.03*
Forecast × Media	-0.022**	*-2.36*	-0.012*	*-1.92*	-0.013*	*-1.66*
Forecast × Disclosure	0.011***	*2.73*	0.005**	*2.14*	0.007**	*2.25*
Industry fixed effects	Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
Clustered	by firm		by firm		by firm	
N	5872		11,136		11,725	
Adj. R^2	0.360		0.383		0.388	

Table 9 reports regression results after controlling for various proxies for market efficiency. In Panel A, *EquityMarket* is the size of equity market as a percentage of a country's total GDP in each year. R^2 is the value-weighted R^2 of a country's stocks obtained from Jin and Myers (2006). *Short-sales* is the percentage of firms with lending supply (that is, with shares available for lending), relative to total local market capitalization, as provided by Saffi and Sigurdsson (2011). In the regression analyses, we multiply *EquityMarket* and *Short-sales* by 100 to display the coefficient estimate. We estimate regressions for subsamples of firms with high and low market efficiency (based on each market efficiency proxy) in Panels A and B, respectively. The high market-efficiency subsamples consist of observations in countries with above-median *EquityMarket*, below-median R^2, and above-median *Short-sales*, respectively, and the low market-efficiency subsamples consist of observations in countries with below-median *EquityMarket*, above-median R^2, and below-median *Short-sales*, respectively. All variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively

Therefore, we partition our sample by the magnitude of the change in annual earnings relative to the prior year and classify a change in earnings of 50% or greater as a large change and a change in earnings of less than 50% as a small change. We repeat our main analyses using the two separate subsamples. Table 11, Panels A and B, reveal that our main inferences hold in both subsamples, suggesting that our main findings are not driven by those management forecasts associated with more significant changes in earnings.

Table 10 Using one-year-ahead realized returns to proxy for the cost of equity capital

	Column (I)		Column (II)	
Variable	*Coef.*	*t*	*Coef.*	*t*
Intercept	-0.606***	*-2.94*	-0.450**	*-2.25*
Forecast	-0.023***	*-4.37*	0.101***	*2.71*
Beta	-0.031***	*-6.69*	-0.025***	*-4.96*
Size	-0.002	*-1.35*	-0.003	*-1.62*
BM	-0.089***	*-20.64*	-0.089***	*-20.14*
Std_Ret	1.744***	*23.75*	1.712***	*22.97*
Leverage	-0.017	*-1.12*	-0.013	*-0.78*
FcBias	-2.155***	*-36.52*	-2.162***	*-34.90*
Inflation	0.862***	*4.91*	0.600***	*3.11*
ROA	-0.335***	*-9.77*	-0.328***	*-9.27*
IndustryCOC	0.462***	*24.18*	0.512***	*25.28*
Accrual	0.025	*0.63*	0.033	*-0.79*
GAAP	-0.115***	*-15.98*	-0.114***	*-14.59*
Big4	0.009	*1.27*	0.011	*1.45*
Cash flow news	0.007***	*8.01*	0.007***	*8.22*
InvestorProtection			-0.007***	*-3.01*
Media			0.006***	*5.77*
Disclosure			-0.049***	*-5.14*
Forecast × InvestorProtection			-0.076***	*-3.58*
Forecast × Media			-0.105**	*-2.42*
Forecast × Disclosure			0.045***	*3.05*
Industry fixed effects	yes		yes	
Year fixed effects	yes		yes	
Clustered	by firm		by firm	
N	34,513		34,513	
Adj. R^2	0.385		0.421	

In Table 10, the dependent variable is one-year-ahead raw stock returns. *CFNews* is cash flow news estimated using the model from Easton and Mohahan (2005) and Baginski and Rakow (2012). Specifically, $CFNews_{t+1} = (ROE_t - FROE_t) + (FROE_{t+1,\ t+1} - FROE_{t,\ t+1}) + \rho/(1- \rho*\omega)*(FROE_{t+1,\ t+2} - FROE_{t,\ t+2})$, where $FROE_{j,k}$ is forecasted *ROE* for fiscal year *k* based on consensus of analyst forecast of EPS_k made in year *j*; ω is the expected persistence of *ROE* as of year *t*, estimated using data from the past 10 years on a rolling basis, from the following model: $ROE_{t+1} = \omega_{0t} + \omega_t *ROE_t$. Following Baginski and Rakow (2012), we construct five price-to-dividend portfolios (with one portfolio containing nondividend payers) and then match them to the values of ρ from Easton and Monahan (2005). We multiply *CFNews* by 100 to display the coefficient estimate. All other variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively

