Annual Report Readability and the Cost
of Equity Capital

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Abstract

      This paper examines the effect of annual report readability on the cost of equity capital in a sample of unique 288 French firms between 2002 and 2006. After controlling for several risk factors, the results show that firms with less readable annual reports exhibit a higher cost of equity capital. This finding is consistent with the notion that more complex corporate disclosures deter investors' ability to process and interpret annual reports, who require in turn a higher cost of capital. This study supplements the huge body of research that investigates the relation between disclosure quality and the cost of equity capital with novel results and enhances our understanding of the role of corporate narrative disclosures in capital markets. Our results are shown to be robust to the use of various econometric methods and to the inclusion of alternative proxies for annual report readability.

1. Introduction

The U.S. Securities and Exchange Commission has set in motion, since its establishment, a continuous effort to streamline and simplify firms' reporting to promote better information disclosure for the benefit of general investors. The rationale is that regulators and standard setters view disclosure quality as a key determinant of capital allocation efficiency in the stock market. For instance, Mary Schapiro the former chairman of the SEC, argues that the primary focus of the agency is to "ensure that investors have the information that they need in a form that is helpful to them to make decisions about the allocation of their capital" (Schapiro (2011)). An equally important rationale is that regulators strongly believe that increased disclosure quality can lower firms' cost of capital (Levitt (1997)). Considering the latter issue, a voluminous body of literature investigates the relation between disclosure quality and the cost of equity capital in different settings.

Theoretically, there is a strong support for the cost of equity effect of reporting quality (e.g. Diamond and Verrecchia (1991); Easley and O'Hara (2004); Lambert et al. (2007)). However, empirical results are mixed and inconclusive. One of the main reasons why previous studies fail to draw clear-cut conclusions is that proxies of disclosure quality are plagued with many problems (Beyer et al. (2010)). Recently, evidence against the empirical validity of accounting quality proxies is mounting. For example, Wysocki (2009) demonstrates that the measures obtained from the Dechow and Dichev (2002) discretionary accruals model do not accurately capture firm's accounting quality since their ability to distinguish between discretionary and non-discretionary accruals is limited. In this paper, we attempt to overcome these limitaitons by using alternative empirical constructs derived from the computational linguistics litertature and based on syntactic and semantic features of annual reports. In doing so we respond to the call by Core (2001) for using natural language processing technology to capture the quality of disclosure. The drive for using these techniques continues to gain momentum. For instance, Beyer et al. (2010) and Berger (2011) argue that readability measures seem to offer a promisig way to gauge the firms' financial reporting quality.

In the present study we examine the empirical link between annual report readability and the cost of equity capital in a sample of French firms spanning the 2002-2006 period after controlling for several firm-specific factors that have already been identified by prior studies as systematically affecting equities' cost of capital. Consistent with our predictions, we find

that firms enjoy a cheaper access to equity financing when their annual reports are easier to read. These findings are significant for several reasons. First, they corroborate earlier research establishing a link between information quality and the cost of capital, but using novel measures of the disclosure quality based on lexical properties of annual reports. Second, they contribute to our understanding of the role of narrative disclosure in capital markets and extend the longstanding debate on the relation between disclosure and the cost of capital beyond the narrow focus of financial numbers. Finally, our study is one of the few, if not the first, to investigate the cost of capital effects of corporate narrative disclosure. A concurrent paper by Kothari et al. (2009) also examines the relation between corporate narrative disclosure and the cost of capital. However, our papers differ is two important respects. First, we investigate the the readability and other textual properties that capture the characteristics of annual reports, whereas their study focuses on the content of disclosure. Second, we rely on sevral ex-ante cost of equity capital models, based on residual income valuation methods and abnormal earnings growth valuation methods, to infer firms' equity financing costs. In contrast, they gauge the cost of equity using the Fama and French (1993) three-factor model. Elton (1999) and Fama and French (2002) show that this model generates biased and noisy estimates of expected returns.

The paper proceeds as follows. In the next section, we develop our hypotheses. In section 3, we describe our data and construct the varibles used in this study. In Section 4, we report summary statistics and correlations among variables. In the penultimate section, we present our empirical findings. In the last section, we summarize and conclude our study.

