Endogeneity and the Dynamics of Voluntary Disclosure Quality: Is There Really an Effect on the Cost of Equity Capital?*

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Abstract

Research on the effects of voluntary disclosure quality on the cost of equity capital is often plagued by endogeneity concerns. I use a dynamic panel system GMM estimator to minimize these concerns by incorporating the dynamic nature of voluntary disclosure choices. The dynamic panel system GMM approach provides internal instruments from the firm's history that directly address endogeneity arising from unobserved heterogeneity and simultaneity. By using hand-collected voluntary disclosure scores, I examine the relation between voluntary disclosure quality and the cost of equity capital in a panel over 10 years. My results suggest that the *causal* empirical relation between voluntary disclosure quality and the cost of equity capital becomes insignificant after controlling adequately for potential dynamic endogeneity, simultaneity, and unobserved heterogeneity for the full disclosure score. Further analysis, for companies in a low information environment, indicate that firm background information and value-based management-related disclosure are negatively related to cost of equity capital.

Keywords:
Voluntary Disclosure Quality, Cost of Equity Capital, Dynamic Panel System GMM Estimation, Dynamic Endogeneity.

JEL Classification:
C33, C36, G30, M41

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I. Introduction

This paper investigates the relation between the expected cost of equity capital and voluntary disclosure provided in the annual reports of listed companies, specifically, it considers the *dynamic* nature of this relation. "*Whether disclosure policies and financial reporting affect a firm's cost of capital is one of the most interesting and important questions in the accounting and finance literature*" (Beyer et al., 2010, p. 307).

The current state of the academic literature on this relation is far from conclusive, both theoretically and empirically. Some of the empirical accounting studies acknowledge and address at least two potential sources of endogeneity: (1) unobservable heterogeneity and (2) simultaneity. In this paper, I additional speak to the problems arising from dynamic endogeneity. In the context of voluntary disclosure, it seems very likely that the underlying relation between voluntary disclosure and cost of equity is reversed: high cost of equity capital today may encourage and incentivize management to increase voluntary disclosure in the future. Moreover, it is also possible that voluntary disclosure is merely a symptom of an unobserved or neglected factor, such as managerial ability. Controlling for time-invariant, unobserved heterogeneity by adding firm fixed effects can help to mitigate this concern. However, this method comes with strings attached and implies a strong exogeneity assumption, which is often not explicitly recognized and addressed by accounting researchers. Specifically, it assumes that current observations of the explanatory variable (e.g., voluntary disclosure) are independent of past values of the dependent variable (e.g., cost of equity capital). Given that the companies choose their level of voluntary disclosure based on their perceived cost-benefit analysis, this assumption is not likely to hold in the specific context of voluntary disclosure. For example, Dhaliwal et al. (2011) find that companies with a high cost of equity capital are more likely to initiate voluntary disclosure. Applying firm fixed effects in such a dynamic environment will yield inconsistent estimates and may lead to wrong conclusions (Wooldridge, 2002). This paper deals with this specific issue by applying a dynamic panel system GMM.

My measure of voluntary disclosure considers the amount and quality of information provided in firms' annual reports. The disclosure index that captures this is from the Department of Banking and Finance at the University of Zurich. The index is based on different aspects of disclosure such as (i) overall impression, (ii) availability of background information, (iii) availability of important non-financials, (iv) availability of trend analysis, (v) availability of risk information, (vi) implementation of value based management, (vii) comprehensiveness of management discussion and analysis of annual financial statements, (viii) availability of goals and credibility, and (ix) comprehensiveness of sustainability reporting.

Switzerland is particularly well-suited to test my research question for the following three reasons: First, the financial reporting system in Switzerland (Swiss GAAP) provides managers with extensive discretion in the amount of disclosure they want to provide in annual reports. In addition, the mandated level of disclosure is relatively low (Raffournier, 1995). Second, my disclosure score has a large coverage in terms of market capitalization. The firms covered in this research cover around 96% of the market capitalization of the general Swiss equity market index (the Swiss Performance Index). Overall, 91% of the companies listed on the Swiss stock exchange are covered by my index which therefore provides information on a broad spectrum of small, medium, and large companies. By contrast, the AIMR rating, which is often used by accounting scholars, covers mainly larger companies. Given the positive association between company size and voluntary disclosure, my sample has, therefore, a higher cross-sectional variation in voluntary disclosure than the AIMR ratings. In addition, the index used in this paper covers a more recent decade (1999-2008) than the AIMR data which were discontinued in 1996. The sample consists of over 1,039 firm-year observations for a ten year time period. Third, Hughes, Liu and Liu (2007) show that in large economies, idiosyncratic risk and the asymmetric information risk, which are associated with idiosyncratic factors, are fully diversifiable and should not affect the cost of capital in a systematic manner. A relatively small economy like Switzerland – which nonetheless has a liquid stock market – is, therefore, an attractive testing ground for the research question of this paper.

The results imply no robust empirical relation between current voluntary disclosure and cost of equity capital. The analysis proceeds in three steps. First, an OLS regression suggests that voluntary disclosure is negatively associated with cost of equity. This is in line with previous findings in Botosan (1997) and Hail (2002). Second, a standard regression setup with firm fixed effects yields no statistically significant relation. Third, and most importantly, I employ a method that takes into account that voluntary disclosure quality and the past cost of equity capital are likely to be correlated. This is important because if such a relation exists, the firm-fixed effect approach would deliver inconsistent results so that the finding of no relation between disclosure quality and cost of capital may be spurious. Specifically, I use a dynamic panel system GMM approach as proposed by

Blundell and Bond (1998) and applied in the recent corporate finance literature in Hoechle et al. (2012) and Wintoki, Linck and Netter (2012). By using lagged levels and differences of the investigated variable voluntary disclosure and its covariates as instrumental variable, this approach mitigates the endogeneity problems arising from unobserved time-invariant heterogeneity and simultaneity at the same time. Intuitively, the method is comparable to a dynamic simultaneous equations system that uses the firms' history as instrumental variables. To my knowledge, this is the first paper that addresses the dynamic endogeneity concerns in the empirical accounting literature with a dynamic panel system GMM estimator.

In sum, once I control for the endogeneity due to unobserved heterogeneity and as well as the dynamic endogeneity, voluntary disclosure quality has no causal effect on cost of equity capital for the full disclosure score.

Motivated by the analytical findings of Bertomeu, Beyer, and Dye (2011) and the discussion about the disclosure overload (e.g., IASB, 2013), I examine whether there exist some sort of diminishing effect of voluntary disclosure quality. In other words, does the market reward companies with lower cost of equity capital to a certain threshold, but not in addition to that? Because the investors have enough information and do not have the capacities to process it further. Hence, disclosure would have a diminishing marginal utility. I examine this relation with a squared term for voluntary disclosure quality and find that the squared term has a positive coefficient, indicating the diminishing reduction effect of voluntary disclosure quality on cost of equity capital. This finding adds to the discussion to the current disclosure overload debate

In additional tests, I investigate the different types of disclosure, that is subindices 1-9, and its effect on the cost of equity capital. I find for companies from a low information environment, that background information, including product information and corporate governance related disclosure and value-based management related disclosure are causally reducing the cost of equity capital. However, all other seven subindices do not reduce the cost of equity capital.

II. Previous Literature

Due to Akerlof's (1970) "lemons problem", managers have incentives to disclose voluntary information. Barry and Brown (1984, 1985, 1986) argue that investors have to bear risks in forecasting future returns of their investment if disclosure provided by the company is insufficient. Therefore, investors will demand an additional return for their investment because they bear the information risk. Consequently, companies with high disclosure and hence low information risk will face a lower cost of capital.[1] If in theory, high(er) *VDQ* leads to a low(er) *COEC*, why is not every company adopting their information policy and disclosing all available information? There are several reasons why we are not obtaining a corner solution in terms of *VDQ* and can find the unraveling results[2] by Grossman and Hart (1980), Grossman (1981), Milgrom (1981), and Milgrom and Roberts (1986), in the real world. One reason is that the production and distribution of information is costly for a company. Furthermore, not every company has the same incentives to provide additional information to their (potential) investors. Thus, the company carefully selects the level of *VDQ* based on the current *COEC* and the economic situation of the company as shown by Dhaliwal et al. (2011).

The first empirical evidence for decreasing the *COEC* due to high *VDQ* is from Botosan (1997).[3,4] She examines the association between *COEC* and the *VDQ* in annual reports for the U.S. machinery industry. *VDQ* is measured by a disclosure index which is based on recommendations of investors and financial analysts and contains five categories: (i) background information, (ii) summary of historical results, (iii) key non-financials statistics, (iv) project information, and (v) management discussion and analysis. The findings are

[1] Please note that voluntary disclosure quality can only lead to a lower cost of capital if the information risk is not diversifiable. This proposition is discussed in Hughes, Liu, and Liu (2007), and in Lambert, Leuz, and Verrecchia (2007). For example, Hughes, Liu and Liu (2007, p. 707) claim that the pricing of information asymmetries in Easley and O'Hara (2004) can be "diversified away when the economy is large" which is an assumption that is unlikely to hold in smaller financial markets. Furthermore, Armstrong et al. (2011) relax the assumption of perfect market competition and show that if the market is imperfect this leads to a positive relationship between information asymmetries and the *COEC* for a given firm.

[2] According to Beyer et al. (2010, p. 300-301) the assumptions of these models are: "*(1) Disclosure is costless, (2) investors know that firms have, in fact, private information, (3) all investors interpret the firms disclosure in the same way and firms know how investors will interpret that disclosure, (4) managers want to maximize their firms' share prices, (5) firms can credibly disclose their private information, and (6) firms can not commit ex-ante to a specific disclosure policy*".

[3] The empirical findings are not only limited to the *COEC*. Sengupta (1998) provides empirical evidence that firms with high *VDQ* have lower interest costs when issuing debt. Due to the reason that debt financing is an important source for listed companies, the results are important to understanding the further motivation in disclosure.

[4] For the sake of brevity, I focus on the those papers that proxy *VDQ* with a disclosure index. For a full review, please see Healy and Palepu (2001), Botosan (2006), and Beyer et al. (2010).

limited to those companies from an opaque information environment proxied by a low analyst following. Therefore, providing information to investors is less effective in a high-information environment. However, her research design assumes that *VDQ* is more or less exogenous and does not directly control for any endogeneity issues.

Botosan and Plumlee (2002) find further empirical evidence for decreasing *COEC* based on higher disclosure quality.[5] A negative relation between *VDQ* and *COEC* was found in 43 different industries over an 11-year period from 1986-1996 in the U.S. market. Surprisingly, a *positive* association between *COEC* and a higher reporting frequency was found as well. This may be caused by increased stock price volatility. Although, this finding is contrary to the author's theoretical prediction, it is consistent with managers' claims that timely disclosure will lead to higher cost of capital.

Following prior literature, the financial industry is excluded in voluntary disclosure studies due to the different reporting behavior. Poshakwale and Courtis (2005) provide support for a negative correlation between *VDQ* and *COEC* for the financial industry in Europe and the U.S.

To the best of my knowledge, the only study that covers this topic for the Swiss market is by Hail (2002). He reports a negative relation between *COEC* and the fractional rank of *VDQ* of the Annual Value Reporting Rating (AVR) score. He tackles the endogeneity and self-selection problem as a robustness test with a two-stage least squares regression model.[6] He acknowledges that the instrumental variable approach can lead to unreliable results due to the small sample size of 73 firms. Furthermore, the results have to be interpreted with caution due to the potential "weak instrument" problem, which could have an impact on the estimated relation (see Larcker and Rusticus, 2010).

Finally, Nikolaev and van Lent (2005) mitigate the potential endogeneity arising from unobserved heterogeneity in the context of *VDQ* and cost of debt by the use of firm fixed effects. They exemplify the cost of disclosure or managerial ability and employee skills, which can be roughly constant over time.[7]

In the end, whether voluntary disclosure quality reduces a firm's cost of equity capital even after controlling adequately for potential dynamic endogeneity, simultaneity, and unobserved heterogeneity, remains an empirical question.

[5] This study relies on the use of analysts ratings' for the specific annual report. The AIMR (Association for Investment Management and Research) index is not available for the most recent decade.

[6] In the first stage regression Hail (2002) models disclosure as a function of size, return, stock listing status and financial leverage and audit firm size.

[7] They find that OLS regressions underestimate the effect of voluntary disclosure quality on the cost of debt, because the coefficient is larger for the panel regression with firm fixed effects.

III. Hypotheses

My research question is whether companies can reduce their cost of equity capital by providing investors with high voluntary disclosure quality.

Furthermore, it is interesting to determine if this effect is conditional on the current external information environment of a company, which can be differentiated into level and uncertainty. Is there additional utility in the sense of a lower cost of capital for companies that are relatively unknown in the market but provide investors with high a *VDQ*? Previous studies, such as Botosan (1997), argue that a high analyst following is a proxy for a relatively high external information environment. Likewise, high press coverage, which Botosan (1997) uses in a robustness check, may mitigate potential information asymmetries between the company and its investors. Ex-ante, it is unclear whether the information of financial analysts or the press can be seen as substitutes or complementary goods, which are attributed to their role as information multipliers. In the same vein, as Botosan (1997), I expect that companies with a low analyst following, which are providing a higher *VDQ* to their investors will have a lower *COEC*. To evaluate this hypothesis, I introduce an indicator variable based on the yearly coverage in one of the largest daily Swiss newspapers (Tages-Anzeiger), the leading weekly investor's magazine (Handelszeitung) and the Swiss equivalent of the Associated Press (Schweizerische Depeschenagentur).[8]

In addition to the analysis of the external information level environment, I also examine the impact of voluntary disclosure quality on the cost of equity capital under the external market condition of *uncertainty* about the future earnings of the company. In recent survey evidence by Graham, Harvey and Rajgopal (2005), the CFOs in the survey believe on average that estimation risk and disagreement lead to a higher cost of equity capital. Therefore, I expect that *VDQ* has a higher reduction on the *COEC* for those companies that have a higher earnings dispersion reflected by financial analysts' forecasts. Or in other words, companies that face a large uncertainty about their future earnings can reduce this uncertainty by providing investors with additional information. Thus, an increase or higher level in their *VDQ* should reduce information asymmetries and information risks. Therefore, investors can reduce their estimation risk of future cash flows and hence the company has a lower *COEC*.

