Economic consequences of implementing and communicating value based management systems

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Abstract

We study the consequences of implementing and communicating Value Based Management (VBM) systems on information asymmetries and the cost of capital. We analyse the firms' reporting on internal control systems as the source of information for market participants. In addition, literature posits that improving communications with shareholders by providing additional information on value generation (Value Based Reporting, VBR) is an integral part of implementing VBM. We find that the implementation of VBM and the extent of VBR are, both individually and jointly, significantly related to lower information asymmetries and lower cost of capital. We find a slight moderation of the effect of VBM by VBR. For increasing VBR, we find that information asymmetries and cost of capital decrease more strongly for firms without implemented VBM systems. This indicates that VBR can to some extent substitute VBM. Overall, however, firms using a combination of VBM and VBR attain lower levels of information asymmetry and cost of capital. We provide evidence for the real effects of disclosure, suggesting that disclosures on internal control systems serve as a governance mechanism, reducing information asymmetries and the cost of capital by aligning shareholders' and managers' interests.

KEYWORDS
cost of capital, disclosure, information asymmetry, shareholder value, value based management

1 | INTRODUCTION

We analyse the economic consequences of the implementation of and the reporting on Value Based Management (VBM) systems for information asymmetries and the cost of equity capital. VBM systems are considered one of the main new developments in management accounting in the past decades, incorporating a wide variety of other innovations (Ittner & Larcker, 2001). VBM was introduced as a response to reduce agency conflicts arising from the separation of ownership and control (Jensen, 1986). These agency conflicts lead to adverse selection problems (Akerlof, 1970) for shareholders. The implementation of VBM can be considered a signal of management's commitment to act in the

shareholders' best interest. The signal can reduce uncertainty on the part of investors, potentially leading to reduced information asymmetries and lower cost of capital.

For the implementation of VBM to have capital market consequences, the market needs to have knowledge about the former. We analyse the firms' disclosures on internal control systems as the source of information for market participants. Lambert, Leuz, and Verrecchia (2007) find that disclosure affects the cost of capital through two channels: an 'information effect' and a 'stewardship effect' (Core, Hail, & Verdi, 2015). Firstly, disclosure may reduce investors' uncertainty about expected cash flows (information effect). Secondly, disclosure can have indirect effects on the cost of capital by affecting real decisions (stewardship effect). Disclosure improves monitoring and affects real decisions, improving the alignment between managers' and shareholders' interests. Higher quality information reduces managerial misappropriation of the firm's cash flows and consequently reduces the firm's cost of capital. Johnstone (2015, 2016) challenges the information effect and finds that improved disclosure may both increase and decrease the cost of capital. In this paper, we concentrate on the stewardship effect and seek to provide evidence for the role of VBM systems as a management control mechanism to reduce the cost of capital.

VBM systems are specifically designed as mechanisms to align managers' interests with those of shareholders to reduce agency conflicts (Ryan & Trahan, 2007; Young & O'Byrne, 2000). While prior research has mainly been interested in the link between VBM and firm performance (e.g., Biddle, Bowen, & Wallace, 1997; Ryan & Trahan, 2007), no evidence exists for its capital market consequences. Literature posits that the implementation and communication of VBM reduce information asymmetries and the cost of capital (Copeland, Koller, & Murrin, 2000; Rappaport, 1986, 2006). Our paper seeks to provide empirical evidence for this claim.

The rise of VBM was largely associated with the idea of 'value gaps' (Copeland et al., 2000; Fruhan, 1988), that is, the difference between a firm's current value and its potential value if it were managed efficiently.[1] VBM is intended to close these gaps by: (1) improving operations, asset ownership and financial structure; (2) improving communication with shareholders (Copeland et al., 2000). Investors in firms with hidden characteristics are faced with a typical adverse selection problem. According to Jensen's (1986) free cash flow hypothesis, firms investing in organizational inefficiencies are traded at below their potential values. Such value gaps present risks for firms of being taken over or being subject to shareholder activism, and risks for current managers of losing their jobs (Fruhan, 1988). These risks create incentives for managers to manage the firm's resources more efficiently. As a consequence, capital market pressures are effective means of directing resources to more efficient usage (Jensen, 1989). The advent of the market for corporate control has contributed greatly to establishing VBM as a means to manage shareholder value. Likewise, agency-theoretical research suggests that VBM systems, especially incentive systems based on residual income, are mechanisms to reduce agency conflicts (Reichelstein, 1997; Rogerson, 1997). Consequently, information about the implementation of VBM systems can work as a signal of management's commitment to act in the shareholders' best interest, reducing the investors' adverse selection problem.