6.6 Removing observations with multiple management forecasts

In addition to issuing management forecasts in anticipation of significant earnings news, firms can also issue management forecasts because they are required to correct

Table 11 Additional tests for firms with large or small changes in actual earnings, for firms with a single forecast during the year, and for relatively large firms

	Column (I) small changes in actual earnings		Column (II) large changes in actual earnings		Column (III) removing firm-year with multiple forecasts		Column (IV) removing small firms	
Variable	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Panel A: The main effect of management forecasts								
Intercept	-0.305	*-9.81*	-0.267***	*-6.54*	-0.289***	*-10.14*	-0.288***	*-8.27*
Forecast	-0.005***	-7.65	-0.005***	-5.97	-0.004***	*-6.19*	-0.004***	*-6.62*
Beta	-0.002***	*-2.71*	0.000	*0.15*	0.000	*0.85*	0.000	*0.88*
Size	-0.004***	*-19.28*	-0.007***	*-24.03*	-0.006***	*-27.52*	-0.001***	*-3.80*
BM	0.013***	*21.71*	0.012***	*19.52*	0.013***	*26.35*	0.013***	*-20.46*
Std_Ret	0.142***	*18.23*	0.135***	*15.86*	0.147***	*22.47*	0.168***	*19.55*
Leverage	0.016***	*7.20*	0.018***	*6.82*	0.018***	*8.51*	0.014***	*6.12*
FcBias	0.218***	*22.37*	0.201***	*25.23*	0.211***	*32.39*	0.181***	*15.72*
Inflation	0.414***	*16.18*	0.337***	*9.90*	0.386***	*16.34*	0.366***	*13.03*
ROA	-0.004	*-0.72*	-0.011***	*-2.81*	-0.011***	*-2.97*	0.000	*0.02*
IndustryCOC	0.464***	*11.28*	0.646***	*12.25*	0.564***	*15.34*	0.520***	*12.77*
Accrual	0.056***	*9.40*	0.039***	*8.07*	0.050***	*12.17*	0.043***	*8.19*
GAAP	-0.012***	*-11.67*	-0.014***	*-12.00*	-0.012***	*-14.52*	-0.009***	*-8.23*
Big4	0.001	*0.53*	-0.002	*-1.31*	-0.000	*-0.12*	-0.002	*-1.26*
Industry fixed effects	yes		yes		yes		yes	
Year fixed effects	yes		yes		yes		yes	
Clustered	by firm		by firm		by firm		by firm	
N	20,220		17,636		32,028		18,978	
Adj. R^2	0.397		0.354		0.375		0.358	

Table 11 (continued)