[8] These articles about the companies are provided in the LexisNexis database. To decide whether an article is relevant, I follow standard procedures as in Fang and Peress (2009), and use the relevance score of LexisNexis. The main results do not change if I take the Neue Zurcher Zeitung, which is another influential newspaper in Switzerland.

Based on the above discussion, I derive the following hypotheses:

Baseline hypothesis (H_1): Companies with higher *VDQ* have a lower *COEC*.

Opaqueness hypothesis (H_2): Companies from a low-information environment (proxied by analyst following and press coverage) with a high *VDQ* have lower a *COEC*.

Uncertainty hypothesis (H_3): Companies from an information environment with a high *uncertainty* about future earnings (proxied by the standard deviation of earnings per share forecasts of analysts for the next year) and a high *VDQ* have a lower *COEC*.

My expectation is that companies with high *VDQ* have a lower *COEC* (see H_1). Therefore, I expect to obtain a negative relation between *VDQ* and *COEC* controlling for the most important covariates. For companies from a low-information environment level (see H_2), I expect to find a stronger negative relation because *VDQ* of the opaque companies in the annual report is more powerful due to the lack of external sources of information. In the same vein, I would expect (see H_3) that companies with a high uncertainty about their future earnings, will have lower *COEC* if they provide analysts with higher *VDQ*.

IV. Measuring Voluntary Disclosure Quality

Since 1999, the Department of Banking and Finance (DBF; former Swiss Banking Institute) of the University of Zurich conducts the Annual Value Reporting Rating (AVR) in annual reports. The disclosure index was also used by other studies: for example, Hail (2002) and Daske and Gebhardt (2006). The DBF rates the voluntary disclosure quality and value reporting of the Swiss companies with a multi-dimensional disclosure index with several criteria. The *VDQ* is assessed using a disclosure index with over 100 questions aggregated into 35 items in 9 subindices/categories, which are important for the decision-making process of an investor, based on Botosan (1997), and conversations with practitioners.

An overview of the criteria list is provided in Table I. The rating contains following nine subindices: (i) impression, (ii) background information, (iii) important non-financials, (iv) trend analysis, (v) risk information, (vi) value based management, (vii) management discussion and analysis of annual financial statements, (viii) goals and credibility, and (ix) sustainability.

The total score of the ranking is a straightforward summation of the checklist with 35 items, which are graded (1 = no information; 6 = very high-information quality) based on the voluntary information content and quality. On the checklist that assessors use to rate companies, the required disclosure level is exactly specified.[9] Although the DBF publishes their results with a weighting schema, I use data from the unweighted index as previous studies by Hail (2002) and Eugster and Wagner (2013).

I follow prior literature and validate the internal consistency of the disclosure score by calculating the Cronbach's alpha for the components of the score. The resulting value for the full sample period (after 2003) of 0.75 (0.81) is in accordance with the acceptable (good) level of consistency between the items (Cronbach, 1951)[10]. As a comparison; Botosan (1997) has a Cronbach's alpha of 0.64.

I calculate *DISC* as the percentage of points ("fulfillment rate") by dividing the achieved total score for each company by the maximum reachable total score. In contrast to Hail (2002), I do not use the fractional rank of the company due to the changing sample size

[9] I acknowledge that the rating was under revision in the year 2003. Before the weighting scheme was in the range from 0 to 2.

[10] According to Botosan (1997, p. 335) "[...] an alpha of 0.8 indicates that the correlation is attenuated very little by random measurement error [...]" as noted in Carmines and Zellner (1979).

per year.[11]

The sample selection is a crucial determinant of my disclosure study. In the case of the AVR, the DBF began with a relatively small sample and increased the number of covered companies on a yearly basis. In 1999, the first part of the sample included the 50 highest-capitalized companies in Switzerland. The second part contained 43 randomly selected listed and 18 unlisted smaller companies. According to Eugster and Wagner (2013), the AVR coverage increased over the year and entails now almost all the companies from the Swiss Performance Index, which is the most closely followed stock index for the Swiss market.[12] Averaging over the years, the AVR covers around 96 % of the market capitalization of the stocks listed at the Swiss Performance Index and 91 % of the Swiss stock-market capitalization. In contrast to the well-known U.S. AIMR disclosure data, this index covers a more recent period as well as larger variation in companies by including small, medium, and large companies. This helps to investigate the empirical relation between *VDQ* and the *COEC* and provides sufficient cross-sectional variation in the information environment.

The summary statistics of the AVR are available in Table II. Over the years, the voluntary disclosure quality (*DISC*) median value increased from 0.38 to 0.53. The standard deviation of the sample varies over the years from 0.10 to 0.15. The coefficient of variation (calculated as standard deviation by the sample mean) is 0.31 and higher than the variation in Botosan (1997) with 0.27. In the same vein, the inter-quartile difference over the full sample-period is 0.17 and indicates a broad variation of *VDQ* in the sample. According to Larcker and Rusticus (2010), the use of firm-fixed effects is not appropriate in *VDQ* studies due to the small variation of the voluntary disclosure. As we can see in the summary statistics, this is not the case for Switzerland. Following the approach of Nikolaev and van Lent (2005), I further estimate a year-to-year transition probabilities matrix, which indicates the probability of a company moving from decile a in year t to decile b in following year. The results are tabulated in Table V and indicate that a company remains to only 27.7% in the same decile. Last but not least, I provide in Figure 1 a histogram of the variation in *VDQ* measured as per company standard deviation, to underline the relatively high variation in the sample. Therefore the *within* variation is substantial and allows the usage of firm fixed effects in order to control for unobservable heterogeneity.

[11] An example helps to understand this issue. Imagine company A that has no change in voluntary disclosure quality over two years. In the second year company B is added to the sample with a lower voluntary disclosure quality than company A. However, just because of the introduction of company B the fractional rank of company A would imply a higher voluntary disclosure quality, which is not accurate.

[12] The Swiss Performance Index, does not contain securities with a free float below 20%.

Previous literature, such as Lang and Lundholm (1993) as well as Hail (2002), point out that the *VDQ* is positively correlated with company size. My findings (see Table IV) echo this. I find the correlation of *SIZE* (measured as logarithm of the company's market value) and *VDQ* to be 0.53. This is slightly smaller than the result from Hail (2002), but still highly significant. In line with Hail (2002), I run a correlation analysis with the nine subindices and find that all pairwise correlations are positive and significant on the one-percent level. The subindices reflect different disclosure types and therefore I use all nine subindices in this study.

[Table II about here]

[Figure 1 about here]

The AVR faces the difficult task evaluating different industries with the same disclosure score. Table III reports the industries and the number of listed companies on the AVR for the corresponding year.[13] The table shows the distribution of the different industries in Switzerland. Almost half of the sample companies are either industrial (31 %) or financial companies (18 %). Hail (2002) argues that disclosure practices of financial institutions are heavily regulated and different than disclosure practices of other industries. Therefore, a systematic bias may be observable for financials, especially for risk information. Nevertheless, I keep the companies from the financial industry in the sample, because the financial industry is important for Switzerland and represents 18 % of the sample. Furthermore, the subindex (Sub5) for risk information only counts for 5.7 % of the total score. Regardless of these arguments, I exclude financial companies to check that the results are independent of my selection choice without a change of the main results.

[Table III about here]

[13] I classify the industries according to their first Industry Classification Benchmark (ICB) digit.

V. Estimating the Cost of Equity Capital

By reverse engineering valuation models and estimating the expected rate of return implied by stock market prices, book value and earnings as well as forecasts of earnings and dividends, I am able to obtain a proxy for cost of capital that is based on forecasts (and expectations) rather than extrapolation from historical data and relying on noisy returns (Elton 1999). The implied cost of equity capital models derive the internal rate of return by an equation, in which the actual price is given as a function of expected cash flows in the future. Therefore, the models assume indirectly that at least the semi-strong efficient market hypothesis of Fama (1970) holds and the prices are reflecting the value of the company. These models rely on earnings forecasts of financial analysts and so the implied cost of equity capital is only assessable for companies with an analyst following. As a result, the companies without an analyst following are neglected in this study. This works against finding a significant result, if the underlying relationship is more pronounced for the opaque firms.

I obtain my implied cost of equity capital ($COEC$) measures from the reverse-engineered valuation models, which are mainly used in the prior literature, as for example in Hail and Leuz (2006): (i) Claus and Thomas (2001) ($COEC_{CT}$), (ii) Gebhardt, Lee, and Swaminathan (2001) ($COEC_{GLS}$), (iii) Ohlson and Juettner-Nauroth (2005) ($COEC_{OJN}$) and (iv) Easton (2004) ($COEC_E$). Models (i) and (ii) are special cases of Ohlsons' (1995) residual income valuation model. The remaining two models (iii) & (iv) are abnormal earnings growth valuation models.

The estimation methods rest upon different assumptions (e.g., earnings growth assumptions) and thus have different strengths and weaknesses. I use the average[14] ($COEC_A$) of the four implied cost of equity capital models to reduce noise in the individual measures.[15] This approach is in line with several studies, for example: Hail and Leuz (2006), Dhaliwal, Heitzman and Zhen (2006), Hope et al. (2009), and Dhaliwal et al. (2011). Due to the different assumptions of the models (e.g., positive earnings per share growth rate from year one to year two in the Easton (2004) model) the number of estimates vary per company at a given time. Therefore, I require at least two $COEC$ estimates per company-year to

[14] The main results and conclusions do not differ when using the median of the four models.

[15] See Easton (2009) for a extensive review of the different models. I acknowledge that there is a growing amount of literature that focuses on the predictability of future stock returns based on the implied cost of equity estimates (e.g., Guay, Kothari, and Shu (2011) and Easton and Monahan (2005) or the usefulness of the implied cost of equity models to the capture cross-sectional relation between risk and expected return (e.g., Botosan and Plumlee, 2005). My paper has no intention of resolving this debate.

build the $COEC_A$.

In contrast to Hail and Leuz (2006), who apply the estimation in an international setting with different accounting regimes, I estimate the $COEC$ in June of the corresponding year as in Hail (2002). Following the estimation method of Claus and Thomas (2001), Hail and Leuz (2006), and Aggarwal, Mishra, and Wilson (2010), I restrict the implied cost of equity capital estimates to be in the range of 0 % to 100 %.[16]

Table IV provides a summary statistics for the estimated implied cost of equity capital. In Panel A. we see the summary statistics for the four models and the average for the entire sample period. Panel B. shows the summary statistics for $COEC_A$ for every year. Panel C. includes the Pearson coefficients between the implied cost of equity capital estimates and selected variables. Panel D. contains the descriptive statistics for $COEC_A$ with respect to the external information level or uncertainty environment, respectively.

As we can see in Panel A., the median values for the four models are different. I obtain the lowest median value for the $COEC_{GLS}$-approach (0.072), which echoes the findings of Hail and Leuz (2006). The estimates from the Claus and Thomas (2001) model are slightly higher (0.084), followed by the estimations from the Easton (2004) and Ohlson and Juettner-Nauroth (2005) model with 0.089 and 0.104, respectively. Additionally, $COEC_{GLS}$ has the lowest dispersion whereas the estimates of the Easton (2004) model has the highest dispersion. The main measure in the study is $COEC_A$, which has a median value of 0.086 and a standard deviation of 0.04. As we can see in Panel B., the median of the cost of equity capital measure ($COEC_A$) varies from year to year. The lowest (highest) median value is 7.3 % (11.5 %) in 2007 (2003). The estimations from the four different $COEC$ models have a highly significant positive correlation which is reflected in Panel C. The highest correlation (0.87) is between the estimates of the Easton (2004) and Ohlson and Juettner-Nauroth (2005) models. This is not surprising, given that both models are abnormal earnings growth valuation models. I find the lowest correlation between the estimates of $COEC_{GLS}$ and $COEC_E$ models with 0.54, which is still highly significant and comparable to the results from others.[17]

I obtain a positive significant correlation between $BETA$ and $COEC_A$ (0.06) and a theoretically surprising *negative* significant correlation between $BETA$ and $COEC_{GLS}$ on the individual level of the cost of equity capital estimates. Further, I find a positive

[16] The relative high upper bound for $COEC$ has no large or substantial impact on the results. See the robustness section for further analysis.
[17] Hail and Leuz (2006) have a correlation of 0.51.

insignificant correlation between *BETA* and $COEC_{CT}$ and significant positive relations for *BETA* and $COEC_E$ and $COEC_{OJN}$. This could be due to the estimation technique for *BETA*, which is based on the regression of a company's excess returns on value-weighted market returns with weekly data over two years. This procedure may generate measurement errors, if we compare it with the "true" CAPM beta of a company.[18] Further, similar to Hail (2002), I obtain a significant positive correlation between *SIZE* and *BETA*, which indicates a potential problem in terms of a non-trading bias. An indication for this is the positive correlation of beta and the *COEC*, especially for companies with a high analyst following (which in general are larger), where I do not expect that the beta estimation may be unreliable. Beyond the univariate analysis, *BETA* is in line with theoretical predictions. *LEV*[19], which stands for leverage (*SIZE*) has a positive (negative) correlation with an implied cost of equity capital. This is line with the theory that higher leveraged companies have higher risks and thus higher costs of equity. In line with previous research such as Botosan (1997), I find that company size is negatively related to the *COEC*. Furthermore, it is very likely that larger companies have better access to the capital market and thus have a lower *COEC*.