We use the firms' disclosures about their internal control processes as the source of shareholders' information. To the extent that published information on the implementation of VBM works as a credible signal, information asymmetries should decrease. If these disclosures improve monitoring and help align managers' and shareholders' interests (stewardship effect), then disclosures on implemented VBM systems can reduce information asymmetries as well as the cost of capital.

In addition, improvements in the communication with shareholders are considered to be an integral part of implementing VBM.[2] Literature on VBM suggests that firms can improve market valuation by providing additional information on the fundamental value of the firm and its drivers (Copeland et al., 2000). We refer to such disclosures as Value Based Reporting (VBR). Such additional information on the value creation process and the drivers of value of a

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[1] 'The value gap is the difference between the market price of a share of a company's common stock and the value of that share if the company were managed as though the current owners were the only constituency that mattered – that is, managed for the maximum share price possible at this time' (Fruhan, 1988, p. 63).

[2] Copeland et al. (2000) suggest in their 'restructuring pentagon' that firms should improve communications with shareholders to close gaps in perceptions about the future prospects of the firm.

particular firm is provided in order to meet the needs of market participants in the process of valuing shares.[3] The underlying assumption is that by providing additional information on the 'true' value of the firm, fundamental values and market values can be aligned, eliminating opportunities for takeover premiums to be reaped (e.g. Eccles, Herz, Keegan, & Phillips, 2001; Eccles, Serafeim, & Krzus, 2011; Koller, Goedhart, & Wessels, 2010). Consistent with this notion, Serafeim (2011) finds that uncovering hidden information about firm value is an effective deterrent from being targeted by a hostile takeover. VBR potentially reveals characteristics of the firm that help investors assess the true value of the firm, reducing their adverse selection problem. To the extent that VBR meets the information needs of market participants, we can expect that a higher level of VBR is associated with lower information asymmetries and cost of capital. This expectation is in line with findings that improvements in investor relations are associated with positive abnormal returns and significant reductions in information asymmetries (Vlittis & Charitou, 2012). Disclosures on the fundamental value of the firm and its drivers do not necessarily require the firm to have implemented a VBM system; such disclosures can individually be used as means to reduce information asymmetries and as signals of a shareholder orientation. Hence, we investigate two related research questions: *1) Does the implementation of VBM systems (as reported in the annual report) reduce information asymmetries and the cost of capital? 2) Does the voluntary disclosure of information on the fundamental value of the firm and its drivers (VBR) have a moderating effect in this process?*

We analyse a sample of the 118 largest publicly listed German firms for 2000–04. The German governance system has long been considered insider-controlled and stakeholder-oriented (e.g. Chirinko & Elston, 2006; Franks, 1997). While the system is slowly and partly moving toward a more capital market based system, the main characteristics of the German system – strong concentration of ownership, relationship-lending, internal labour markets and an internalization of information – are still in place (Hackethal, Schmidt, & Tyrell, 2005). Within this system, capital market pressures like hostile takeover bids are less pronounced than in capital market based Anglo-Saxon countries. Market imperfections are more likely to be present, providing us with an ideal setting to study the link between disclosure, information asymmetries, and the cost of capital (Armstrong, Core, Taylor, & Verrecchia, 2011; Lambert, Leuz, & Verrecchia, 2012).

The German setting is also particularly interesting in this context because VBR has received much public attention and firms provide a wealth of related voluntary disclosures (e.g. Baetge & Solmecke, 2006; Haller & Dietrich, 2001; Koethner, 2005; Ruhwedel & Schultze, 2002). We use a framework of VBR developed by the German Schmalenbach Society of Business Administration to measure VBR quality (SG, 2002). The framework has been widely used in research and has stimulated public debate on the capital market's need for such disclosures that has led to the introduction of the German Accounting Standard (GAS) 15 on Management Reporting in 2005, making many of these disclosures mandatory. We therefore limit our analysis to the period before 2005 in order to analyse VBR within the theoretical framework of voluntary disclosures. The SG framework includes disclosures on internal control mechanisms, fundamental drivers of business success, sources of value generation within the firm such as intellectual capital. The score is particularly useful for our study as it systematically comprises the additional non-financial information relevant for analysing a firm's value gap. It contains both information on market valuation and internal value generation. The score measures the degree of transparency about internal control processes and the sources of internal value generation. The score also captures information about implemented internal control processes relevant for assessing management's commitment to act in the shareholders' interests.