Variable	Column (I) small changes in actual earnings		Column (II) large changes in actual earnings		Column (III) removing firm-year with multiple forecasts		Column (IV) removing small firms	
	Coef.	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Panel B: The interaction between management forecasts and country-level institutional factors								
Intercept	-0.330***	*-10.23*	-0.283***	*-6.60*	-0.289***	-8.87	-0.271***	*-8.06*
Forecast	0.012***	*2.81*	0.027***	*4.55*	0.010 ***	2.68	0.006**	*2.40*
Beta	0.000	*0.47*	0.002***	*3.93*	0.001**	2.14	0.005***	*8.00*
Size	-0.005***	*-20.27*	-0.007***	*-24.33*	-0.006***	-28.30	-0.001***	*-3.01*
BM	0.013***	*21.49*	0.012***	*19.18*	0.013***	25.75	0.013***	*19.81*
Std_Ret	0.139***	*17.76*	0.136***	*16.00*	0.151***	22.87	0.164***	*19.02*
Leverage	0.015***	*6.78*	0.018***	*7.06*	0.016***	7.97	0.014***	*6.31*
FcBias	0.215***	*22.20*	0.198***	*24.90*	0.210***	32.14	0.178***	*15.63*
Inflation	0.433***	*16.05*	0.333***	*9.41*	0.390***	14.90	0.334***	*12.79*
ROA	-0.006	*-0.94*	-0.014***	*-3.81*	-0.011***	-3.19	-0.003	*-0.76*
IndustryCOC	0.447***	*11.00*	0.614***	*11.83*	0.559***	15.31	0.477***	*12.02*
Accrual	0.051***	*8.58*	0.036***	*7.69*	0.050***	12.10	0.037***	*6.92*
GAAP	-0.011***	*-10.62*	-0.013***	*-10.45*	-0.012 ***	-13.16	-0.005***	*-4.00*
Big4	-0.000	*-0.20*	-0.003***	*-2.61*	-0.000	-0.51	-0.002	*-1.57*
InvestorProtection	0.012***	*4.51*	0.003***	*2.88*	-0.005***	-2.72	0.001***	*2.78*
Media	0.001***	*4.45*	0.001***	*5.79*	-0.001	-0.38	0.001***	*4.42*
Disclosure	-0.015***	*-11.64*	-0.022***	*-13.96*	-0.006***	-5.56	0.004**	*1.97*
Forecast × InvestorProtection	-0.011***	*-3.25*	-0.008***	*-2.61*	-0.008***	-3.33	-0.010***	*-2.96*
Forecast × Media	-0.015***	*-2.99*	-0.026***	*-4.77*	-0.012**	-2.42	-0.005***	*-2.74*
Forecast × Disclosure	0.007***	*4.19*	0.006***	*2.59*	0.007***	4.28	0.006***	*3.74*
Industry fixed effects	yes		yes		yes		yes	

Table 11 (continued)

Variable	Column (I) small changes in actual earnings		Column (II) large changes in actual earnings		Column (III) removing firm-year with multiple forecasts		Column (IV) removing small firms	
	Coef.	*t*	*Coef.*	*t*	*Coef.*	*t*	*Coef.*	*t*
Year fixed effects	yes		yes		yes		yes	
Clustered	by firm		by firm		by firm		by firm	
N	20,220		17,636		32,028		18,978	
Adj. R^2	0.408		0.370		0.377		0.386	

Table 11, Columns (I) and (II), report the results for subsamples based on the magnitude of changes in annual earnings. "Large changes in actual earnings" are earning changes of more than 50% relative to the prior year. "Small changes in actual earnings" are earnings changes of less than 50% relative to the prior year. Column (III) reports the results after removing firm-years with multiple forecasts. Column (IV) reports the results after removing firms with market capitalization below the country's median. All variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively

previously issued forecasts. Thus we remove firm-year observations with multiple management forecasts from our sample. The results are reported in Table 11, Column (III). In both panels, inferences are the same as for the full sample.

6.7 Removing small firms from the sample

If media penetration affects the quality of our management forecast data, our findings related to the effect of the media could have alternative explanations. Although we cannot completely rule out this possibility, we perform an additional analysis to address this concern. Specifically, we suggest that, if the quality of the data is positively correlated with a country's media penetration, the confounding effect may be more severe for small firms because they would rely more on the media to disseminate their management forecasts. In contrast, large firms have more channels through which to distribute information (e.g., conference calls, corporate websites, interviews, etc.), and thus the information in their management forecasts is more likely to be available even if media penetration is weak. Thus we remove firms with market capitalization below the country median and we re-estimate our main test. Table 11, Column (IV), reveals that our main inferences hold for the subsample of large firms.

6.8 Controlling for the sign of the news in management forecasts

Kothari et al. (2009) find that the relation between management forecasts and the COC depends on the sign of the news: only management forecasts with positive news are associated with a lower COC. We identify the sign of the news based on the cumulative abnormal returns (CAR) in days [−1, 0] relative to the issuance of management forecasts. We first form a sample that includes nonforecasters and firms issuing good-news management forecasts and another sample that includes nonforecasters and firms issuing bad-news management forecasts. We then re-estimate our main test for these two samples separately. In untabulated analyses, we find that management forecasts are negatively associated with the COC for both samples but, consistent with the findings of Kothari et al. (2009), that the coefficient estimate on *Forecast* is more negative for the good news sample than for the bad news sample. However, the interaction effects are significant in both samples, and the coefficient estimates are very similar across the two samples, suggesting that the sign of the news does not have a significant impact.