In line with my hypotheses, I find a significant negative correlation between *DISC* and the four estimation methods as well as their average. Worth mentioning, the negative correlation between $COEC_{GLS}$ and *DISC* is the most pronounced among the four models. The main measure $COEC_A$ has a negative correlation with *DISC* of -0.24.

Panel D. shows univariate results indicating that companies with a low analyst following have higher *COEC* than companies with a high analyst following. Using the Wilcoxon rank sum test, I find that this difference is highly significant. In the same vein, the statistical difference in *COEC* levels between the subsample with low and high press coverage is observable. Finally, the difference between companies with a low and high earnings dispersion is also statistically significant whereas companies with high earnings dispersion also have a higher implied cost of equity capital.

[Table IV about here]

[18] Another way to mitigate this problem is to derive the beta on a monthly basis over the past 5 years (with at least 24 monthly observations). The correlation between the *COEC* measures (despite $COEC_{GLS}$)and the market beta is significantly positive. However, to maintain the large sample size in order to exploit the panel setup, I stay with the betas estimated over two years.

[19] I follow Hail (2002) and define leverage as ratio of debt-to-equity available on Worldscope (Data Item WC08231). Using the debt to asset ratio does not change the results and the interpretation.

VI. Empirical Strategy

A. Sample Selection

Two hundred and ninety three companies have been rated by the DBF from 1999 until 2008. Eighty companies have never been listed during the sample period and are not included in the sample. I exclude two companies because they are not listed in Switzerland and ten companies due to a lack of market data. Analyst earnings per share forecast data is not available for 30 companies due to the lack of an analyst following, therefore the *COEC* cannot be estimated for these companies. After the exclusions, the sample size remains at 173 companies. Table VI summarizes the sample selection for this paper. There are 1,297 available *VDQ* scores but due to missing analyst forecast and market data, the sample reduces to 1,039 voluntary disclosure quality scores.

[Table VI about here]

B. Data

This study is based on the dataset from the Annual Value Reporting Rating conducted by the DBF of the University of Zurich for the years 1999–2008.[20] It uses market data (financial statement data) from 1997 to 2008 from Datastream (Worldscope). I obtain the analyst-coverage data as well as the analyst forecasts from the I/B/E/S International database. I measure the analyst following by the average number of earnings forecast for a given company. The media coverage data for the daily newspaper Tages-Anzeiger, the leading weekly investor's magazine (Handelszeitung) and the Swiss equivalent of the Associated Press (Schweizerische Depeschenagentur) is from LexisNexis. I follow standard procedures as conducted in Fang and Peress (2009) to ensure the relevance of the corresponding news. The market beta is a rolling regression over the last two years with weekly data based on the returns of the Swiss Performance Index (SPI) as market portfolio.[21] The accounting standard is from Worldscope but is double checked with the companies' annual report. Table VII shows the summary statistics for the relevant variables based on their external information environment level and uncertainty.

[20] The author was not involved in the data collection in the time period under investigation in this study.
[21] As per Hail (2002), I requested a minimum of 24 observations for estimating the market beta for a given company.

C. Methodology

I use three empirical approaches to investigate if the *VDQ* has an influence on the *COEC* of a company. First, I obtain the relation between the *COEC* and the voluntary disclosure with a static regression, where the level of *VDQ* and the level of past *COEC* can be seen as exogenous. Second, I estimate a dynamic OLS model, which includes the lagged cost of equity capital. Last but not least, I estimate a dynamic panel system GMM model, where the lagged cost of equity capital is considered in the regression and all other variables on the right-hand side are treated as endogenous.

Static Models

The first hypothesis is tested by regressing the average of the four cost of equity capital estimates per firm $COEC_A$ on voluntary disclosure quality, risk, size, market-to-book value, and international accounting standards. I estimate the following equation with (i) pooled OLS and (ii) by including firm fixed effects. For all regressions I use robust standard errors clustered at firm-level:

$$COEC_{A,i,t} = \alpha + \beta_1 DISC_{it} + \beta_2 BETA_{it} + \beta_3 LEV_{it} + \beta_4 SIZE_{it} + \beta_5 MTBV_{it} + \beta_6 IA_{it} + e_{it}, \quad (1)$$

where, $COEC_{A,i,t}$ is the average cost of equity capital for company i at time t. *DISC* is the scaled *VDQ* score (in percentage of possible points) for a company at the given time. The control variables (*CONTROLS*) are: *LEV* is the leverage and *BETA* is the CAPM market beta factor. *SIZE* is the *log* of the equity market value for the company. *MTBV* is the market-to-book value for the company over the time.[22] *IA* is 1 if a company applies an international accounting standard IFRS or US GAAP and 0 otherwise. As already mentioned, the usage of firm fixed effects mitigates endogeneity problems arising from time-invariant heterogeneity such as management ability or firm culture.

As a second hypothesis, I conduct a further analysis with an indicator variable for (i) the level and (ii) the uncertainty of external information environment. For the external information level environment I have two proxies: analyst following and media coverage. Thus, the indicator variable D_{IE} is 1 if the company has a *below* median analyst following (press coverage) in the corresponding year. As a proxy for the uncertainty of the external information environment, I use the dispersion (measured by the standard deviation) of analysts one year ahead earnings per share forecasts (Barron et al. 1998). Similar, an

[22] *BETA, LEV, SIZE, MTBV* are winsorized at the 1 and 99 percent levels to mitigate the effects of outliers.

indicator variable is 1 if the company has a *high* (above the median) earnings dispersion. Due to the data requirement of at least two analyst forecasts in order to calculate the analyst dispersion, the sample size reduces from 171 (1,039) to 164 (971) firm(-year)s. The following regression includes the indicator variable (D_{IE}) as an additional constant and as interaction term with *VDQ* (*DISC* as in Equation (1)). I estimate the regressions (i) with pooled OLS and, (ii) including firm fixed effects:

$$COEC_{A,i,t} = \alpha + \beta_1 D_{IE} + \beta_2 DISC_{it} + \beta_3 D_{IE} * DISC_{it} + \beta_4 CONTROLS + e_{it}. \quad (2)$$

Dynamic Models

As an intermediate step I estimate a simple dynamic OLS model (with firm fixed effects) which adds the lagged cost of equity capital ($COEC_{t-1}$) as an control variable to in Equation 1 and Equation 2. This helps us to see the effect of the lagged *COEC*.

As a final model and in order to appropriately control for dynamic endogeneity, simultaneity, and unobserved heterogeneity, I use the dynamic panel system GMM estimator, which is derived from a series of papers.[23] Wintoki, Linck and Netter (2012) argue that researchers try to deal with endogeneity, but miss the fact that the relation between the left-hand side and right-hand side variables is likely dynamic. Wintoki, Linck and Netter (2012) use a dynamic panel system GMM approach to address the dynamic endogeneity between governance (board size/board independence) and performance (*ROA*). In the context of *VDQ* and the *COEC*, it seems likely that past *COEC* or market valuations will have an influence on future levels of *VDQ* and thus the subsequent *COEC*. In this paper, I use the dynamic panel system GMM approach to determine the relation between *VDQ* and *COEC* with respect to dynamic endogeneity, simultaneity, and unobserved heterogeneity with the regression shown in Equation 3: [24]

$$\begin{bmatrix} COEC_{it} \\ \Delta COEC_{it} \end{bmatrix} = \alpha + \kappa \begin{bmatrix} COEC_{it-1} \\ \Delta COEC_{it-1} \end{bmatrix} + \beta \begin{bmatrix} DISC_{it} \\ \Delta DISC_{it} \end{bmatrix} + \gamma \begin{bmatrix} Z_{it} \\ \Delta Z_{it} \end{bmatrix} + \epsilon_{it}. \quad (3)$$

The dynamic panel system GMM contains an equation in differences and one in levels. The lagged historical variables in differences are used as instruments for the endoge-

[23] Please see Holtz-Eakin, Newey, and Rosen (1988), Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) for further insights.

[24] The second and third hypotheses with respect to the external information environment level and uncertainty are addressed with in the same spirit as Equation 3 but include an indicator variable D_{IE} and interaction term between *DISC* and the indicator variable.

nous variables in the level regression and vice versa. Z_{it} are the control variables from the previous static regressions: *BETA*, *LEV*, *MTBV*, *SIZE*, and *IA*. There are two main econometric advantages of this approach: First, differencing eliminates a potential omitted variables bias and unobserved heterogeneity. Second, using the past values of the corresponding variables for the present mitigates potential biases from reverse causality and simultaneity. Following Wintoki, Linck and Netter (2012), I assume that only *AGE* (log of number of years since inception) and year indicators are exogenous which is reflected by D_{it}. Thus, the remaining variables are endogenous and summarized in the above dynamic panel regression by Z_{it}.

I specify the model according to the checklist in Roodman (2009) and use his *xtabond2* command in Stata in order to perform the dynamic panel system GMM regression with following options: *twostep*, *robust*, *small*, *orthogonal*, and *collapse*. I use the option *twostep* because the standard covariance matrix is robust to panel-specific autocorrelation and heteroskedasticity.[25] According to Blundell and Bond (1998), the two-step standard errors tend to be downward biased in a dynamic panel system. Thus, I use the finite-sample Windmeijer (2005) correction of the two-step covariance matrix. Further, I include time dummies and use *orthogonal* deviations, as the panel has gaps. With the *small* option, I evoke a correction for the small sample size. As in Wintoki, Linck and Netter (2012), I use the *collapse* option to avoid instrument proliferation.

In contrast to Wintoki, Linck and Netter (2012), I use only one lag of the dependent variable ($COEC_{t-1}$) on the right-hand side of the regression, because I think the *COEC* is more quickly reflected into the *VDQ* and the control variables than board size in performance. In order to obtain exogenous instruments, I use a lag of three years, which is reasonable to assume. I check the reliability of the system GMM estimates with the Hansen *J* test for instruments validity (over-identifying restrictions) and Arellano and Bond (1991) in order to test for serially uncorrelated error terms. The Hansen *J-statistic* tests the null hypothesis of a correct model specification and valid overidentifying restrictions. In other words, it tests if the instruments as a group are exogenous. Therefore, a *p*-value of 10 % or higher indicates that the lagged firm values are exogenous to the current values. The Arellano and Bond (1991) test for autocorrelation has the null hypothesis of no autocorrelation and is applied to the differenced residuals. Due to the construction of the dynamic system GMM panel, the AR(1) test will be usually rejected. Nevertheless, the AR(2) test remains

[25] Please see Roodman (2009) for further details on the command and detail estimation of dynamic panel data using *xtabond2*.

important to detect serial correlation in the level equation. A second-order serial correlation in the dynamic panel system GMM indicates a specification error and a potential omitted variable bias.

VII. Results

This section presents the results from the summary statistics as well as static and dynamic regressions models. First, I examine the regressions for the baseline hypothesis (H_1) followed by the analysis with respect to the external information-level (H_2) and uncertainty environment (H_3) proxied by the number of analysts' following, press coverage, and earnings-forecast dispersion.

A. Summary Statistics and Univariate Analysis

The summary statistics are available in Table VII. Companies with a low information-level environment not only have a higher implied cost of equity capital, they also tend to have lower *VDQ*. For example, the median value for *COEC* (*VDQ*) is 9.2 % (0.42) for the low analyst following subsample compared to 8.3 % (0.50) for the subsample with a high analyst following. In the same vein, these results are reflected in the corresponding subsamples based on press coverage. Companies with a high earnings dispersion have a significantly higher *COEC* but there is no difference between the subsamples concerning their *VDQ*. These results indicate that controlling for the external information-level and uncertainty environment is important.

The differences between the information environment subsamples are not only limited to the implied cost of equity capital and voluntary disclosure quality. As an example, the low analyst coverage sample has a median *BETA* of 0.45, whereas the high analyst subsample has a median of 0.89. Just based on the CAPM beta one would expect to see a higher median *COEC* for the high analyst following subsample, which is not the case. According to Hail (2002), these results may occur due to the "non-trading" bias for smaller companies.[26] The standard deviation for *DISC* is higher for the high information and low-uncertainty environment but the reverse is observable for $COEC_A$. This is in line with the findings in Botosan (1997).

[Table VII about here]

[26] The market index (Swiss Performance Index) in Switzerland is mainly driven by large capitalized companies.

B. Static Models

Table VIII contains the results of the regressions of voluntary disclosure quality on the implied cost of equity capital. The first two columns present the results for the baseline model from Equation (1) (see H_1) without considering the external information-level and uncertainty environment. The remaining columns consider the information environment with respect to analyst following, media coverage, and earnings dispersion, as in Equation (2) (see H_2 and H_3).

The results for the baseline hypothesis are available in Table VIII in Columns 1 (pooled OLS) and 2 (with firm fixed effects (FE)). The results indicate that there is a relatively small negative but insignificant effect of *DISC* on *COEC* for both regression specification (OLS: -0.01; t=-0.80 / FE: -0.01; t=-1.04). Before the inclusion of firm fixed effects, all coefficients (with the exception of *IA* and *MTBV*) of the control variables are highly significant and in the expected direction. Therefore, the market beta (*BETA*) and leverage (LEV) are positively related to *COEC*, whereas the market equity capitalization (*SIZE*) are negatively related. By the inclusion of firm fixed effects, the coefficient for *MTBV* changes the sign from negative to positive and *BETA* does not remain significant on the common significance levels. The adjusted R^2 increases from 0.27 to 0.30 due to the inclusion of firm fixed effects. However, there is *no* empirical evidence for the baseline hypothesis (H_1) that companies can decrease their *COEC* by providing their (potential) investors with *VDQ*.