We find evidence consistent with our expectations. Both the implementation of VBM systems and higher levels of VBR are significantly related to lower information asymmetries and lower cost of capital. For firms that have not implemented a VBM system, VBR has a stronger effect on information asymmetries and the cost of capital than for VBM firms. However, when used in conjunction, firms with implemented VBM attain lower levels of information asymmetries and cost of capital than firms not employing VBM systems.

Our results contribute to the discussion on the effectiveness of implementing VBM systems (e.g. Biddle et al., 1997; Ryan & Trahan, 2007). We provide evidence for a link between VBM systems and the information processing in

[3] Consulting firms have developed value based reporting systems to meet the needs of investors. For example, ValueReporting™ is a consulting concept and protected trademark of PricewaterhouseCoopers (PwC).

capital markets. We establish that implementing VBM systems is an important means for mitigating agency conflicts, significantly reducing information asymmetries and the cost of capital. Our results imply that voluntary disclosures on the value generation process (VBR) work as a complement for implemented VBM, as suggested by the literature on VBM.

Our results also contribute to the literature on the consequences of disclosure (Botosan, 2006). Our analysis provides a unique setting to study the role of disclosures for improving monitoring and aligning managers' and shareholders' interests (stewardship effect). We provide direct evidence for these real effects of disclosure (Lambert et al., 2007). The results suggest that non-financial disclosures on internal control systems serve as a governance mechanism, reducing information asymmetries and the cost of capital (Core et al., 2015).

We also add to the literature on non-financial disclosures and enhanced business reporting, e.g. intellectual capital (IC) reporting (e.g. Boedker, Mouritsen, & Guthrie, 2008; Guthrie, Ricceri, & Dumay, 2012; Orens, Aerts, & Lybaert, 2009). Improved disclosures on the value generation process are considered part of enhanced business reporting and integrated reporting. Our findings imply that such improved disclosures reduce information asymmetries and the cost of capital. VBR can, to some extent, replace VBM systems and their effect on information asymmetries and the cost of capital. We provide evidence that shareholder value orientation and IC-related disclosures are complements and can be used in conjunction (Mouritsen, 1998).

The paper is organized as follows: in Section 2 we derive the hypotheses of our study based on prior literature. Our research methodology and the description of the key variables are presented in Sections 3 and 4. Sections 5 and 6 provide sample description and the empirical results of our study. Section 7 summarizes and concludes this paper.

2 | RELATED LITERATURE AND HYPOTHESES DEVELOPMENT

There is a large literature interested in the consequences of implementing VBM systems for firm performance (e.g. Biddle et al., 1997; Ryan & Trahan, 2007).[4] The main objective of VBM has been the closing of 'value gaps', that is, the difference between a firm's current value and its potential value if it were managed efficiently (Copeland et al., 2000; Fruhan, 1988). VBM systems are designed as mechanisms to align managers' interests with those of shareholders in order to reduce agency conflicts (Ryan & Trahan, 2007; Young & O'Byrne, 2000). The VBM literature suggests that the implementation and communication of VBM results in reduced information asymmetries and cost of capital as well as improved market valuation (Copeland et al., 2000; Rappaport, 1986, 2006). Prior empirical studies show that implemented VBM systems are significantly related to improvements in firm performance, measured by residual income or net operating income (e.g. Balachandran, 2006; Hogan & Lewis, 2005; Ryan & Trahan, 2007). Other studies compare the ability of VBM-metrics to explain stock market returns relative to traditional earnings figures. While some studies find that VBM metrics better explain stock returns (e.g. Stern, Stewart, & Chew, 1995) others do not support those findings (e.g. Biddle et al., 1997).

Only a few studies have analysed the capital market's response to the adoption of VBM systems. Some studies find an improvement in stock market returns (e.g. Athanassakos, 2007; Rapp, Schellong, Schmidt, & Wolff, 2011; Wallace, 1997), but do not provide a theoretical rationale for this. So far, to the best of our knowledge, no empirical evidence exists on the link between implemented VBM systems and information asymmetries and the cost of capital.