2. Hypothesis development

The link between firms' disclosure policy and their cost of equity capital has been extensively discussed in the literature. Theoretically, Easley and O'Hara (2004) demonstrate that firms' accounting treatment of earnings and disclosure policy can influence their financing costs. They show that poor disclosure quality increases information asymmetry which induces a systematic risk factor reflected in stock returns. Actually, Easley and O'Hara (2004) put forth a rational expectations equilibrium model in which a firm's information structure is a mixture of public and private information. Greater private, and correspondingly less public, information levels create a non diversifiable risk for uninformed investors since informed investors are better able to shift their portfolio weights to incorporate new information. Accordingly, uninformed investors require a higher premium to compensate for

bearing this risk.[1] One implication therefore is that firms may reduce their cost of equity capital through greater and more precise financial disclosure. Aboody et al. (2005) and Francis et al. (2005a) expand on the aforementioned theory and test whether earnings quality is priced by including an accruals quality mimicking factor in asset-pricing regressions. Both papers report a positive loading on the accruals quality factor suggesting that information quality is priced, which is tantamount to an increase of the cost of equity for firms with poor earnings quality.[2]

Another set of theoretical arguments considers the effect of estimation risk arising from investors' uncertainty about the true parameters of stock's return or payoff distribution (e.g. Klein and Bawa (1976); Bawa et al. (1979); Barry and Brown (1985) and Coles et al. (1995) among others). Under the estimation risk framework, the common knowledge assumption about the mean-variance matrix of asset returns is relaxed and investors have to infer the parameters of the asset's return or payoff generating process conditional on their information set about the firm. In equilibrium, investors charge a higher premium for low information firms to offset the increased estimation risk, which is a non-diversifiable risk factor. Lambert et al. (2007) extend these findings by constructing a cash flow-based asset pricing model consistent with the CAPM in which they demonstrate that disclosure quality affects investors' assessment of the covariance between firm and market cash flows. Their model predicts that higher information quality reduces forward-looking betas, leading to a lower cost of equity capital.

A sizable body of research lends support to the theoretical predictions relating information quality to firms' cost of equity capital. Using self-constructed disclosure scores, Botosan (1997) finds a negative relation between voluntary disclosure levels and the cost of equity capital for firms with low analyst following. Similarly, Botosan and Plumlee (2002) document a lower cost of equity financing for firms with higher AIMR analyst ranking of annual report disclosures. Francis et al. (2004) examine the association between several earnings attributes and firm's capital market environment. They uncover evidence that higher earnings quality translates into a lower equity cost of capital. In an international context, several papers find that earnings transparency (Bhattacharya et al. (2003)), voluntary disclosure level (Francis et al. (2005b)), accounting conservatism (Li (2009)), U.S cross

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[1] Empirically, Easley et al. (2002) document that information asymmetry, as proxied by the probability of informed trading, is priced in the cross-section.

[2] Chen et al. (2007) reach similar conclusions in a dividend change setting.

listing (Hail and Leuz (2009)) and mandatory IFRS adoption (Li (2010)), among other, contribute to the reduction of firms' cost of equity capital.

Noteworthily, extant literature focuses overwhelmingly on capital market implications of quantitative information disclosure. Yet, qualitative information in the form of text represents an integral part of overall firm's disclosure policy (Beyer et al. (2010)). By analogy to previous studies, we argue that linguistic features of annual reports may have an effect on firms' cost of equity capital. This effect comes about through at least two channels.[3] First, with respect to information asymmetry, we argue that firms disclosing more complex (i.e. difficult to read) annual reports are more likely to suffer from severe adverse selection problems. The premise underlying this argument is that managers of these firms tend to strategically structure the annual reports (e.g. use of sesquipedalian words and/or unnecessary long sentences) to obfuscate their poor performance or to conceal bad news from investors (Li (2008)). In a large sample study, Li (2008) finds that 10-K SEC filings of poor performing firms are longer and harder to read. Moreover, he reports a negative association between earnings quality, as measured by earnings persistence, and annual reports' readability level. Recently, Lee (2010) examines the effect of quarterly reports' readability on information asymmetry surrounding 10-Q filing dates. She finds that less readable 10-Qs are associated with greater information asymmetry. Second, to the extent that qualitative information contained in annual reports is forward-looking and of a predictive nature, less readable communications alter investors' perception about future performance and hinder their ability to draw accurate forecasts of the underlying parameters of the stock's return distribution. As a result, firms with fuzzier annual reports are required a higher estimation risk premium, which increases their cost of equity capital.

Based on the discussion above, we present the following testable hypothesis (stated in the alternative form):

H_1: Firms with less readable annual reports have higher cost of equity capital, ceteris paribus.

3. Data and variables construction

In this section we describe data sources and construct the variables used in the subsequent analysis.

3.1. Data sources

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[3] In this paper, we pinpoint reasons why annual report readability affects the cost of equity capital. Nonetheless, we do not attempt to disentangle these different explanations.