For the opaqueness hypothesis (H_2), I control for the external information-level environment of the companies. The results for this analysis are available in Table VIII in Columns 3 and 4. As mentioned previously, companies with a low analyst following tend to have on average a higher implied cost of equity capital. The indicator variable, which indicates a low analyst following, echoes the previous finding from the summary statistics, but only for the hypothetical case where *DISC* is zero. This difference is fairly large with 0.03 and is significant on the 5 %-level for the pooled OLS regression. Our main interest is on the interaction term of the indicator variable with *DISC*, which is negatively related and highly significant for the pooled OLS analysis (-0.08; t=-2.88). This is in line with previous studies (e.g., Botosan, 1997), which find a negative impact of *VDQ* on the *COEC* for companies with a low-information environment. The overall effect of *DISC* is *positive* (0.02; t=1.23) but insignificant. In the pooled OLS regression, the control variables are again as expected despite the non-negative coefficient for the indicator variable for an international accounting standards. Due to the inclusion of firm fixed effects, the negative relation of *MTBV* switches again from negative to positive and *BETA* no longer remains significant but has the expected positive correlation. Most importantly, after including firm fixed effects to control for unobserved heterogeneity the relation between *VDQ* and *COEC* disappears (-0.02; t=0.94) for the opaque companies. Therefore, an unobservable or omitted factor such as managerial ability or firm culture, which is positively related to *VDQ* and negatively to *COEC*, seems to drive the results in the "normal" pooled OLS regression. The results for using press coverage as a proxy for a firm's general opaqueness are comparable but weaker (see the fifth and sixth columns of Table VIII).[27] The coefficient of the interaction term of low press coverage and *VDQ* is -0.04 and has a p-value of 0.104. In the same vein as the previous analysis with analyst following as a proxy, the results are not robust after controlling for unobserved heterogeneity. Given the results based on both external information proxies, I only find very limited empirical evidence for the opaqueness hypothesis (H_2).

The results from the regression, which control for the external information uncertainty environment (H_3) with a proxy based on the earnings forecast dispersion of financial analysts, are in the last two columns of Table VIII. Due to the inclusion of this proxy the company has to been covered by at least two financial analysts, which reduces the sample size from 1,039 to 971 firm-years. In contrast to the results from the opaqueness hypothesis, the coefficient on the interaction between the indicator variable and *DISC* is *robust* to the inclusion of firm fixed effects (OLS: -0.04; -0.04; t=-1.84 / FE: t=-2.23). The result is also economically significant but close to zero: A change in *VDQ* from the first quartile to the third quartile for the median company with a high earnings dispersion results in a reduction of the cost of equity by a half percentage with a 95% confidence interval of [-0.1071 and -0.0005].[28] In addition, the uncertainty-environment indicator variable shows a higher *COEC*. For example, those companies with a relatively high earnings dispersion have a higher *COEC* in average on 4.1 %, the fixed effects regressions. Including firm fixed effects increased the adjusted R^2 from 0.28 to 0.36. Based on the static investigation, I find empirical evidence for the uncertainty hypothesis (H_3), which is robust to the inclusion of firm fixed effects.

The main take away message from the static regressions is that there is only strong empirical evidence for the uncertainty hypothesis (H_3). The results for the opaqueness

[27] An analysis based on the Neue Zurcher Zeitung (NZZ) instead of the press coverage from LexisNexis is provided in the robustness section.

[28] These estimates were produced using the Stata package Clarify (King, Tomz, and Wittenberg 2000, Tomz, Wittenberg, and King 2003).

hypothesis (H_2) is mixed and there is no empirical evidence for the baseline hypothesis (H_1). In other words, there seems to be only a reduction of the *COEC* for companies with a relatively large earnings-dispersion forecast, which is robust to unobserved heterogeneity.

[Table VIII about here]

C. Dynamic Models

This subsection presents the results from the dynamic analysis in order to control for dynamic endogeneity with potential simultaneity and unobserved heterogeneity. As an intermediate step before applying the dynamic panel system GMM estimation model, I use a simple dynamic OLS model with the lagged cost of equity capital as explanatory variable in order to take the incentives for the management into account. Using the past cost of capital will give us the first indication where the dynamic panel system GMM model will lead us.

Therefore, I examine a dynamic OLS model, which is similar to the previous static model, but does contain the lagged *COEC*. Table IX contains the results for this analysis. As a final step, I will examine the relation between *COEC* and *VDQ* with a dynamic panel system GMM approach, which further mitigates the potential simultaneity and unobserved heterogeneity. These results are available in Table X.

Dynamic OLS and FE

Based on the statistical view and the economic argumentation, controlling for the past *COEC* seems to be important: For example, for the model to investigate the baseline hypothesis (H_1) the adjusted R^2 increases from 0.27 to 0.46 (0.30 to 0.36) (with firm fixed effects). Furthermore, results indicate that the coefficient for the past *COEC* is highly significant (0.50; t=8.53) as we can see in Table IX. However, the coefficient on *DISC* is negatively related but insignificant (-0.01; t=-1.30). It is important to note that the control variables have the same magnitude as in the previous static investigation and introducing firm fixed effects with this dynamic model does not change the main results for the baseline hypothesis (H_1).

Further analysis for opaqueness hypothesis (H_2) echo the findings from the static regressions. Therefore, the relation between *COEC* and *VDQ* is only significant for the companies with a low analyst following but only in the case if firm fixed effects are neglected (DynOLS: -0.05; t=-2.58 / DynFE: -0.02; t=-1.09). Using media coverage as a proxy delivers results that are not significant on the common statistical level, which echoes the previous findings in the static regressions.

The results from a dynamic OLS model for the uncertainty hypothesis (H_3) yield results that are not statistically significant on the common levels (Both: -0.03; DynOLS: t=-1.49; DynFE: t=-1.37). Given the results from a dynamic OLS model, I find no empirical evidence for all three hypotheses.

[Table IX about here]

Dynamic Panel System GMM Estimation

Again, the first two columns in Table X are the results for the baseline hypothesis (H_1). The third (fifth) and the forth (sixth) column are for the analysis for the opaqueness hypothesis and based on the analyst following (media coverage). The last two columns contain the results for the uncertainty hypothesis (H_3), with the earnings dispersion as proxy.

This dynamic estimation comes with a cost, because it reduces the sample size. Due to the data requirements (lagged variables) the sample is reduced from 173 (1,039) to 166 (927) firm(-year)s. Applying the dynamic panel system GMM estimator for the baseline hypothesis (H_1) indicates that *VDQ* does *not* decrease the implied *COEC*. The coefficient of *DISC* is large (-0.21) but insignificant (t=-1.22). Furthermore, the coefficient of the lagged *COEC* increases from 0.50 to 0.66 compared with the previous dynamic OLS regression model and is highly significant (t=4.67). The remaining control variables, despite *MTBV*, are statistically indistinguishable from zero on the common levels. Naturally, this raises the question of the reliability of the empirical model. There are several main checks to perform for a dynamic panel system GMM model, which are as follows.

First, the model should not have more instruments (24) than the number of firms (166). This is not the case in my analysis because I use the *collapse* option in the *xtabond2* Stata command, which only uses instruments with the exact specified lag as instrumental variables. Omitting this option would lead to the usage of the entire firm's history as instrumental variable for the current values. The usage of the *collapse* option is strongly recommended by Wintoki, Linck and Netter (2012) and Roodman (2009) to avoid instrument proliferation.

Second, I perform the tests of over-identification restrictions (Hansen J), which the model passes with a p-value of 0.68. This indicates that the instruments are valid.

Third, I investigate whether the residuals have a second-order serial correlation with the AR(2) test of Arellano and Bond (1991). The resulting p-value of 0.08 indicates that the estimates of the dynamic panel system may suffer from an omitted variable bias or specification problem.[29] Therefore, I estimate an alternative dynamic system panel GMM model with the specification that the instrumental variables are used by a lag of three and previous four years.[30] This specification passes the AR(2) test. Due to this specification, the instrument should be more exogenous in comparison with the specification lag of three years.

Lastly, if multiple lags are used as instruments, the Diff-in-Hansen tests of exogeneity, which has the null hypotheses that the instruments used for the equations in levels are exogenous, it should verify the assumption that any correlation between the endogenous variables and the unobserved (fixed) effect is constant over time. Therefore, the test verifies if the lagged differences are exogenous for the level equation. The alternative lag specification (3 4) allows us to conduct the test. Furthermore, the additional lag specification test should help us in understanding the underlying model and should be more robust in terms of the exogeneity concerns of the instruments. The results of the alternative lag specification (3 4) are comparable. For example, *DISC* is smaller in magnitude but still statistically indistinguishable from zero. Although, only one control variable is significant, this alternative specification mitigates concerns that the generated instruments are not exogenous. For example, the Hansen J test (p=0.17), AR(2) test (p=0.10^{+}) indicate that the model-generated instruments are exogenous. Further, the Diff-in-Hansen test indicates that the instrumental variables tend to be exogenous (p=0.37) As already seen in the static and dynamic OLS regression, I find *no* evidence for the baseline hypothesis (H_1).

Focusing on the opaqueness hypothesis (H_2) in Columns 3-6 in Table X does not change the results and gained insight from the dynamic OLS investigation. For example, the coefficient *DISC* is insignificant (-0.81; t=-0.55) for the dynamic panel system GMM with the specification lag (3) and opaqueness proxied by the analyst following. The coefficient for the interaction term between the low analyst following indicator and *VDQ* is -0.10. However, it is statistically indistinguishable from zero on the normal levels of significance

[29] It is important to note, that the Hansen J test and the test of second-order serial correlation (AR(2)) check the validity of the instruments under the assumption that I already have the "right" empirical model specification.

[30] I will refer to this alternative setting as the lag specification (3 4).

and it has a p-value of 0.115 based on a two-tailed t-test, which is more conservative. However, using the alternative lag specification (3 4), the coefficient on the interaction term is (-0.08; t=-1.33). Reflecting previous findings, the indicator variable for a low analyst following indicates that these companies have statistically higher *COEC*, which is also in line with the findings for the univariate tests. In addition, I include more variables (indicator and interaction term) in the model, the number of instruments (28) is lower than the number of included companies (147). The instruments are passing the Hansen J and the AR(2) test. Using media coverage as a second proxy for external information-level-environment does not change the results and the interpretation of the dynamic panel system GMM model. Similar to the low analyst following analysis I find *no* empirical evidence for a reduction of *COEC* due to *VDQ*. Thus, there is no empirical evidence that supports the opaqueness hypothesis (H_2).

Using the earnings dispersion as a proxy to investigate uncertainty hypothesis (H_3) reduces the sample size to 871 firm-years and 158 companies. The results are available in the last two columns in Table X. Again, and as a repetition to the dynamic OLS investigation, I find no empirical evidence that supports the uncertainty hypothesis (H_3). The significant results from the static regressions disappear after controlling for the potential dynamics between the cost of equity and voluntary disclosure quality.

[Table X about here]

D. Additional Analyses

D.1. Disclosure Overload

Motivated by the analytical findings of Bertomeu, Beyer, and Dye (2011) and the discussion about the disclosure overload (e.g., IASB, 2013), I examine whether there exist some sort of diminishing effect of voluntary disclosure quality. I asked myself: Do we have really a linear relation? And is more *VDQ* really better? Empirical accounting research often assumes that the underlying economic relation is of a linear nature. This would require that all managers would deliver the maximum amount of *VDQ* or at least try to fulfill the expectations of the market. As a further investigation, I relax this assumption and introduce a *DISC*-squared term in the regressions and re-run the analysis. I expect *DISC* to be negatively related to the *COEC* and the *DISC*-squared to be positively related due to the diminishing marginal utility of *VDQ*. The results are in Table XI. The results for the baseline hypothesis (H_1) indicate that the *net* effect of *VDQ* disappears with an increasing *VDQ*. To be more precise, both coefficient are highly significant ($DISC$=-0.20; $DISC^2$=0.21). Including the firm fixed effects, the coefficients are (-0.11) and 0.11 for $DISC$ and $DISC$-squared, respectively. For an average company this would indicate that the usage of an average (0.47) *VDQ* would have the highest effect on *COEC*. I also re-run the analysis with the dynamic panel system GMM estimator and obtain robust results. $DISC$ is (-0.55) and $DISC^2$ is 0.48 for the baseline hypothesis, which would yield an optimal effect of $DISC$ in the area of 0.56. After controlling for the opaqueness hypothesis (H_2) and the uncertainty hypothesis (H_3) with an indicator variable and an interaction term, the loadings on $DISC$ and $DISC^2$ become smaller than in the baseline model, which supports the notion of a potential non-linear effect of voluntary disclosure quality on cost of equity capital. This could explain at least the results in this paper based for the opaqueness hypothesis (H_2) and the uncertainty hypothesis (H_3).

[Table XI about here]

D.2. Individual Disclosure Categories

I also try to examine which type of disclosure may have an impact on cost of equity capital. Although, a very interesting question, it is extremely hard, to disentangle the effects stemming from the different types of disclosure. In order to avoid multicolinearity issues, I used the 9 subindices separately from each other. The results for the low analyst following analysis with a dynamic panel system GMM (Lag 3) indicate that disclosures related to background information (subindex 2) and value based management (subindex 6) have a negative and statistically interaction term of disclosure and cost of equity. The results are available in Table XII.

[Table XII about here]

E. Specification and Robustness Tests

To assess the sensitivity of the results, I perform a battery of specification and robustness checks. If not else-wise indicated, the results are comparable in magnitude and interpretation. I analyze the results in three dimensions, (i) the cost of equity capital, (ii) voluntary disclosure quality, (iii) sample and specification. In order to convey space and brevity, I do not tabulate the results.