Healy and Palepu (2001) characterize the information asymmetry problem as a 'lemons' problem arising from information differences and conflicting interests between managers and investors (Akerlof, 1970). Managers may have incentives to expropriate wealth from investors by acquiring perquisites, paying excessive compensation, or making harmful investment decisions (Jensen & Meckling, 1976). Hidden characteristics of the firm will lead to adverse selection problems for shareholders. Firms investing in organizational inefficiencies are traded at below their potential values (Jensen, 1986). These problems can be overcome by contracting disclosure as well as by information intermediaries, e.g. financial analysts, who engage in private information production to uncover managers' superior information

[4] We do not review the vast literature on VBM here. A recent and comprehensive review of the literature can be found for example in Lueg & Schaeffer (2010).

and managerial misuse of resources. Disclosures can be used by investors and intermediaries to monitor management and verify the extent to which managers have used the firm's resources efficiently (Healy & Palepu, 2001). Agency-theoretical literature also suggests that VBM can help overcome agency problems by using residual income as a performance measure in reward systems (e.g. Reichelstein, 1997; Rogerson, 1997). VBM is created as a framework for measuring and managing businesses based on 'the explicit objective of creating superior long-term value for shareholders' (Ittner & Larcker, 2001, p. 352). Information about the implementation of a VBM system may therefore be considered a signal for management's commitment to use the firm's resources in the best interest of the owners.

Disclosure theory is a special case of signalling theory (Dye, 2001) and studies the information provision of firms in capital markets. The firm's information environment develops endogenously dependent upon various factors (Beyer, Cohen, Lys, & Walther, 2010). The unravelling result in Grossman (1981), Grossman and Hart (1980), Milgrom (1981) and Milgrom and Roberts (1986) identifies the conditions under which firms voluntarily disclose all their private information (full disclosure equilibria).[5] Recent theoretical models engage in explaining partial disclosure by violations of these conditions. Models building on such violations show that firms disclose only some fraction of their private information because they face different trade-offs whether to disclose or not. For example, Guttman, Kremer, and Skrzypacz (2014) show that firms face a trade-off between disclosing early or late and find that later disclosures are interpreted more favourably. Beyer and Guttman (2012) find that when managers have private incentives to manipulate disclosures through real effects manipulation, non-disclosure can be explained. Overall, firms are faced with a cost-benefit trade off, implying disclosure only when benefits exceed the cost of disclosure. Disclosures involve direct and indirect costs, especially strategic costs (Wagenhofer, 1990).[6] The disclosure decision depends on the (private) benefits of disclosure relative to the costs involved. We capture this trade off by endogenizing the disclosure decision in a simultaneous equations approach (Marquardt & Wiedman, 1998), consistent with Beyer et al. (2010).

Prior literature on the consequences of disclosure has particularly focused on information asymmetries and the cost of capital (Botosan, 1997, 2006). However, the theoretical link between disclosure and the cost of capital has been subject to much debate. In particular, it is unclear whether the cost of capital contains a separate component for information risk. Lambert et al. (2012) show that information asymmetry is not a separately priced component of the cost of capital under perfect competition. However, under imperfect competition, higher information asymmetries increase the cost of capital via market liquidity by reducing investors' average precision. Lambert and Verrecchia (2015) confirm these results extending them to the multi-asset setting, consistent with the empirical findings in Armstrong et al. (2011). Lambert et al. (2007) show that disclosure has a direct effect on the cost of capital via the assessed variance of a firm's cash flows and its covariance with other firms. They find that increased disclosure increases the precision of investors' estimates of future cash flows, reducing the cost of capital (information effect). Johnstone (2015, 2016) shows that disclosure not only affects covariance but also the mean of expected future cash flows. In conjunction, both effects can either lead to increased or decreased cost of capital. The intuition is that more precise, but unfavourable information will reduce expected future payoffs and thereby increase the cost of capital. However, his analysis holds the firm's activities fixed, that is, he focuses on the direct effects and abstracts from the indirect effects analysed in Lambert et al. (2007).