We begin with all French non-financial listed firms appearing in Worldscope database from 2002 to 2006. Firms that do not have a valid construct of their cost of equity capital are dropped. To compute readability proxies, we first download annual reports from the *Autorité des Marchés Financiers* and from firms' websites.[4] We then manually remove tables, graphs, paragraphs less than one line and paragraphs with more than 50% of non alphabetic characters. We finally analyze the remaining text using a self-constructed Hypertext Processor (PHP) program that provides several text statistics including number of sentences, words count, syllables per word and number of complex words, i.e. words with three or more syllables, among others.[5] Financial data is obtained from Datastream and Thomson One Banker databases. Our final sample contains 288 unique firms totaling 1013 firm-year observations.

3.2. Variables

3.2.1. Cost of equity capital

We follow recent accounting and finance literature and compute the cost equity capital by estimating the *ex ante* expected return implied in current stock prices and analyst forecasts of firm's future cash flows based on four different models (Hail and Leuz (2006); Dhaliwal et al. (2006); Attig et al. (2008); Guedhami and Mishra (2009); Boubakri et al. (2012)). These models are either based on the residual income valuation model (Claus and Thomas (2001) and Gebhardt et al. (2001)) or on the abnormal earnings growth valuation model (Easton (2004) and Ohlson and Juettner-Nauroth (2005)). We follow Hail and Leuz (2006) and Dhaliwal et al. (2006), among other, and define our estimate of the cost of equity capital as the average from the above four models. We do so since the literature provides little guidance on the relative performance of a model over another and to avoid measurement errors associated with a particular model. The Appendix presents details on the implementation of these models.

3.2.2. Annual report readability

Following Li (2008), we assess the readability of annual reports using the Gunning-Fog index derived from the computational linguistics literature. This metric is widely used in recent accounting and finance research (e.g. Biddle et al. (2009); Miller (2010); Lawrence (2011); Lehavy et al. (2011); Ramanna and Watts (2011)). Practitioners, as well, advocate the use of the Fog index to evaluate the level of compliance with the SEC's plain English rules

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[4] The *Autorité des Marchés Financiers* is the French equivalent of U.S. Securities and Exchange Commission.
[5] To check the validity of the readability constructs, we manually calculate *FOG* for several randomly selected annual reports. Results based on the computer program are quite similar to those calculated manaually.

(Cox (2007)).[6] The Gunning-Fog index is defined as a linear combination of the average sentence length and the percent of complex words and is calculated as follows:

$$FOG_{i,t} = (average\_word\_per\_sentence + percent\_of\_complex\_words) \times 0.4 \quad (1)$$

where, $FOG_{i,t}$ indicates the average number of years of formal education a person would need to read the disclosure once and grasp its meaning. For instance, annual reports with a resulting index higher than 18 are considered as unreadable.

4. Summary statistics and correlation matrix

Table 1 provides summary statistics for the sample of 1013 firm-year observations between 2002 and 2006. The average cost of equity capital for the sample firms is 10.89%, with an interquartile range from 8.91% to 12.43%. *FOG* has a mean (median) value of 21.80 (21.57). These statistics are quite similar to those reported in Li (2008) who finds a mean (median) *FOG* of 19.39 (19.24), and suggest that firms' annual reports are, on average, difficult to read. Moreover, *FOG* displays a substantial cross sectional variation as evidenced in the standard deviation and the interquartile range of 2.24 and 2.60, respectively.

Table 1 displays also statistics on the control variables. The mean (median) firm leverage is 24.46 (23.72). The mean (median) market-to-book ratio is 2.54 (2.15). The mean (median) long-term earnings growth is 10.32 (10.09). The mean (median) size of our sampled firms is 13.54 (13.23).

[Insert Table 1 here]

Table 2 presents Pearson and Spearman correlations among variables. Consistent with our theoretical prediction, *FOG* displays a positive and significant (at the 1% level) correlation with *COE*. Generally, all other variables display correlations with *COE* that are in line with those reported in prior literature.[7] The Pearson and Spearman correlations are qualitatively similar. Taken together, they lend preliminary support to the hypothesized relation between annual report readability and the cost of equity capital.

[Insert Table 2 here]

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[6] In his words, former SEC chairman Christopher Cox states that: "Just as the Black-Scholes model is a commonplace when it comes to compliance with the stock option compensation rules, we may soon be looking to the Gunning-Fog and Flesch-Kincaid models to judge the level of compliance with the plain English rules."

[7] Potential multicollinearities between variables is a serious concern, and ignoring it may lead to incorrect inferences. We adress this problem by computing variance inflation factors for all independent varaibles. All VIFs (unreported) are below the value of 10, indicating that multicollinerity is less likely to be an issue.