1. Implied Cost of Equity Capital

I calculate the average implied *COEC* to mitigate potential measurement errors. For further insight, I re-run the analysis for every individual-estimation model. In line with Hail (2002), I find a significant relation by using the implied cost of equity capital model of Gebhardt, Lee and Swaminathan (2001) for the baseline hypothesis, even after including firm fixed effects (-0.02; t=-2.50). However, the same coefficient is *not* significant for the dynamic panel system GMM estimation (-0.07; t=-0.50).

In general models, I find the same results as in the main analysis.[31], for the other three *COEC* Therefore, the coefficients for the interaction term of *DISC* and D_{IE} are negatively significant but only if firm fixed effects are neglected. These results provide empirical evidence for the possibility that the results of the plain vanilla OLS regression may be biased due to the omitted variables such as managerial ability or firm culture.

In further specification tests of the implied *COEC* measure—instead of the average of the four models—I use (i) the median, (ii) a prediction of a principal component analysis of the four cost of equity models, and (iii) the average cost of equity capital but only below 25% to mitigate potential outliers. The results and the interpretation remain unchanged.

Aside from this, I re-run the analysis for only those companies, where *all* four implied *COEC* models yield an estimate in the corresponding year. Again, the results and the interpretation remain unchanged.[32]

2. Voluntary Disclosure Quality

Any rating system has some degree of subjectivity attached to it, and the annual value reporting rating, which is used as my *VDQ* proxy, is no exception. According to Cooke and Wallace (1989), an index is reliable if other researchers may replicate the results. Healy et al. (1999) put the replicability into question. They consider that a general drawback of disclosure studies is the difficulty in measuring voluntary disclosure because it is often based on personal judgments and therefore difficult to replicate.[33] However, a great effort

[31] One exception: The dynamic system panel GMM estimator with the lag specification (3 4) for $COEC_E$ indicates a negative interaction term (-0.25; t=-1.66).
[32] The negative interaction term for analyst coverage and *VDQ* if all four cost of equity capital models are required is significantly negative but does not pass the Hansen J test.
[33] A recommendable review of disclosure indices in accounting is provided by Marston and Shrives (1991).

has been made to minimize this potential issue and make the rating index evident.[34]

Another possible issue is the focus on voluntary disclosure in printed annual reports. Any additional voluntary disclosure provided by the companies in interim reports, conference calls, roadshows, and analyst meetings is omitted from this analysis. In line with previous research (e.g., Lang and Lundholm, 1993), I find empirical evidence of a significant and high-positive correlation between disclosure in annual reports and another channels of communication. Therefore, it is not surprising that I find a positive association (0.57 in 2007) between the *VDQ* scores based on annual reports and those from corporate Websites with focus on the investor relations. Therefore, the use of voluntary disclosure in annual reports as a proxy of general voluntary disclosure seems to be justified. Nevertheless, I rerun the analysis for the Web-based disclosure score, which has been collected since 2000.[35] The results and the interpretation remain unchanged.[36]

As a further test, I use a principal component analysis for all nine subindices to generate a new disclosure score to show that the results are not driven by the implicit weights of the original disclosure score. In the same spirit, I use a principal component analysis to generate a disclosure score based on the annual reports *and* the Web-based score. For both robustness checks, the results and their interpretation remain unchanged.

3. Specification and Sample

Time and (firm)-fixed effects.

Including time fixed effects in order to control for a potential time trend or exogenous time shocks on the cost of equity capital asuch as the financial crisis, have an impact on the results: The results for the baseline hypothesis (H_1) indicate a *positive* and significant relation (OLS: 0.04; t=2.11) between voluntary disclosure and the cost of equity capital. However, when controlling for unobserved heterogeneity, the significant positive relation disappears (FE: 0.02; t= 1.33). The same pattern is observable for the opaqueness hypothesis (H_2) (proxied by media coverage). However, the results are different for the analyst following split and earnings dispersion analysis. In general, the results indicate a positive effect of voluntary disclosure quality on the cost of equity capital for well-known companies

[34] First, the assessors have been carefully recruited and trained. A team consists of two independent assessors, allowing for double checking.

[35] The Web-based voluntary disclosure quality score is available upon request.

[36] There is a negative interaction term for analyst coverage and *VDQ* (-0.03; t=-2.16) but again this relation does not hold for the dynamic panel system GMM due to the specification problem, which is indicated by the AR(2) test.

and the coefficient on *DISC* is *positive* and significant even after controlling for firm fixed effects. The coefficient for the interaction effect is in the same range as the coefficient on *DISC* but negative and statistically significant. After controlling for firm fixed effect and time fixed effect, only the analysis for the uncertainty hypothesis (H_3) indicates noteworthy results: The coefficient for *DISC* is 0.03 with a t-statistics of 1.77 and the coefficient of the interaction term is -0.04 with t-statistics of -2.09. These results indicate a different effect for companies from a low-/high-information or -uncertainty environment. One possible explanation would be that the estimated effect is not linear.

Alternative Indicator Specification.

I create the indicator variable on the median level for the external information-level- and uncertainty-environment proxy. To gain further insight, I use the lowest tercile as a breakpoint for the indicator variable based on analyst following, media coverage, and earnings dispersion. I would expect to find stronger results for the even more opaque companies. The interaction term is -0.08 (-0.05) with a t-statistic of -0.40 (-1.95) for the pooled OLS (including firm fixed effects) for the low analyst following companies. In fact, the interaction term of the regression, which includes firm fixed effects is slightly larger and significant. No significant result is obtainable for the media coverage split whereas an effect is observable for companies with a high earnings dispersion (OLS: -0.05; t=-1.99 / FE: -0.05; t=-2.22). Again, these results (for analyst following and earnings dispersion) are not robust for the application of the dynamic panel system GMM approach.

Exclusion of Financial Companies.

Further, I estimate the static and dynamic models for the subsample without the financial companies.[37] The sample reduces to 850 firm-year observations. The results for the baseline hypothesis (H_1) indicate that *VDQ* is not significantly related to the *COEC* on the common level. Including firm fixed effects, the coefficient of *DISC* is -0.02 with a t-statistic of -1.61, which has a p-value of 0.11. The analysis for the opaqueness hypothesis (H_2) based on the low analyst following proxy shows a negative interaction term of -0.07 (-0.05) with a t-statistic of -2.52 (-1.86) for the pooled OLS (including firm fixed effects). These results hold for only one of the two dynamic panel system GMM specifications including the corresponding checks. For example, the lag specification (3 4) yields in an

[37] Therefore, I exclude the financial and insurance industry (based on the "Industry Classification Benchmark" number; ICB: 8000) and re-run the analysis.

interaction term of -0.11 with a t-statistic of -1.78, where as the lag specification (3) has a t-statistic of -1.16.[38]

Exclusion of U.S. Cross-Listed Companies.

In order to verify, that the results are not driven by cross-listed companies in the U.S. that face stronger regulations, I estimate the regressions with a non-cross-listed subsample, which reduces the sample to 957 firm-year observations. The results remain unchanged for the static external information-level-environment analysis (opaqueness hypothesis (H_2)) but not for the uncertainty hypothesis (H_3). For both static regression models, I obtain a significant negative interaction term. The dynamic panel system GMM analysis and its interpretation remain unchanged and therefore I find no significant effect of VDQ on $COEC$.

Exclusion of the Beginning of the Financial Crisis (2007/2008).

Additionally, I check whether the results are driven by the inclusion of the financial crisis. As a robustness check I exclude the years 2007 and 2008. The results and interpretation remain unchanged.

Alternative Media Database.

Instead of relying on the LexisNexis database I use the number of articles in the Neue Zurcher Zeitung (NZZ), which is an important newspaper for investors in Switzerland. The results shows a negative interaction term (OLS: -0.07; t=-2.76 / FE: -0.05; t=-2.26) for the static regressions. The results are slightly smaller but still robust in the dynamic OLS model but are not significant on the common levels in the dynamic panel system GMM model. However, the p-value of the interaction term in the lag specification (3 4) is 0.11. In contrast, using the lag specification (3) gives an insignificant result (-0.07; t=0.90).

Alternative Beta Measure.

In order to address the potential non-trading-bias, I derive the market beta based on monthly returns for a five-year period instead of using weekly stock returns for a two-year period. The results and interpretation remain unchanged for static and dynamic models.

[38] The dynamic OLS regression without fixed effects indicates that the interaction term (-0.06; t=-2.49) is also significant on the common level. Including firm fixed effects, the coefficient is -0.04 with a t-stat of 1.61.

VIII. Limitations and Conclusion

A. Limitations

Measuring the Cost of Equity Capital.

A drawback of relying on the implied cost of equity capital measures is the data requirement of analyst coverage, which yields to a reduced sample size compared with Eugster and Wagner (2013). Unfortunately, the companies without any analyst coverage may benefit the most from providing voluntary disclosure quality to their investors (at least according to my opaqueness hypothesis (H_2)). Future research may focus on these very opaque companies by using a cross-sectional earnings model of Hou, van Dijk, and Zhang (2012). Unfortunately, the cross-section in Switzerland is relatively small compared to the U.S. in generating trustworthy and reliable earnings forecasts, which would allow me to calculate the implied cost of capital measures for those companies without an analyst.

Measuring Voluntary Disclosure Quality.

As previously mentioned, the use of disclosure score as a proxy for disclosure and value reporting quality is criticized by researchers because of the replication of the index. However, no other solution to directly measure quality and quantity of disclosure is available.

Estimation Method: Dynamic Panel System GMM.

According to Wintoki, Linck and Netter (2012), the dynamic panel GMM estimator does not solve all endogeneity problems and also has its limitations. A basic assumption is that the company's history (lags of independent and dependent variables) is reliable for identification, therefore the generated instruments should be (i) exogenous and (ii) relevant. Furthermore, a bias could arise from errors in variables (measurement errors in *VDQ* or *COEC*), which may be increased with the panel data estimation (Griliches and Hausman 1986). Furthermore, the dynamic panel system GMM contains an equation based on the first difference, which does not eliminate the measure error bias. I try to follow best practices in order to measure the cost of equity capital and voluntary disclosure quality but the concerns about measurement errors remain. Lastly, the estimated results are sensitive to the option used in the Stata *xtabond2* command. I follow the checklist in Roodman (2009).

B. Conclusion

I use the econometric opportunity of a panel with static regressions (including firm fixed effects) to control for unobserved heterogeneity and a dynamic panel system GMM estimator to analyze the effect between *VDQ* on the *COEC* for the Swiss market from 1999-2008.

First, the baseline results provide *no* empirical evidence for a negative effect of *VDQ* on the implied cost of equity capital.

Second, after taking account of the disperse external information-level (opaqueness hypothesis (H_2)) and the uncertainty environment (uncertainty hypothesis (H_3)), I find a negative relation for voluntary disclosure quality and the implied cost of equity capital. As expected from previous studies (for example, Botosan 1997) a negative relation is observable for companies from a low-information environment. After controlling for unobserved heterogeneity and including firm fixed effects, the negative relation vanishes. A potential explanation may be that managerial ability or firm culture drive the pooled OLS results.

Third, because the underlying relation between *VDQ* and *COEC* may be dynamic, I estimate the relation with a simple dynamic OLS panel (including firm fixed effects) and find only mixed evidence for an effect of *VDQ* on the *COEC*, which maybe driven by unobserved heterogeneity. Most importantly, I examine a dynamic panel system GMM approach and find *no* significant empirical relation between the investigated variables, even for the companies from a low-information or high-uncertainty environment. Therefore, I conclude that there is *no* significant negative relation between *VDQ* and the *COEC* when applying the appropriate research methods for the full disclosure score.

Forth, using the individual disclosure scores, indicate that at least background information and value-based management related disclosure can decrease the cost of equity capital for companies in a low information environment.

Last but not least, additional tests indicate that the examined relation between *VDQ* and *COEC* may be not linear. This indicates a marginal utility of voluntary disclosure quality in order to decrease the cost of equity capital.

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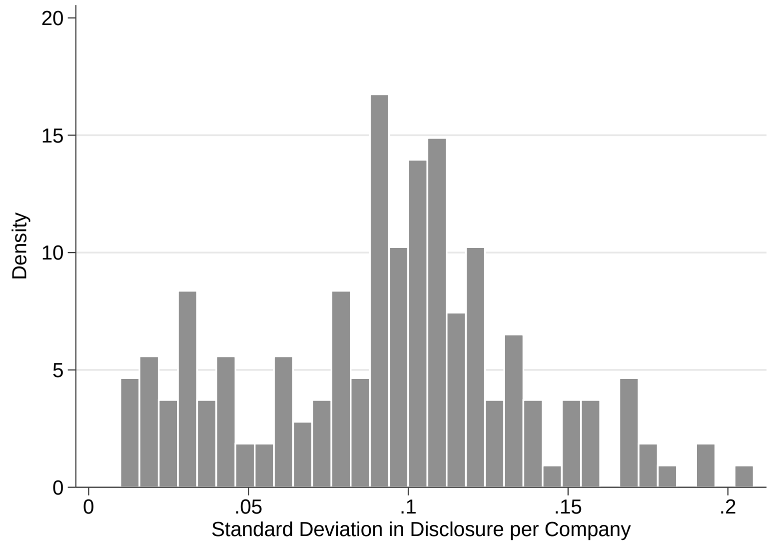

Figure 1. Standard Deviation in Disclosure per Company.
This figure summarizes the standard deviation in voluntary disclosure quality per company over the sample period.

Table I
Criteria List

This is the criteria list of the Annual Value Reporting Rating conducted on a yearly basis by the Department of Banking and Finance from the University of Zurich. Based on the results, which are a straightforward summation of the scores from this rating, I construct the *DISC* as a simple fraction of the total points by the maximum points that have been possible to achieve. The full disclosure index is available in the appendix of the dissertation.