6.9 Using alternative measures of mandatory disclosure requirements

Our measure of mandatory disclosure requirements (from Frost et al. (2006)) could contain noise because many countries have adopted IFRS since 2005. We control for the adoption of IFRS in our main model, but to provide further evidence, we use three alternative proxies for mandatory disclosure requirements. The first is an indicator variable for the adoption of IFRS or U.S. GAAP because both sets of accounting principles have stricter mandatory financial reporting requirements. Second, we follow Leuz et al. (2003) and Daske et al. (2013) and construct a comprehensive measure of country-level earnings quality. Third, we construct an aggregate country-level measure of

annual report quality using data from Lang and Stice-Lawrence (2015).[37] Although the last two measures reflect the output of mandatory disclosure requirements, they provide an updated (albeit noisier) proxy for mandatory reporting requirements. Untabulated analyses confirm that our findings related to the country-level factors are robust to using all three proxies for mandatory reporting requirements.[38]

7 Conclusion

We examine whether voluntary disclosure, proxied for by management forecasts, is associated with the COC in an international setting and to what extent the relation varies with country-level institutional factors and management forecast characteristics. We find a negative and significant association between management forecasts and firms' COC across countries. In addition, while higher mandatory disclosure requirements weaken the negative relation between management forecasts and the COC, stronger investor protection and better information dissemination strengthen the relation. We also find that management forecast characteristics impact the effect of management forecasts on the COC, in that the effectiveness of management forecasts increases with forecast quality and management's commitment to making regular voluntary disclosures.

Taken together, our findings illuminate the roles that institutional factors and management forecast characteristics play on the relation between voluntary disclosure and the COC. Our study also responds to calls for research on the effects of management forecasts in international contexts (Bushman et al. 2004; Hirst et al. 2008; Francis et al. 2008) and on the interaction between voluntary and mandatory disclosures (Beyer et al. 2010). As such, the evidence provided here should matter to researchers, regulators, and managers when evaluating the possible effects of voluntary disclosures, and management forecasts in particular, in international capital markets.

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[37] Lang and Stice-Lawrence (2015) construct country-level measures related to four characteristics of firms' annual reports: the length of the reports, the degree of boilerplate language, the comparability of reports with those of peer firms, and a FOG-based measure of readability. We exclude the last measure because, as Lang and Stice-Lawrence (2015, 114) point out, it may reflect the complexity of the underlying economics in addition to the complexity of the annual report. Consequently, high readability based on the FOG-based measure does not necessarily indicate poor financial reporting quality.

[38] A related concern is that the adoption of IRFS has led to substantial homogeneity of mandatory reporting practices across E.U. countries. To address this concern, we partition all countries in Lang and Stice-Lawrence (2015) into two groups—the E.U. country group and the non-E.U. country group. F-tests reveal that the variances of two of the three characteristics we use to proxy for mandatory disclosure requirements (specifically, length of the annual report and the amount of boilerplate language) are not significantly different across the two groups. Overall, these statistics suggest that there is a reasonable degree of heterogeneity in the financial reporting practices of E.U. countries even after the adoption of IFRS.