5. Regression results

In this section we investigate the relation between annual report readability and the implied cost of equity capital by estimating the following panel regression:

$$COE_{i,t} = \alpha + \beta_1 READABILITY_{i,t} + \beta_2 LEVERAGE_{i,t} + \beta_3 MTB_{i,t} + \beta_4 YR5GTH_{i,t} \qquad (3)$$
$$+ \beta_5 SIZE + IndustryDummies + \varepsilon_{i,t}$$

where, *COE* is our measure of the cost of equity capital defined as the arithmetic average of implied cost of equity estimates obtained from the models of Claus and Thomas (2001), Gebhardt et al. (2001), Easton (2004) and Ohlson and Juettner-Nauroth (2005). *READABILITY* denotes proxies for annual reports' readability level. We include a set of control variables shown to affect the cost of equity capital. These variables are firm leverage (*LEVERAGE*), the market-to-book ratio (*MTB*), long term earnings growth rate (*YR5GTH*) and firm size (*SIZE*). We also include industry dummies based on Campbell (1996) industrial classification.

5.1. Leverage

Gode and Mohanram (2003) and Botosan and Plumlee (2005) argue that levered firms are moe exposed to financial distress and face hence higher risk. Both papers provide evidence that leverage is positively associated with the cost of equity capital. We measure firm leverage as the ratio of total debt to total assets.

5.2. Market-to-Book ratio

Following Hail and Leuz (2006), we include market-to-book ratio to control for differences in firms' growth opportunities. Guedhami and Mishra (2009) contend that firms with high growth prospects are expected to have higher prices and to generate higher long-term growth in cash flows, which translates in a lower cost of capital. We proxy for growth opportunities as the ratio of market value to book value of equity.

5.3. Long-term growth in expected earnings

Gebhardt et al. (2001) argue that higher long-term growth firms face greater donward pressure on their cost of capital. This argument is based on the findings of La Porta (1996) who shows that analyst forecasts are, on average, more optimisitc for higher long-term growth firms, which leads to higher stock prices. Contrariwise, Gode and Mohanram (2003) contend that high-growth firms are perceived as risky since any errors in the estimation of growth can have a significant impact on prices. We proxy for long-term growth using the I/B/E/S five-year earnings growth rate.

5.4. Firm size

Diamond and Verrecchia (1991) demonstrate that greater information disclosure can lead to higher prices, which lowers in turn risk premium. More importantly, they show that the upward price movement resulting from greater information availibility is more pronounced for larger firms. Consistently, Gebhardt et al. (2001) and Gode and Mohanram (2003) document a negative association between firm size and the implied cost of equity capital. We proxy for firm size by natural logarithm of total assets.

Table 3 portrays the results from regression analysis of the relation between annual report readability and the cost of equity capital after controlling for other potential determinants of the cost of equity capital. We estimate Eq. (3) using the Fama and Macbeth (1973) two-step regressions, including industry dummies based on Campbell (1996) industrial classification. We adjust the standard errors for heteroskedasticity and autocorrelation using the Newey and West (1987) correction. As suggested by Cochrane (2001), the serial correlation in the estimated coefficients is captured using a first-order autoregressive process.

The first column of Table 3 presents the results of the baseline regression where we regress the implied cost of capital against the fog index and firm size. Consistet with our prediction, *FOG* exihibits a positive loading on *COE*. However, these results might be biased since we do not include several risk factors deemed to affect the implied cost of equity capital. Column 2 of Table 3 extends the basic model by including firm leverage, market-to-book ratio, long-term earnings growth rate and firm size as control variables. The coefficient for *FOG* is positive and significant at the 1% threshold suggesting that firms with less readable annual reports are penalized with a higher cost of equity. Consienct with Gode and Mohanram (2003) and Dhaliwal et al. (2006), *LEVERAGE* has a positive and significant (at less than 1%) relation with *COE*, suggesting that investors perceive high-levereged firms as risky and require consquently a higher return. The coefficient for *MTB* is negative and significant at less than one 1% level, consistent with the evidence in Fama and French (1992) that higher market-to-book firms earn higher ex-post return. Finally, we document that higher information availiblity, as proxied by firm size, decreases the cost of equity capital. This result is consitent with the previous findings of Fama and French (1992) and Gebhardt et al. (2001). The coefficient for *YR5GTH* is negative but non-signficant at any conventional level.