1	**Impression**
1.1	Structure, usability
1.2	Style, comprehensibility, language, illustrations
2	**Background Information**
2.1	Discussion of important products
2.2	Discussion of important markets and market share
2.3	Strategy, critical success factors
2.4	Corporate Governance I: Organization
2.5	Corporate Governance II: Governance
3	**Important Non-Financials**
3.1	Publication of future investments
3.2	Publication of investments in education of staff
3.3	Discussion of innovation rate and process of development
3.4	Discussion of customer satisfaction
3.5	Discussion of employee satisfaction
3.6	Process improvement
3.7	Brand introduction
4	**Trend Analysis**
4.1	Revenue trend by region/segment
4.2	Profit trend by region/segment
4.3	Investment trend by region/segment
4.4	Total shareholder return
5	**Risk Information**
5.1	Implementation of risk management
5.2	Publication of quantitative data of risk management
6	**Value Based Management**
6.1	Application of value based management
6.2	Publication of quantitative data
6.3	System of management compensation
6.4	Quantitative data of management compensation
7	**Management-Discussion and Analysis of Financial Statements**
7.1	Reasons for change in revenue / market share and provisions
7.2	Reasons for change in profit and provisions
7.3	Reasons for change in future investments and provisions
8	**Goals and Credibility**
8.1	Target rentability or profit
8.2	Target growth (revenue/market share)
9	**Sustainability**
9.1	Illustration of enterprise and product ecology
9.2	Quantitative statements to the environmental impact
9.3	Discussion of environmental issues
9.4	Illustration of social policy
9.5	Quantitative statements to the social policy
9.6	Discussion of social policy

Table II
Summary Statistics: Voluntary Disclosure Quality Score

This table summarizes the voluntary disclosure quality total score scaled by the maximum reachable points (*DISC*) for the years 1999-2008. Δ Q3 - Q1 is the difference between the third quartile and first quartile. Pr. stands for percentile and SD for standard deviation.

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Observations	82	98	97	109	117	110	111	114	117	84	1,039
Minimum	0.15	0.16	0.24	0.05	0.27	0.29	0.30	0.27	0.32	0.36	0.05
1% Pr.	0.15	0.16	0.24	0.09	0.28	0.31	0.31	0.27	0.34	0.36	0.16
5% Pr.	0.19	0.26	0.34	0.14	0.30	0.32	0.35	0.34	0.37	0.40	0.21
25% Pr.	0.31	0.38	0.44	0.19	0.36	0.37	0.40	0.42	0.44	0.46	0.37
Median	0.38	0.47	0.50	0.24	0.40	0.43	0.46	0.50	0.50	0.53	0.45
75% Pr.	0.46	0.54	0.56	0.31	0.48	0.51	0.55	0.57	0.59	0.63	0.54
95% Pr.	0.58	0.76	0.72	0.53	0.61	0.68	0.69	0.69	0.69	0.75	0.69
99% Pr.	0.63	0.88	0.84	0.62	0.71	0.72	0.71	0.76	0.78	0.78	0.78
Maximum	0.63	0.88	0.84	0.66	0.75	0.73	0.73	0.78	0.81	0.78	0.88
SD	0.12	0.15	0.12	0.12	0.10	0.10	0.10	0.11	0.10	0.11	0.14
Δ Q3 - Q1	0.15	0.16	0.12	0.12	0.12	0.14	0.14	0.15	0.15	0.17	0.17

Table III
Sample Industry Breakdown

This table lists the total number of firms covered by the Annual Value Reporting Rating and classified by the corresponding industry over the years. The industry classification is provided by the ICB (Industry Classification Benchmark).

ICB	Industry	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total	
1000	Basic materials	6	7	7	11	9	9	10	9	8	4	80	8%
2000	Industrials	26	33	35	35	34	34	34	34	37	25	327	31%
3000	Consumer goods	7	11	9	10	12	10	11	13	13	9	105	10%
4000	Health care	10	11	12	14	13	11	12	13	15	12	123	12%
5000	Consumer services	12	13	12	11	13	13	13	12	11	7	117	11%
6000	Telecommunications	0	1	1	1	1	1	1	1	1	1	9	1%
7000	Utilities	1	0	0	4	4	4	4	4	4	2	27	3%
8000	Financials	16	16	14	14	22	22	21	22	23	19	189	18%
9000	Technology	4	6	7	9	9	6	5	6	5	5	62	6%
	Total	82	98	97	109	117	110	111	114	117	84	1,039	100%

Table IV
Summary Statistics: Implied Cost of Equity Capital

This table presents the cost of equity capital estimates' distribution statistics and correlation coefficients for the sample with the period from 1999-2008. $COEC_A$ is the average of the four implied cost of equity models of Claus and Thomas (2001) ($COEC_{CT}$), Gebhardt, Lee, and Swaminathan (2001) ($COEC_{GLS}$), Ohlson and Juettner-Nauroth (2005) ($COEC_{OJN}$), and Easton (2004) ($COEC_E$). $DISC$ is the voluntary disclosure score. LEV is the leverage and $BETA$ is the beta factor derived from a regression of weekly excess returns of the company on the Swiss market portfolio proxied by the Swiss Performance Index over two years. $SIZE$ is the *log* of the equity market value of the company. $MTBV$ is the market-to-book value for the company over the time. Pr. stands for percentile and SD for standard deviation. Panel A. provides the minimum, first quartile (Q1), average, median, third quartile (Q3), maximum and standard deviation (SD). Panel B. shows the summary statistics for $COEC_A$ on a yearly basis. Panel C. shows the Pearson pair-wise correlations (* denotes significant at 10 %.) for the cost of equity estimates and selected variables. Panel D. shows the summary statistics for $COEC_A$ based on the information and uncertainty environment based on the median value of the following three proxies: (i) $ANALYST$ is the yearly average number of analyst following, (ii) $MEDIA$ is the yearly media coverage from LexisNexis, and (iii) E_D is the dispersion of analysts earnings (EPS) one-year ahead forecasts measured as yearly average.

Panel A: Descriptive Statistics for Implied Cost of Equity Estimates

	Obs.	Min	Q1	Aver.	Median	Q3	Max	SD
$COEC_{CT}$	1,039	0.022	0.069	0.089	0.084	0.101	0.287	0.033
$COEC_{GLS}$	1,039	0.014	0.057	0.076	0.072	0.089	0.220	0.029
$COEC_E$	996	0.006	0.070	0.111	0.089	0.125	1.000	0.083
$COEC_{OJN}$	894	0.010	0.087	0.111	0.104	0.128	0.313	0.039
$COEC_A$	1,039	0.030	0.072	0.097	0.086	0.110	0.402	0.042

Panel B: Cost of Equity Capital $COEC_A$ by Year

	Obs.	Min	Q1	Aver.	Median	Q3	Max	SD
1999	82	0.037	0.068	0.089	0.081	0.097	0.322	0.042
2000	98	0.032	0.067	0.085	0.082	0.101	0.200	0.027
2001	97	0.037	0.076	0.100	0.093	0.115	0.278	0.039
2002	109	0.042	0.085	0.123	0.107	0.138	0.367	0.060
2003	117	0.045	0.084	0.125	0.115	0.146	0.402	0.060
2004	110	0.031	0.078	0.103	0.096	0.115	0.264	0.037
2005	111	0.034	0.073	0.090	0.085	0.101	0.234	0.028
2006	114	0.030	0.067	0.082	0.079	0.093	0.142	0.020
2007	117	0.039	0.065	0.074	0.073	0.083	0.155	0.017
2008	84	0.048	0.073	0.092	0.085	0.099	0.276	0.035

Panel C: Correlations between the Implied Cost of Equity Estimates and Selected Variables

	$COEC_{CT}$	$COEC_{GLS}$	$COEC_E$	$COEC_{OJN}$	$COEC_A$	$DISC$	$BETA$	LEV
$COEC_{GLS}$	0.80*							
$COEC_E$	0.61*	0.54*						
$COEC_{OJN}$	0.83*	0.68*	0.87*					
$COEC_A$	0.85*	0.77*	0.92*	0.96*				
$DISC$	-0.17*	-0.29*	-0.22*	-0.21*	-0.24*			
$BETA$	0.02	-0.09*	0.10*	0.07*	0.06*	0.21*		
LEV	0.12*	-0.01	0.07*	0.05	0.08*	0.16*	0.14*	
$SIZE$	-0.38*	-0.46*	-0.37*	-0.36*	-0.43*	0.53*	0.40*	0.21*

Panel D: Descriptive Statistics for the Implied Cost of Equity $COEC_A$ for Sample Splits

	Obs.	Min	Q1	Aver.	Median	Q3	Max	SD
High Analyst F.	509	0.032	0.071	0.088	0.083	0.098	0.241	0.027
Low Analyst F.	530	0.030	0.073	0.105	0.092	0.120	0.402	0.052
High Media C.	503	0.032	0.072	0.093	0.084	0.101	0.390	0.037
Low Media C.	536	0.030	0.072	0.100	0.090	0.116	0.402	0.046
High Earnings D.	483	0.044	0.074	0.100	0.089	0.112	0.402	0.044
Low Earnings D.	488	0.032	0.071	0.091	0.083	0.103	0.285	0.031

Table V
Year-to-Year Transition Probabilities Matrix for DISC

This table contains the year-to-year transition probabilities matrix for disclosure score $DISC$, which shows the probabilities of a company moving from decile i in year t (columns) to decile j in year $t+1$ (rows).

t+1 / t	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
D1	**0.35**	0.24	0.15	0.09	0.04	0.05	0.04	0.00	0.04	0.00
D2	0.26	**0.23**	0.18	0.14	0.11	0.04	0.00	0.01	0.03	0.00
D3	0.11	0.19	**0.19**	0.13	0.10	0.11	0.06	0.08	0.02	0.01
D4	0.13	0.13	0.24	**0.11**	0.13	0.06	0.07	0.07	0.04	0.01
D5	0.05	0.04	0.14	0.14	**0.28**	0.19	0.05	0.08	0.03	0.01
D6	0.02	0.04	0.13	0.14	0.15	**0.18**	0.14	0.06	0.10	0.03
D7	0.04	0.01	0.01	0.10	0.10	0.22	**0.22**	0.15	0.14	0.01
D8	0.01	0.00	0.05	0.05	0.08	0.15	0.22	**0.22**	0.15	0.07
D9	0.00	0.00	0.02	0.03	0.01	0.07	0.10	0.27	**0.31**	0.17
D10	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.09	0.21	**0.67**

Table VI
Sample Selection

This table presents the sample selection. On the left (right) side is the sample breakdown on the firm level (firm-year level). The AVR is the Annual Value Reporting Rating conducted on a yearly basis by the Department for Banking and Finance from the University of Zurich. I use this data *(DISC)* as voluntary disclosure score. I/B/E/S is the Institutional Brokers' Estimate System.

Sample Breakdown (per company)		Observation Information (firm-year)	
Unique companies in AVR	293	All *DISC* scores	1,297
Not listed at all	-80	Missing I/B/E/S analyst data	240
Subtotal	213	Missing data (capital market)	18
No market data available	-10	Total firm-year	1,039
Lack of I/B/E/S analyst data	-30		
Total in sample	173		

Table VII
Summary Statistics: Full Sample and the Different Information Environments

This table presents the summary statistics for the variables used for the regression analysis. $COEC_A$ is the average of the four implied cost of equity models of Claus and Thomas (2001) ($COEC_{CT}$), Gebhardt, Lee, and Swaminathan (2001) ($COEC_{GLS}$), Ohlson and Juettner-Nauroth (2005) ($COEC_{OJN}$), and Easton (2004) ($COEC_E$). *DISC* is the voluntary disclosure score. *LEV* is the leverage and *BETA* is the beta factor derived from a regression of weekly excess returns of the company on the Swiss market portfolio proxied by the Swiss Performance Index over two years. *SIZE* is the *log* of the market value of the company. *MTBV* is the market-to-book value for the company over the time. *IA* indicates if the company has an international accounting standard (IFRS or US GAAP). *ANALYST* is the yearly average number of analyst following. *MEDIA* is the yearly media coverage from LexisNexis. E_D is the dispersion of analysts earnings (EPS) one-year ahead forecasts measured as yearly average. I build D_{IE} the indicator variable based on the corresponding yearly median value for the three information proxies. Pr. stands for percentile and SD for standard deviation. The sample period is 1999-2008.