Appendix

Table 12 Variable definitions

	Definition
Dependent Variable	
COC	The cost of equity capital (COC), measured as the mean value of four different measures of the implied COC: COC_{MPEG}, COC_{OJN}, COC_{GLS}, and COC_{CT}.
COC_{MPEG}	The modified PEG measure of the COC as in Easton (2004). See Appendix B for a more detailed description of the calculation.
COC_{OJN}	The COC following Gode and Mohanram (2003) and Easton and Monahan (2005), which is based on the model in Ohlson and Juettner-Nauroth (2005). See Appendix B for a more detailed description of the calculation.
COC_{GLS}	The COC from Gebhardt et al. (2001). See Appendix B for a more detailed description of the calculation.
COC_{CT}	The COC from Claus and Thomas (2001). See Appendix B for a more detailed description of the calculation.
Forecast	An indicator variable set to 1 if the firm issues a management earnings forecast in the year and 0 otherwise.
MF_Freq	The total number of management forecasts issued by the firm in the year.
MF_Prec	A score measuring management forecast precision, set to 1, 2, 3, or 4 if the forecast is a qualitative, minimum or maximum, range, or point forecast, respectively. For firm-year observations, *MF_Prec* is measured as the mean precision score for all forecasts in the year.
MF_Disagg	The total number of unique line items forecasted. Specifically, we follow Barton et al. (2010) and consider 10 different performance measures, including (1) sales, (2) EBITDA, (3) operating income, (4) income before taxes, (5) income before extraordinary items and discontinued operations, (6) net income, (7) capital expenditure, (8) operating cash flow, (9) expenses, and (10) other balance sheet items.
MF_Quality	Management forecast quality, measured as *log*(*1+ ave_frequency*ave_precision*), where *ave_frequency* is the average number of forecasts made per year by a firm over the sample period, and *ave_precision* is the average value of forecast precision for all forecasts made over the sample period by a firm. *MF_Quality* is measured at the firm level (i.e., each firm has only one value of *MF_Quality*) and is set to zero for nonforecasting firms.
MF_Comm	The cumulative number of years to date in which the firm has provided a management forecast divided by the cumulative number of years to date in which the firm has appeared in the sample.
Country-level institutional factors	
Disclosure	A measure, from Frost et al. (2006), of the overall disclosure level mandated by the country's stock exchanges, based on both publicly available information and survey-based information provided by the stock exchanges. If a country has more than one stock exchange, we use the mean.
InvestorProtection	An investor protection measure, computed as the arithmetic mean of the public enforcement index from La Porta et al. (2006) and the anti-director rights index from La Porta et al. (1998). The public enforcement index is the arithmetic mean of (1) the supervisor characteristics index, (2) the rule-making power index, (3) the investigative powers index, (4) the orders index, and (5) the criminal index. The anti-director rights index is formed by adding one when (1) the country allows shareholders to submit their proxy votes by mail, (2)

Table 12 (continued)

	Definition
	shareholders are not required to deposit their shares before the general shareholders meeting, (3) cumulative voting or proportional representation of minorities on the board of directors is allowed, (4) an oppressed minorities mechanism is in place, (5) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders' meeting is less than or equal to 10%, or (6) when shareholders have preemptive rights that can only be waived by a shareholder meeting. We divide the sum by six so that it ranges between 0 and 1.
Media	A measure from World Bank (World Development Indicator) of media penetration, computed as the average ranking of (1) total average circulation of newspapers per 1000 inhabitants, (2) the number of daily newspaper titles per 1 million inhabitants, and (3) the number of internet users per 100 inhabitants. The first two rankings are based on data from 2004 (which is the latest year these data are available), and the third ranking is averaged from 2004 through 2009.
Control variables	
Accrual	The absolute value of discretionary accruals from the modified Jones model (Dechow et al. 1995).
Age	Firm age, measured as the number of years since the firm was founded.
Beta	Market beta of the firm, provided by Capital IQ.
Big4	An indicator variable set to 1 if the firm engages a Big 4 auditor in the year and 0 otherwise.
BM	The logarithm of the book-to-market ratio. We exclude observations with a negative book-to-market ratio.
CountryROEstd	The country median of the firm-level standard deviation of return on equity over the past five years.
FcBias	Analyst forecast bias, measured as forecasted EPS minus realized EPS scaled by stock price at the start of the year.
GAAP	An indicator variable set to 1 if the firm uses IFRS or U.S. GAAP in the year and 0 otherwise.
GDPGrowth	The country's GDP growth rate in the year.
HighTech	An indicator variable set to 1 if the firm is in a high-tech industry and 0 otherwise, where high-tech industries are defined as those with SIC codes 2833–2836, 3570–3577, 3600–3674, 7371–7379, and 8731–8734.
IndustryCOC	The median COC in the Fama-French 48-industry classification, measured using the COC measure that corresponds to the dependent variable.
Inflation	The relative consumer price index, from the World Bank, in the country-year, equal to the inflation rate plus one.
InstOwn	The percentage of firm equity held by institutional investors in the year.
Leverage	Total debt divided by total assets
MBE	An indicator variable set to 1 if the firm met or beat the analyst consensus forecast in all of the past three years and 0 otherwise.
NumAnalysts	The logarithm of the number of analysts following the firm in the year.
ROA	Return on assets, calculated as net income before extraordinary items divided by total assets at the start of the year.
Std_Ret	Stock return volatility, measured as the standard deviation of monthly stock returns in the year.