In the third column of Table 3 we use an alternative proxy for annual report readability. Specifically, Eq. (3) includes *FOG_HIGH* defined as a dummy variable that equals one if *FOG* is higher than the median Fog index and zero otherwise. Consisent with our previous

findings, *FOG_HIGH* loads positively on *COE* and is statistically significant at less than the 1% level. This suggests that our results are qualitatively robust to the use of alternative proxies of annual reports' readability level. Moreover, all control variables across the two models display signs that are in the expected directions.

The last column of Table 3 reports the estimates of econmic impacts of the right-hand variables using coefficient estimates from Eq. (2). Each entry denotes the impact on *COE* resulting from an increase of the right-side variables from the 25th to the 75th percentile of the sample distribution. On average, an interquartile change in *FOG* from the lower quartile to the upper quartile yields roughly 29 basis points increase in the cost of equity capital. *SIZE* accounts for the largest economic impact on *COE*.

[Insert Table 3 here]

Although the aurocorrelation-adjusted Fama and MacBeth (1973) methodology corrects for the presence of firm and time effects, Petersen (2009) argues that this method might produce, in some cases, standard errors that are downwardly biased. Based on the recommendations of several recent studies (Petersen (2009); Thompson (2011); Cameron et al. (2011)), our test statistics are based on standard errors adjusted by a two-dimensional cluster at the firm and year levels that corrects for heteroskedasticity, time-series and cross-sectional correlation. Taken together, the results reported in Table 4 corroborate those derived from the autocorrelation-adjusted Fama and Mabeth (1973) methodology.

All in all, the evidence presentd in Tables 3 and 4 supports our hypothesis that firms with less readable annual reports face higher costs of equity financing. It also supplements the recent findings of Kothari et al. (2009) who document that the tone of firms' narrative communications explains, to some extent, differences in the cost of equity capital.

[Insert Table 4 here]

6. Robustness Checks

In this section we perform several sensitivity tests to check the robustness of our results. First, we examine whether our conclusions are unduly influenced by potential reverse causality in the relation between annual report readability and the cost of equity capital. Although it is unlikely that firms adjust the readability level of their disclosures in response to changes in their cost of their equity financing, we conduct an additional test to mitigate this concern. Eq. (1) of Table 5 reports regression results using lagged values of the Fog index. The coefficient on *LAGGED_FOG* is positive and statistically significant at less than the 5% threshold, implying that reverse causality is less likely to be a serious concern in this study.

Second, we rely on alternative econometric techniques to control for cross-sectional and serial dependence, namely, Newey-West and Prais-Winsten estimation methods. Eq. (2) and Eq. (3) of Table 5 show that our results remain qualitatively unchanged.

Third, to rule out the possibility that our inferences are affected by the presence of outliers, we rely on a median regression setting, which minimizes the absolute residuals instead of the residual sum of squares as in the ordinary least squares. In this regression, the standard errors are computed using the bootstrap resampling based on 20 replications. The results reported in the fourth column of Table 5 are mostly consistent with our primary analyses, indicating that outliers are not likely to be a concern.

Finally, we replicate our main regression after discarding utilities (SIC codes 4900-4999) from the analysis. We do so since disclosure policies of these firms are more likely to be driven by regulatory reasons than agency concerns. Eq. (5) of Table 5 shows that our findings are not affected by the inclusion of utility firms.

[Insert Table 5 here]

7. Conclusion

This study examines the effect of annual report readability on the cost of equity capital for a sample of 288 French listed firms during the 2002-2006 period. After controlling for several risk factors, our results provide evidence that firms with less readable annual reports face higher cost of equity financing. These findings are consistent with the notion that because less readable annual reports are more costly to process and interpret, investors require a higher risk premium, which translates in a higher cost of equity capital. Although one might think that lay investors are not primary users of annual reports and may hence seek information from analysts, Lehavy et al. (2011) document that analysts provide less accurate earnings forecasts when annual reports are difficult-to- read.

Our results complement the extensive literature that investigates the relation between disclosure quality and the cost of capital. Moreover, our focus on textual properties of firms' disclosures supplements this well-trodden research field with new evidence and contributes to better our understanding of the capital market implications of narrative disclosures.

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Appendix. Models of implied cost of equity capital

This appendix describes the implementation of the implied cost of equity models used in this paper. We begin by defining the common variables that are used in the following four models:

A.1. Common variables

K_{OJ} = cost of equity estimate of the model of Ohlson and Juettner-Nauroth (2005).

K_{CT} = cost of equity estimate of the model of Claus and Thomas (2001).

K_{GLS} = cost of equity estimate of the model of Gebhardt et al. (2001).