	COEC	*DISC*	*LEV*	*MTBV*	*BETA*	*SIZE*	*IA*	*ANALYST*	*MEDIA*	E_D	*COEC*	*DISC*	*LEV*	*MTBV*	*BETA*	*SIZE*	*IA*	*ANALYST*	*MEDIA*	E_D
Panel A: Full Sample																				
Minimum	0.030	0.052	0.00	0.34	-0.10	3.73	0	1.0	0.0	0.0										
1 % Pr.	0.042	0.155	0.00	0.34	-0.10	3.73	0	1.0	0.0	0.0										
5 % Pr.	0.056	0.207	0.00	0.59	0.07	4.66	0	1.0	1.0	0.1										
25 % Pr.	0.072	0.367	0.15	1.19	0.37	6.09	0	3.4	6.0	0.3										
Median	0.086	0.448	0.46	1.89	0.64	7.10	1	6.8	21.0	0.8										
75 % Pr.	0.110	0.540	0.92	3.23	1.00	8.26	1	11.9	66.0	2.8										
95 % Pr.	0.166	0.690	4.86	7.43	1.61	10.90	1	26.7	400.0	9.0										
99 % Pr.	0.285	0.776	15.81	15.32	2.12	11.95	1	34.9	1049.0	23.5										
Maximum	0.402	0.880	15.81	15.32	2.12	11.95	1	43.7	2520.0	38.2										
SD	0.042	0.136	2.32	2.49	0.47	1.78	0.5	7.9	202.7	4.4										
Panel B: Analyst Following																				
	High Analyst Following										Low Analyst Following									
Minimum	0.032	0.086	0.00	0.39	-0.10	5.25	0	4.6	0.0	0.0	0.030	0.052	0.00	0.34	-0.10	3.73	0	1.0	0.0	0.0
1 % Pr.	0.048	0.155	0.00	0.57	0.04	5.70	0	5.1	0.0	0.1	0.042	0.155	0.00	0.34	-0.10	3.73	0	1.0	0.0	0.0
5 % Pr.	0.058	0.259	0.00	0.86	0.30	6.31	0	5.5	1.0	0.1	0.054	0.190	0.00	0.48	0.01	4.04	0	1.0	0.0	0.1
25 % Pr.	0.071	0.410	0.19	1.54	0.63	7.21	1	8.8	13.0	0.3	0.073	0.343	0.13	0.97	0.24	5.43	0	2.0	4.0	0.3
Median	0.083	0.500	0.48	2.50	0.89	8.17	1	12.1	46.0	0.7	0.092	0.418	0.43	1.49	0.45	6.16	1	3.4	12.0	1.0
75 % Pr.	0.098	0.603	0.90	4.16	1.23	9.32	1	18.8	133.0	2.5	0.120	0.481	0.94	2.32	0.68	6.89	1	5.0	31.0	3.5
95 % Pr.	0.142	0.729	4.60	9.33	1.80	11.65	1	30.6	615.0	7.6	0.190	0.576	5.07	5.25	1.26	8.10	1	7.8	104.0	11.2
99 % Pr.	0.178	0.781	15.81	15.32	2.12	11.95	1	38.0	1426.0	21.6	0.334	0.657	8.88	11.26	1.86	8.78	1	8.8	332.0	26.6
Maximum	0.241	0.880	15.81	15.32	2.12	11.95	1	43.7	2520.0	34.8	0.402	0.760	15.81	15.32	2.12	9.35	1	9.8	1049.0	38.2
SD	0.027	0.143	2.78	2.81	0.45	1.57	0.4	7.9	268.0	3.9	0.052	0.111	1.76	1.91	0.38	1.15	0.5	2.1	79.0	4.8
Panel C: Media Coverage																				
	High Media Coverage										Low Media Coverage									
Minimum	0.032	0.103	0.00	0.34	-0.10	3.73	0	1.0	3.0	0.0	0.030	0.052	0.00	0.34	-0.10	3.73	0	1.0	0.0	0.0
1 % Pr.	0.046	0.155	0.00	0.44	-0.01	4.23	0	1.0	4.0	0.1	0.042	0.138	0.00	0.34	-0.10	3.73	0	1.0	0.0	0.0
5 % Pr.	0.058	0.224	0.00	0.78	0.19	5.48	0	2.7	7.0	0.1	0.055	0.190	0.00	0.55	0.03	4.22	0	1.0	0.0	0.1
25 % Pr.	0.072	0.400	0.21	1.47	0.51	6.88	1	5.8	27.0	0.3	0.072	0.350	0.12	1.06	0.28	5.60	0	2.1	2.0	0.3
Median	0.084	0.500	0.55	2.24	0.84	7.96	1	10.8	69.0	0.9	0.090	0.419	0.38	1.55	0.51	6.46	1	4.2	7.0	0.8
75 % Pr.	0.101	0.600	1.07	3.53	1.19	9.31	1	18.5	152.0	3.0	0.116	0.490	0.81	2.74	0.79	7.27	1	7.6	20.0	2.5
95 % Pr.	0.154	0.720	5.53	6.89	1.80	11.65	1	30.6	723.0	11.6	0.180	0.600	3.76	7.65	1.35	8.42	1	12.6	39.0	8.1
99 % Pr.	0.229	0.781	15.81	15.32	2.12	11.95	1	38.0	1426.0	24.2	0.311	0.700	7.61	15.15	1.86	9.13	1	17.3	44.0	22.3
Maximum	0.390	0.880	15.81	15.32	2.12	11.95	1	43.7	2520.0	34.8	0.402	0.760	15.81	15.32	2.12	9.77	1	28.3	48.0	38.2
SD	0.037	0.145	2.90	2.38	0.48	1.82	0.4	9.0	271.5	4.6	0.046	0.116	1.55	2.56	0.41	1.24	0.5	3.9	12.6	4.1
Panel D: Earnings Dispersion																				
	Low Earnings Forecast Dispersion										High Earnings Forecast Dispersion									
Minimum	0.032	0.052	0.00	0.34	-0.10	3.73	0	1.1	0.0	0.0	0.044	0.086	0.00	0.34	-0.10	3.73	0	1.1	0.0	0.6
1 % Pr.	0.040	0.138	0.00	0.36	-0.03	4.46	0	1.3	0.0	0.0	0.050	0.155	0.00	0.44	-0.05	3.89	0	1.2	0.0	0.6
5 % Pr.	0.058	0.207	0.00	0.62	0.16	5.24	0	2.0	0.0	0.1	0.058	0.224	0.00	0.67	0.11	4.90	0	1.8	1.0	0.7
25 % Pr.	0.071	0.375	0.14	1.39	0.47	6.35	1	4.2	5.0	0.2	0.074	0.371	0.17	1.17	0.36	6.11	0	3.6	7.0	1.6
Median	0.083	0.460	0.48	2.35	0.76	7.55	1	8.1	24.0	0.3	0.089	0.452	0.45	1.73	0.60	6.98	1	6.4	22.0	2.8
75 % Pr.	0.103	0.560	0.96	3.83	1.12	8.77	1	16.2	71.5	0.5	0.112	0.540	0.87	2.76	0.93	7.90	1	10.1	71.0	5.0
95 % Pr.	0.155	0.705	6.09	8.93	1.71	11.65	1	30.3	469.0	0.9	0.178	0.680	3.41	6.10	1.58	10.14	1	21.2	329.0	15.3
99 % Pr.	0.187	0.781	15.81	15.15	2.01	11.95	1	38.8	1129.0	1.5	0.322	0.740	10.50	15.32	2.12	10.90	1	29.5	915.0	28.7
Maximum	0.285	0.880	15.81	15.32	2.12	11.95	1	43.7	1696.0	1.6	0.402	0.781	15.81	15.32	2.12	11.88	1	35.9	2520.0	38.2
SD	0.031	0.144	2.73	2.64	0.46	1.87	0.4	9.1	215.6	0.3	0.044	0.130	1.78	2.38	0.46	1.49	0.5	6.1	201.5	5.4

Table VIII
Regression of *COEC* on *VDQ*: Static Models

This table presents the results from the following regression:
$COEC_{A,t,M} = \alpha_i + \beta_0 * D_{IE} + \beta_1\, DISC_{it} + \beta_{1b} * D_{IE} * DISC_{it} + \beta_2\, BETA_{it} + \beta_3\, LEV_{it} + \beta_4\, SIZE_{it} + \beta_5\, MTBV_{it} + \beta_6\, IA_{it} + e_{it}$, where $COEC_{A,t,M}$ is the cost of equity capital for company i at time t estimated with average cost of equity measure based on the the four models used in Hail and Leuz (2006): Claus and Thomas (2001) ($COEC_{CT}$), Gebhardt, Lee, and Swaminathan (2001) ($COEC_{GLS}$), Ohlson and Juettner-Nauroth (2005) ($COEC_{OJN}$), and Easton (2004) ($COEC_E$). *DISC* is the voluntary disclosure score for a company at the given time. D_{IE} is a indicator variable for information environment level/uncertainty indicating (i) low analyst following, (ii) low press coverage, and (iii) high earnings forecast dispersion. *Interaction* is the interaction term of $D_{IE} * DISC$. *LEV* is the leverage and *BETA* is the beta factor derived from a regression of weekly excess returns of the company on the Swiss market portfolio proxied by the Swiss Performance Index over two years. *SIZE* is the *log* of the equity market value of the company. *MTBV* is the market-to-book value for the company over the time. *IA* indicates if the company has an international accounting standard (IFRS or US GAAP). The expectations for the coefficients are in parentheses by the variable name. The sample period is 1999-2008. The t-statistics are in parentheses and are based on robust firm-clustered standard errors. * denotes significant at 10 %, ** denotes significant at 5 %, *** denotes significant at a 1 %-level.

	Baseline M. (H_1)		Analyst Following (H_2)		Media Coverage (H_2)		Earnings Dispersion (H_3)	
DISC (-)	-0.010	-0.011	0.021	0.000	0.008	-0.003	0.010	0.006
	(-0.80)	(-1.04)	(1.23)	(0.01)	(0.44)	(-0.19)	(0.61)	(0.54)
Indicator (+)			0.029**	0.013	0.011	0.004	0.024**	0.041***
			(2.40)	(1.34)	(0.84)	(0.41)	(2.09)	(3.49)
Interaction (-)			-0.077***	-0.028	-0.044	-0.018	-0.042*	-0.042**
			(-2.88)	(-1.31)	(-1.64)	(-0.94)	(-1.84)	(-2.23)
BETA (+)	0.024***	0.004	0.023***	0.004	0.023***	0.004	0.023***	0.007**
	(5.27)	(1.10)	(4.59)	(1.12)	(5.02)	(1.02)	(5.78)	(2.26)
LEV (+)	0.003***	0.003**	0.003***	0.003**	0.003***	0.004**	0.003***	0.002
	(2.85)	(2.36)	(2.91)	(2.34)	(2.90)	(2.37)	(3.79)	(1.35)
SIZE (-)	-0.013***	-0.031***	-0.014***	-0.030***	-0.014***	-0.031***	-0.011***	-0.030***
	(-6.80)	(-7.34)	(-6.95)	(-7.31)	(-7.13)	(-7.36)	(-6.56)	(-7.68)
MTBV (-)	-0.001**	0.001	-0.001**	0.001	-0.001**	0.001	-0.002***	0.001
	(-2.55)	(0.88)	(-2.46)	(0.82)	(-2.06)	(0.87)	(-2.77)	(1.32)
IA (-)	0.002	-0.000	0.002	0.000	0.002	0.000	0.000	0.000
	(0.52)	(-0.03)	(0.48)	(0.11)	(0.56)	(0.02)	(0.04)	(0.05)
Constant	0.175***	0.316***	0.171***	0.308***	0.181***	0.314***	0.154***	0.297***
	(14.98)	(10.98)	(12.28)	(10.41)	(13.13)	(10.80)	(15.27)	(11.09)
Observations	1,039	1,039	1,039	1,039	1,039	1,039	971	971
Adj. R^2	0.274	0.300	0.287	0.301	0.284	0.302	0.279	0.360
Fixed effects		Yes		Yes		yes		Yes

Table IX
Regression of *COEC* on *VDQ*: Dynamic OLS Models

This table presents the results from the following regression:
$COEC_{A,t,M} = \alpha_i + \kappa_1 COEC_{A,i,t-1} + \beta_0 * D_{IE} + \beta_1 \, DISC_{it} + \beta_{1b} * D_{IE} * DISC_{it} + \beta_2 \, BETA_{it} + \beta_3 \, LEV_{it} + \beta_4 \, SIZE_{it} + \beta_5 \, MTBV_{it} + \beta_6 \, IA_{it} + e_{it}$, where $COEC_{A,t,M}$ is the cost of equity capital for company i at time t estimated with average cost of equity measure based on the the four models used in Hail and Leuz (2006): Claus and Thomas (2001) ($COEC_{CT}$), Gebhardt, Lee, and Swaminathan (2001) ($COEC_{GLS}$), Ohlson and Juettner-Nauroth (2005) ($COEC_{OJN}$), and Easton (2004) ($COEC_E$). *DISC* is the voluntary disclosure score for a company at the given time. D_{IE} is a indicator variable for information environment level/uncertainty indicating (i) low analyst following, (ii) low press coverage, and (iii) high earnings forecast dispersion. *Interaction* is the interaction term of $D_{IE} * DISC$. *LEV* is the leverage and *BETA* is the beta factor derived from a regression of weekly excess returns of the company on the Swiss market portfolio proxied by the Swiss Performance Index over two years. *SIZE* is the *log* of the equity market value of the company. *MTBV* is the market-to-book value for the company over the given time. *IA* indicates whether the company has an international accounting standard (IFRS or US GAAP). The expectations for the coefficients are in parentheses by the variable name. The sample period is 1999-2008. The t-statistics are in parentheses and are based on robust firm-clustered standard errors. * denotes significant at 10 %, ** denotes significant at 5 %, *** denotes significant at a 1 %-level.