Measurement of the Implied Cost of Equity Capital

We follow Hail and Leuz (2006) and Cao et al. (2014) and estimate the implied COC using four models. The variables used in the models are defined below.

p_t = current stock price, measured as the closing price on the trading day before the measurement of e_t.

bv_t = current book value of equity per share, measured at the beginning of the fiscal year when $t = 0$ and estimated from the models when $t > 0$.

e_t = expected future EPS for year t, measured as the consensus analyst forecast in the sixth month of the fiscal year t.

d_t = expected future dividends per share for year t, measured as year t-1's actual dividends.

g = economic growth, set to $r_f - 3\%$, where r_f is the interest rate on a 10-year Treasury bill measured in June of the given year.

glt = consensus analyst forecast for the long-term growth rate from I/B/E/S.

k = the average dividend payout ratio over the past three years.

We extract bv_t and k from S&P Capital IQ. p_0 and bv_0 are adjusted for stock splits. We obtain p_t and analyst earnings forecasts (e_{t+1}, e_{t+2}, e_{t+3}, e_{t+4}, and e_{t+5}, g_{lt}) from I/B/E/S. They are adjusted for stock splits. We require nonmissing values for e_{t+1} and e_{t+2}, and that $e_{t+2} > e_{t+1}$. All data items are converted to U.S. dollars.

(1) The measure from Claus and Thomas (2001) (r_{CT})

$$p_t = bv_t + \sum_{\tau=1}^{5} \frac{e_{t+\tau} - r_{CT} \times bv_t}{(1 + r_{CT})^{t+\tau}} + \frac{(e_{t+5} - r_{CT} \times bv_{t+4}) \times (1 + g)}{(r_{CT} - g)(1 + r_{CT})^5} \tag{3}$$

$bv_t = bv_{t-1} + e_t - e_t \times k$.

If e_{t+3}, e_{t+4}, and e_{t+5} are missing, they are replaced using the formula $e_{t+1} = e_t \times (1 + g_{lt})$.

(2) The measure from Gebhardt et al. (2001) (r_{GLS})

$$p_t = bv_t + \sum_{\tau=1}^{3} \frac{e_{t+\tau} - r_{GLS} \times bv_{t+\tau-1}}{(1 + r_{GLS})^{\tau}} + \sum_{\tau=4}^{11} \frac{\overline{ROE_{t+\tau}} - r_{GLS} \times bv_{t+\tau-1}}{(1 + r_{GLS})^{\tau}} + \frac{\overline{ROE_{t+12}} - r_{GLS} \times bv_{t+11}}{r_{GLS} \times (1 + r_{GLS})^{11}} \tag{4}$$

$\overline{ROE_t} = \frac{1}{I} \sum_{i=1}^{I} \overline{ROE_{t,i}}$, where I is the total number of firms in firm i's industry.

$ROE_{t,i} = e_{t,i} / bv_{t,i}$

$$\mathrm{bv_t} = \mathrm{bv_{t-1}} + \mathrm{e_t} - \mathrm{e_t} \times \mathrm{k}$$

(3) The measure from Gode and Mohanram (2003) and Easton and Monahan (2005), based on the model from Ohlson and Juettner-Nauroth (2005) (r_{OJN})

$$p_t = \frac{e_{t+1}}{r_{OJN}} + \frac{eps_{t+2} - eps_{t+1} - r_{OJN} \times (eps_{t+1} - dps_{t+1})}{r_{OJN} \times (r_{OJN} - g)} \tag{5}$$

(4) The modified PEG ratio model by Easton (2004) (r_{PEG})

$$p_t = (e_{t+2} + r_{PEG} \times d_{t+1} - e_{t+1})/r_{PEG}^2 \quad (6)$$

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