K_{ES} = cost of equity estimate of the model of Easton (2004).

$FEPS_{T+t}$ = I/B/E/S mean earnings forecast for the tth year from the estimation year.

P_T = Market price at the statistics release date for the estimation year.

B_T = Book value per share, $B_{T+i} = B_{T+i-1} + FEPS_{T+i} - D_{T+i}$

D_{T+i} = $FEPS_{T+i}$*Dividend Payout [the firm's dividend payout, where available, otherwise 50% as in Claus and Thomas (2001)].

A.2. Model 1: Ohlson and Juettner-Nauroth (2005)

$$K_{OJ} = A + \sqrt{A^2 + \frac{FEPS_{T+1}}{P_T}\left(g_2 - (y-1)\right)}$$

where, $A = \frac{1}{2}\left[(y-1) + \frac{D_{T+1}}{P_T}\right]$, $g_2 = \frac{FEPS_{T+2} - FEPS_{T+1}}{FEPS_{T+1}}$, y = a constant that is equal to 1+long-term growth

rate; the long-term growth rate (y−1) was fixed at inflation premium (in this case a constant equal to 4%).

A.3. Model 2: Claus and Thomas (2001)

$$P_T = B_T + \frac{FEPS_{T+1} - K_{CT}B_T}{1 + K_{CT}} + ... + \frac{FEPS_{T+5} - K_{CT}B_{T+4}}{\left(1 + K_{CT}\right)^5} + \frac{\left(FEPS_{T+5} - K_{CT}B_{T+4}\right)\left(1 + g_n\right)}{\left(K_{CT} - g_n\right)\left(1 + K_{CT}\right)^5}$$

The forecasts beyond two years are taken as reported where available, otherwise they are generated based on the five-year consensus growth rate forecast or the average growth in $FEPS_1$ to $FEPS_3$. The long-term growth rate beyond five years is given by g_n equal to the excess of U.S. Treasury Bond yield over the real risk-free rate (approximately 4%).

A.4. Model 3: Gebhardt et al. (2001)

$$P_T = B_T + \frac{FEPS_{T+1} - K_{GLS}B_T}{1 + K_{GLS}} + ... + \frac{FEPS_{T+i} - K_{GLS}B_{T+i-1}}{\left(1 + K_{GLS}\right)^i} + ... + \frac{\left(FEPS_{T+t+1} - K_{GLS}B_{T+t}\right)}{K_{GLS}\left(1 + K_{GLS}\right)^i}$$

$FEPS_{T+4}$ to $FEPS_{T+12}$ are forecasted such that the return on investment (*ROI*) gradually (linearly) converges to industry *ROI* in the 12th year. Industry *ROI* is estimated as the mean of all firms' year 1 *ROI* at Fama–French 48 industry portfolios for the estimation period. Growth in earnings after the 12th year is assumed to be zero.

A.5. Model 4: Easton (2004)

$$P_T = \frac{FEPS_{T+2} + K_{ES}D_{T+1} - FEPS_{T+1}}{K_{ES}^2}$$

Table 1
Summary statistics.

Variables	Mean	S.D	5th percentile	25th percentile	Median	75th percentile	95th percentile
COE	0.1089	0.02704	0.0711	0.0891	0.1036	0.1243	0.1721
FOG	21.8059	2.2416	18.6970	20.3568	21.5746	22.9629	25.8299
LEVERAGE	24.4634	16.8293	1.2481	11.8955	23.7217	33.9683	52.7092
MTB	2.5495	1.4551	0.85	1.48	2.15	3.25	6.51
YR5GTH	10.3214	23.9202	-23.8294	-2.2782	10.0923	21.0131	48.5597
SIZE	13.5454	2.0949	10.4978	12.0507	13.2360	14.8670	17.2458

This table provides summary statistics of variables used in this paper. The sample contains 1013 firm-year observations from 2002 to 2006. *COE* is our measure of the implied cost of equity capital and is defined as the arithmetic average of implied cost of equity estimates obtained from the four models presented in the Appendix. *FOG* is the Fog index of the annual report calculated as (average words per sentence + percent of complex words)×0.4. *LEVERAGE* is the firm leverage defined as the ratio of total debt to total assets. *MTB* is the market-to-book ratio defined as the ratio of market value to book value of equity. *YR5GTH* is long-term growth in expected earnings defined as the I/B/E/S five-year earnings growth rate. *SIZE* is the firm size defined as the natural logarithm of total assets.

Table 2
Correlation Matrix.