	Baseline M. (H_1)		Analyst Following (H_2)		Media Coverage (H_2)		Earnings Dispersion (H_3)	
COEC (t-1) (+)	0.504***	0.152***	0.497***	0.155***	0.497***	0.151***	0.496***	0.178***
	(8.53)	(3.37)	(8.33)	(3.39)	(8.27)	(3.32)	(7.11)	(3.72)
DISC (-)	-0.011	-0.011	0.008	-0.003	-0.002	-0.003	-0.001	0.000
	(-1.30)	(-1.03)	(0.71)	(-0.24)	(-0.17)	(-0.23)	(-0.08)	(0.01)
Indicator (+)			0.021**	0.014	0.003	0.004	0.018*	0.031***
			(2.30)	(1.41)	(0.29)	(0.40)	(1.76)	(2.63)
Interaction (-)			-0.050**	-0.023	-0.023	-0.016	-0.030	-0.027
			(-2.58)	(-1.09)	(-1.13)	(-0.77)	(-1.49)	(-1.37)
BETA (+)	0.013***	0.003	0.013***	0.003	0.012***	0.002	0.013***	0.005
	(4.59)	(0.76)	(4.37)	(0.77)	(4.32)	(0.72)	(5.14)	(1.55)
LEV (+)	0.002***	0.002*	0.002***	0.002*	0.002***	0.002*	0.002***	0.002
	(2.85)	(1.88)	(2.80)	(1.84)	(2.89)	(1.89)	(3.58)	(1.16)
SIZE (-)	-0.006***	-0.031***	-0.007***	-0.031***	-0.008***	-0.031***	-0.006***	-0.031***
	(-4.88)	(-8.39)	(-4.67)	(-8.20)	(-5.22)	(-8.42)	(-4.72)	(-9.04)
MTBV (-)	0.000	0.001*	0.000	0.001*	0.000	0.001	0.000	0.001**
	(0.34)	(1.66)	(0.35)	(1.66)	(0.61)	(1.63)	(0.23)	(2.17)
IA (-)	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.002	-0.001
	(-0.07)	(-0.08)	(-0.06)	(0.08)	(-0.03)	(-0.01)	(-0.53)	(-0.30)
Constant	0.088***	0.308***	0.083***	0.298***	0.097***	0.306***	0.080***	0.294***
	(7.89)	(11.55)	(6.22)	(10.72)	(7.12)	(11.34)	(6.78)	(11.93)
Observations	927	927	927	927	927	927	871	871
Adj. R^2	0.459	0.358	0.463	0.359	0.464	0.358	0.462	0.417
Fixed effects		Yes		Yes		Yes		Yes

Table X
Regression of *COEC* on *VDQ*: Dynamic Panel Estimation

This table presents the results from the following dynamic panel regression: (System GMM with orthogonal deviations and a two-step estimation and Windmeijer-corrected cluster-robust errors)
$COEC_{A,i,t} = \alpha_1 + \kappa_1 COEC_{A,i,t-1} + \beta_a DISC_{it} + \beta_b D_{IE} + \beta_c D_{IE} * DISC + \gamma Z_{it} + \Theta D_{it} + \eta_i + \epsilon_{it}$, t=1999-2008, where $COEC_{A,i,t}$ is the average cost of equity capital for company i at time t with the four models used in Hail and Leuz (2006): Claus and Thomas (2001) ($COEC_{CT}$), Gebhardt, Lee, and Swaminathan (2001) ($COEC_{GLS}$), Ohlson and Juettner-Nauroth (2005) ($COEC_{OJN}$), and Easton (2004) ($COEC_{E}$). *DISC* is the voluntary disclosure score for a company at the given time. D_{IE} is a indicator variable indicating (i) low analyst following, (ii) low press coverage, and (iii) high earnings dispersion. *Interaction* is the interaction term of D_{IE} and *DISC*. Z_{it} contains the following control variables: *LEV* is the leverage and *BETA* is the beta factor derived from a regression of monthly two-year excess returns of the company on the Swiss market portfolio proxied by the Swiss Performance Index. *SIZE* is the *log* of the equity market value of the company. *MTBV* is the market-to-book value for the company over the time period. *IA* is a indicator variable that indicates if the company is applying an international accounting standard (IFRS or US GAAP). The expectations for the coefficients are in parentheses by the variable name. D_{it} are the exogenous variables (see Wintoki, Linck and Netter, 2012) includes AGE, which is the age of the company since its foundation and year dummies. By using the *xtabond2* command in STATA, I evoke following the options: twostep; robust, small and orthogonal. I specified the model according to the conclusion checklist in Roodman (2009). Therefore, I include time dummies and use orthogonal deviations because the panel has certain gaps. Therefore, all standard errors have the Windmeijer-correction. With the small option I use a correction for the small sample size. As in Wintoki, Linck and Netter (2012), I use the collapse option to avoid instrument proliferation. AR(1) and AR(2) are tests for first-order and second-order serial correlation in the first-differenced residuals, under the null of no-serial correlation. The Hansen test of over-identification is under the null that all instruments are valid. The Diff-in-Hansen test of the exogeneity is under the null that instruments used for the equations in levels are exogenous. The t-statistics are in parentheses. * denotes significant at 10 %, ** denotes significant at 5 %, *** denotes significant at a 1 %-level.

	Baseline (H_1)		Analyst F. (H_2)		Media C. (H_2)		Earnings D. (H_3)	
COEC (t-1) (+)	0.661***	0.636***	0.653***	0.479***	0.563**	0.610**	0.518*	0.459*
	(4.67)	(4.37)	(4.13)	(3.49)	(3.18)	(3.17)	(2.15)	(2.47)
DISC (-)	-0.214	-0.080	-0.084	0.014	-0.045	-0.067	-0.198	0.065
	(-1.22)	(-0.60)	(-0.55)	(0.12)	(-0.30)	(-0.45)	(-1.17)	(0.67)
Indicator (+)			0.077	0.015	-0.019	-0.056	0.008	0.051
			(1.91)	(0.42)	(-0.25)	(-1.11)	(0.17)	(1.73)
Interaction (-)			-0.103	-0.078	-0.028	0.037	0.051	-0.045
			(-1.58)	(-1.33)	(-0.22)	(0.42)	(0.57)	(-1.04)
BETA (+)	0.000	0.010	-0.004	0.003	-0.030	-0.024	0.002	0.015
	(0.00)	(0.74)	(-0.24)	(0.19)	(-1.09)	(-1.27)	(0.17)	(1.42)
LEV (+)	0.001	0.000	-0.001	0.005	0.002	-0.001	0.005	0.002
	(0.19)	(0.12)	(-0.18)	(1.28)	(0.32)	(-0.23)	(0.91)	(0.70)
SIZE (-)	0.007	-0.004	0.012	-0.014	-0.001	-0.005	0.009	-0.009
	(0.72)	(-0.44)	(0.81)	(-1.17)	(-0.11)	(-0.54)	(0.90)	(-1.32)
MTBV (-)	-0.005*	-0.003	-0.003	-0.002	-0.003	-0.002	-0.008	-0.001
	(-1.60)	(-1.69)	(-1.33)	(-0.95)	(-0.91)	(-0.65)	(-1.65)	(-0.42)
IA (-)	0.007	0.003	0.012	0.003	0.004	-0.000	0.004	-0.003
	(0.76)	(0.30)	(1.15)	(0.28)	(0.30)	(-0.03)	(0.34)	(-0.38)
AGE	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.75)	(-0.73)	(-0.60)	(-0.57)	(-1.35)	(-1.45)	(-1.33)	(-1.19)
Constant	0.117*	0.118**	-0.015	0.168*	0.138	0.181*	0.103	0.078*
	(2.30)	(2.71)	(-0.14)	(2.06)	(1.52)	(2.11)	(1.74)	(2.24)
Firm-year	927	927	927	927	927	927	871	871
# of firms	166	166	166	166	166	166	158	158
# of Instruments	24	31	28	37	28	37	28	37
F-Stat	17.73	25.16	17.66	19.90	11.18	9.97	12.11	22.09
Hansen: χ^2(DF)	7	14	9	18	9	18	9	18
χ^2	4.84	18.79	9.17	22.44	7.63	19.95	5.59	21.87
p-value	(0.68)	(0.17)	(0.42)	(0.21)	(0.57)	(0.34)	(0.78)	(0.24)
AR(1) test (p)	(0.00)	(0.00)	(0.00)	(0.00)	(0.08)	(0.00)	(0.00)	(0.00)
AR(2) test (p)	(0.08)	(0.10)	(0.11)	(0.22)	(0.12)	(0.09)	(0.28)	(0.80)
Diff in Hansen (p)		(0.37)		(0.38)		(0.38)		(0.71)
Lag Spec.	3	3-4	3	3-4	3	3-4	3	3-4

Table XI
Regression of *COEC* on *VDQ*: Non-Linear Estimations

This table presents the results for an investigation with a disclosure-squared term. In Column (1) I present the OLS regressions, in Column (2) firm fixed effects are included. In Column (3) are the results for the dynamic OLS regression, in Column (4) are the results for the dynamic panel system GMM regression. AR(1) and AR(2) are tests for first-order and second-order serial correlation in the first-differenced residuals, under the null of no-serial correlation. The Hansen test of over-identification is under the null that all instruments are valid. The Diff-in-Hansen test of the exogeneity is under the null that instruments used for the equations in levels are exogenous. The t-statistics are in parentheses. * denotes significant at 10 %, ** denotes significant at 5 %, *** denotes significant at a 1 %-level.

	OLS	FE	Dynamic OLS	Dynamic Panel System GMM
Model	(i)	(ii)	(iii)	(iv)
$COEC_{t-1}$			0.506***	0.533***
			(8.53)	(3.80)
DISC	-0.197***	-0.109**	-0.202***	-0.546*
	(-3.30)	(-2.46)	(-4.32)	(-2.14)
*DISC*DISC*	0.211***	0.114**	0.214***	0.484*
	(3.25)	(2.43)	(4.29)	(2.06)
BETA	0.023***	0.003	0.012***	-0.002
	(5.08)	(0.81)	(4.45)	(-0.10)
LEV	0.003***	0.003**	0.002**	0.009
	(2.67)	(2.30)	(2.59)	(1.59)
SIZE	-0.013***	-0.031***	-0.007***	0.004
	(-7.13)	(-7.34)	(-5.42)	(0.35)
MTBV	-0.001**	0.000	0.000	-0.005
	(-2.38)	(0.69)	(0.55)	(-1.80)
IA	0.003	0.000	0.000	0.007
	(0.65)	(0.03)	(0.01)	(0.63)
AGE				-0.000
				(-1.37)
Constant	0.218***	0.336***	0.133***	0.181**
	(11.22)	(10.65)	(7.99)	(2.71)
Observations	1,039	1,039	927	927
Adj. R-squared	0.29	0.31	0.47	
Number of firms	173	173	173	166
Hansen: χ^2 (DF)				8
χ^2				5.73
p-value				0.68
AR(1)-test (p)				0.00
AR(2)-test (p)				0.24

Table XII
Analysis of Individual Disclosure Categories: Regression of *COEC* on *VDQ* for Low Information Environment (Analysts)

This table presents the result from the same regression (dynamic panel system GMM, lag (3)) as in Table X but replaces *DISC* by the 9 different subindices (individual disclosure categories), which are: (1) impression, (2) background information, (3) important non-financials, (4) trend analysis, (5) risk information, (6) value based management, (7) management discussion and analysis of annual financial statements, (8) goals and credibility, and (9) sustainability. The Indicator and Interaction variable are equal to 1 if the firm has a analyst coverage below the yearly median value.

Subindex	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
COEC (t-1) (+)	0.571***	0.647***	0.521**	0.635***	0.599***	0.482**	0.649***	0.495**	0.473**
	(3.57)	(3.71)	(2.69)	(5.90)	(4.34)	(3.25)	(5.07)	(3.14)	(3.16)
DISC (-)	-0.064	-0.051	0.025	-0.024	-0.094	-0.012	-0.092	0.083	0.053
	(-0.34)	(-0.55)	(0.21)	(-0.46)	(-0.55)	(-0.15)	(-1.03)	(0.88)	(1.22)
Indicator (+)	0.024	0.133	0.045	0.014	0.045	0.036	0.044	0.053	0.011
	(0.22)	(1.86)	(1.27)	(0.41)	(1.08)	(1.40)	(0.73)	(1.71)	(0.47)
Interaction (-)	-0.006	-0.150	-0.142	0.034	-0.035	-0.057	-0.032	-0.112	-0.010
	(-0.04)	(-1.68)	(-1.55)	(0.44)	(-0.78)	(-1.78)	(-0.32)	(-1.24)	(-0.24)
BETA (+)	0.001	-0.003	-0.002	-0.012	0.010	-0.000	0.016	0.002	0.004
	(0.05)	(-0.17)	(-0.13)	(-0.81)	(0.48)	(-0.01)	(0.72)	(0.09)	(0.28)
LEV (+)	-0.000	-0.002	0.004	0.002	0.010	0.009	-0.002	0.008	-0.001
	(-0.01)	(-0.26)	(0.50)	(0.43)	(1.09)	(1.50)	(-0.34)	(1.21)	(-0.08)
SIZE (-)	0.002	0.006	-0.005	0.008	0.018	0.002	-0.006	-0.002	-0.012
	(0.11)	(0.51)	(-0.40)	(0.69)	(0.77)	(0.22)	(-0.55)	(-0.16)	(-0.77)
MTBV (-)	0.000	-0.001	-0.001	-0.002	-0.005	-0.002	-0.001	-0.002	0.003
	(0.06)	(-0.22)	(-0.56)	(-0.58)	(-1.52)	(-0.55)	(-0.20)	(-0.53)	(0.38)
IA (-)	0.000	0.024	0.009	0.006	0.016	0.003	0.006	0.008	-0.005
	(0.05)	(1.47)	(0.90)	(0.46)	(0.98)	(0.32)	(0.38)	(0.64)	(-0.55)
AGE	-0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.66)	(0.27)	(-0.49)	(-0.69)	(-0.26)	(-1.02)	(-0.56)	(-1.45)	(-0.76)
Constant	0.069	0.007	0.084	-0.012	-0.047	0.042	0.118	0.032	0.118
	(0.67)	(0.05)	(0.85)	(-0.11)	(-0.35)	(0.46)	(1.08)	(0.30)	(1.11)
Firm-year	634	927	927	927	927	927	927	927	634
Number of firms	159	166	166	166	166	166	166	166	159
F-Stat	18.73	10.72	14.51	23.19	11.43	17.60	17.44	17.28	19.36
Hansen: χ^2 (DF)	9	9	9	9	9	9	9	9	9
χ^2	10.68	5.04	5.88	8.49	8.23	7.35	8.54	8.92	9.94
p-value	0.30	0.83	0.75	0.49	0.51	0.03	0.02	0.45	0.36
AR(1)-test (*p*)	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01
AR(2)-test (*p*)	0.69	0.16	0.25	0.16	0.20	0.17	0.11	0.12	0.80