Variable	COE	FOG	LEVERAGE	MTB	YR5GTH	SIZE
COE	1	0.0814[a]	0.0657[b]	-0.0311[a]	-0.0816[a]	-0.2178[a]
FOG	0.0959[a]	1	-0.0473	0.0796[b]	0.0221	-0.0338
LEVERAGE	0.0670[b]	-0.0377	1	-0.2009[a]	-0.0518	0.3322[a]
MTB	-0.2396[a]	0.0439	-0.1776[a]	1	0.2242[a]	-0.1036[a]
YR5GTH	-0.1089[a]	0.0063	0	0.1902[a]	1	-0.0373
SIZE	-0.2045[a]	-0.0431	0.2890[a]	-0.1229[a]	-0.0015	1

This table reports correlation coefficients between variables applied in the study. *COE* is our measure of the implied cost of equity capital and is defined as the arithmetic average of implied cost of equity estimates obtained from the four models presented in the Appendix. *FOG* is the Fog index of the annual report calculated as (average words per sentence + percent of complex words)×0.4. *LEVERAGE* is the firm leverage defined as the ratio of total debt to total assets. *MTB* is the market-to-book ratio defined as the ratio of market value to book value of equity. *LEVERAGE* is the firm leverage defined as the ratio of long term debt to total capital. *YR5GTH* is long-term growth in expected earnings defined as the I/B/E/S five-year earnings growth rate. *SIZE* is the firm size defined as the natural logarithm of total assets. Pearson (Spearman) correlations are below (above) the diagonal.
[a] statistical significance at the 1% level.
[b] statistical significance at the 5% level.
[c] statistical significance at the 10% level.

Table 3
Annual report readability and the cost of equity capital (Fama and MacBeth (1973) two-step regression).

Independent variable	Expected sign	Baseline regression Eq. (1)	Full regression Eq. (2)	Full regression Eq. (3)	Economic impact (Eq. (2))
FOG	+	0.1013[a] (5.3909)	0.1114[a] (6.2907)		0.0029
FOG_HIGH	+			0.3336[a] (5.0745)	
LEVERAGE	+		0.0207[a] (6.0614)	0.0209[a] (5.3025)	0.0045
MTB	-		-0.5030[a] (-8.5802)	-0.4986[a] (-8.5367)	-0.0089
YR5GTH	+/-		-0.0083 (-1.7982)	-0.0085 (-1.7750)	-0.0019
SIZE	-	-0.2437[a] (-8.4215)	-0.3204[a] (-12.9895)	-0.3157[a] (-12.3370)	-0.0090
Intercept	?	12.6000[a] (14.8858)	14.1518[a] (18.9590)	16.3844[a] (31.8137)	
Industry dummies		Yes	Yes	Yes	
N		1013	1013	1013	
R-squared		0.1509	0.2572	0.2504	
F		15.58[a]	24.45[a]	22.76[a]	

This table reports the results of the effect of annual report readability on the cost of equity capital using the Fama and MacBeth (1973) cross-sectional regressions, adjusted for Newey and West (1987) autocorrelation with one lag. The dependent variable (*COE*) is defined as the arithmetic average of implied cost of equity estimates obtained from the four models presented in the Appendix, multiplied by 10^2. The main test variable (*FOG*) is the Fog index of the annual report calculated as (average words per sentence + percent of complex words)×0.4. For robustness, we use *FOG_HIGH* as an additional proxy for annual report readability. This variable is defined as a dummy variable that equals one if *FOG* is higher than the median Fog index and zero otherwise. *LEVERAGE* is the firm leverage defined as the ratio of total debt to total assets. *MTB* is the market-to-book ratio defined as the ratio of market value to book value of equity. *YR5GTH* is long-term growth in expected earnings defined as the I/B/E/S five-year earnings growth rate. *SIZE* is the firm size defined as the natural logarithm of total assets. Industry (based on Campbell (1996) classification) are also included. The *t*-statistics reported in parentheses are based on the autocorrelation-adjusted Fama and MacBeth (1973) standard errors.

[a] statistical significance at the 1% level.
[b] statistical significance at the 5% level.
[c] statistical significance at the 10% level.

Table 4
Annual report readability and the cost of equity capital (two-way clustering at the firm and year levels).

Independent variable	Expected sign	Baseline regression	Full regression	
		Eq (1)	Eq (2)	Eq (3)
FOG	+	0.1002[b]	0.1120[a]	
		(2.3615)	(2.6293)	
FOG_HIGH	+			0.2961[b]
				(2.1704)
LEVERAGE	+		0.0196[a]	0.0198[a]
			(3.7921)	(3.7460)
MTB	-		-0.4991[a]	-0.4989[a]
			(-5.3986)	(-5.3759)
YR5GTH	+/-		-0.0062	-0.0061
			(-1.5383)	(-1.4628)
SIZE	-	-0.2478[a]	-0.3267[a]	-0.3240[a]
		(-3.7582)	(-5.9605)	(-5.9675)
Intercept	?	12.6817[a]	14.2956[a]	16.5906[a]
		(9.1031)	(10.8529)	(18.3699)
Industry dummies		Yes	Yes	Yes
N		1013	1013	1013
R-squared		0.1086	0.2041	0.1986
F		9.64[a]	16.38[a]	15.77[a]

This table portrays the results of the effect of annual report readability on the cost of equity capital. The dependent variable (*COE*) is defined as the arithmetic average of implied cost of equity estimates obtained from the four models presented in the Appendix, multiplied by 10^2. The main test variable (*FOG*) is the Fog Index of the annual report calculated as (average words per sentence + percent of complex words)×0.4. For robustness, we use *FOG_HIGH* as an additional proxy for annual report readability. This variable is defined as a dummy variable that equals one if *FOG* is higher than the median Fog index and zero otherwise. *LEVERAGE* is the firm leverage defined as the ratio of total debt to total assets. *MTB* is the market-to-book ratio defined as the ratio of market value to book value of equity. *YR5GTH* is long-term growth in expected earnings defined as the I/B/E/S five-year earnings growth rate. *SIZE* is the firm size defined as the natural logarithm of total assets. Industry dummies based on Campbell (1996) classification are also included. The *t*-statistics reported in parentheses are based on standard errors adjusted by a two-dimensional cluster at the firm and year levels.
[a] statistical significance at the 1% level.
[b] statistical significance at the 5% level.
[c] statistical significance at the 10% level.

Table 5
Robustness checks.

Independent variable	Eq. (1) using lagged FOG	Eq. (2) Newey and West regression	Eq. (3) Prais-Winsten regrssion	Eq. (4) using meadian regression	Eq. (5) excluding utility firms
FOG		0.1097[a]	0.0813[b]	0.1030[a]	0.1302[a]
		(2.8419)	(2.4195)	(3.3554)	(6.3931)
LAGGED_FOG	0.1311[b]				
	(4.4434)				
LEVERAGE	0.0180[b]	0.0195[a]	0.0147[b]	0.0170[a]	0.0226[a]
	(3.6514)	(3.4134)	(2.1068)	(3.2399)	(7.1498)
MTB	-0.4664[a]	-0.4815[a]	-0.3954[a]	-0.5040[a]	-0.5090[a]
	(-10.0014)	(-5.5387)	(-4.7887)	(-8.4085)	(-7.8165)
YR5GTH	-0.0099	-0.0075[b]	-0.0052[c]	-0.0051[c]	-0.0092
	(-1.4300)	(-2.0389)	(-1.8016)	(-1.4747)	(-1.9892)
SIZE	-0.2404[a]	-0.3268[a]	-0.3506[a]	-0.2948[a]	-0.3186[a]
	(-11.6661)	(-6.6894)	(-5.5172)	(-4.9511)	(-9.9845)
Intercept	12.8106[a]	14.7674[a]	15.6452[a]	13.4636[a]	13.6927[a]
	(24.3454)	(12.8495)	(12.8663)	(10.7141)	(15.0957)
N	699	1013	1013	1013	986
R-squared	0.2877	-	0.5703	-	0.2640
Pseudo R-squared	-	-	-	0.1215	-
F	36.65[a]	11.53[a]	8.06[a]	-	20.57[a]

This table reports results of the robustness checks. The first equation uses the lagged values of *FOG* as main test variable. The second and third equations perform the Newey-West and Prais-Winsten regressions, respectively. The fourth equation estimates a median regression. The fifth equation excludes utility firms from the analysis. *FOG* is the Fog Index of the annual report calculated as (average words per sentence + percent of complex words)×0.4. *LEVERAGE* is the firm leverage defined as the ratio of total debt to total assets. *MTB* is the market-to-book ratio defined as the ratio of market value to book value of equity. *YR5GTH* is long-term growth in expected earnings defined as the I/B/E/S five-year earnings growth rate. *SIZE* is the firm size defined as the natural logarithm of total assets. Industry dummies based on Campbell (1996) classification are included in all equations. For the first and fifth equations, the *t*-statistics reported in parentheses are based on the autocorrelation-adjusted Fama and MacBeth (1973) standard errors.
[a] statistical significance at the 1% level.
[b] statistical significance at the 5% level.
[c] statistical significance at the 10% level.