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[5] To avoid high costs of capital, agency and signalling theory imply full disclosure as the optimal decision for companies (Beyer et al., 2010). If investors know about the management's failure to disclose information in a frictionless market, they will assume that the current market price of the company overstates the actual value, considering the probably unfavourable information withheld. The consequence is that the failure to disclose implies that the information is of the worst possible kind (Lundholm & van Winkle, 2006). As a consequence, investors will revise their demand for the shares downward (Dye, 1985) and the price of the stock will fall. Grossman (1981) and Milgrom (1981) demonstrate that for any failure of the company to disclose, enterprise value will fall (also Dye, 1985; Verrecchia, 2001). Thus, managers are encouraged to disclose the information to distinguish it from the worst information they could possibly have. These results depend on the following conditions: (1) disclosures are 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 cannot commit *ex-ante* to a specific disclosure policy.

[6] Proprietary cost theory suggests that there are direct or indirect costs arising from the preparation, dissemination and the auditing of information. Moreover, there can be strategic reasons for withholding information. Companies face proprietary costs when the information disclosed can be used by competitors in a way which is harmful to the disclosing company (Verrecchia, 1983, 2001) or may affect actions of regulatory authorities (Lambert et al., 2007). In this case, the capital market does not fully discount for the retained information (Verrecchia, 1983). Companies will have an incentive to withhold information if they can avoid competitive reactions of competitors (Wagenhofer, 1990).

Lambert et al. (2007) show that disclosures can have indirect effects on the cost of capital by affecting real decisions (stewardship effect), beyond the direct effects on the mean or covariance of expected cash flows discussed above. Disclosure improves monitoring, thus affecting real decisions, improving the alignment between managers' and shareholders' interests. Higher quality information reduces managerial misappropriation of the firm's cash flows. The reduced agency costs increase the mean of expected future cash flows while holding the variance and covariance of a firm's cash flow with other firms' cash flows constant. The higher expected future payoff reduces the firm's cost of capital. Core et al. (2015) provide empirical evidence for this stewardship effect by analysing inside ownership as a governance mechanism, moderating the effects of disclosure on the cost of capital. Their path analysis shows that inside ownership works as a substitute for disclosure, consistent with the stewardship role of disclosure. They contribute to the large empirical literature[7] on the effects of disclosure on the cost of capital by showing that these effects are underestimated in previous studies when not controlling for inside ownership.

In this paper, we focus on the stewardship effect and the role of VBM systems as a management control mechanism to reduce the cost of capital. Given the nature of VBM systems as internal control systems, information on their implementation has the potential to improve monitoring. Such disclosures may serve as signals about management's commitment to act in the investors' best interest and be used to verify the extent to which shareholder value orientation is actually implemented. Prior studies have found that some firms claim to have the objective of shareholder value maximization without establishing appropriate mechanisms. There are great differences in the intensity of using these systems (e.g. Burkert & Lueg, 2012; Malmi & Ikaheimo, 2003). Misleading or false disclosures may cause political as well as litigation costs. Hence, disclosures on internal control systems can be used by market participants to verify the degree to which those systems have actually been implemented and how extensively they are used. This information can reveal hidden characteristics of the firm that help investors assess the true value of the firm, reducing their adverse selection problem. To the extent that published information on the implementation of VBM works as a credible signal of management's commitment to act in the shareholders' best interest, we expect this information to reduce information asymmetries (Amihud & Mendelson, 1986; Verrecchia, 2001; Welker, 1995). Disclosures on VBM systems should help align managers' and shareholders' interests by reducing managerial misappropriation of cash flows and alleviating agency problems of investment decisions (Jensen & Meckling, 1976). Lower managerial misappropriation and more efficient investment decisions will lead to lower agency costs for the shareholders and, hence, increased expected cash flows while holding the variance and covariance constant. Based on the stewardship effect (Lambert et al., 2007), this should lead to a decrease in the cost of capital. We hypothesize:

H1a: Implemented VBM systems are associated with lower levels of information asymmetry.

H1b: Implemented VBM systems are associated with lower cost of equity capital.

VBM and VBR address two distinct, but related aspects of the agency problem between management and shareholders. While VBM is largely concerned with providing managers with effective tools for making value increasing decisions and according incentives (Ryan & Trahan, 2007), VBR addresses the information gap between the firm's internal value generation and its translation into market values (Copeland et al., 2000). Literature on VBM suggests that firms can improve market valuation by providing additional information on the fundamental value of the firm and its drivers (Copeland et al., 2000). It is claimed that additional information on the 'true' value of the firm can align fundamental values and market valuation (e.g. Koller et al., 2010). Consistent with this notion, Serafeim (2011) finds that uncovering hidden information about firm value is an effective deterrent from being targeted by a hostile takeover. Transparency about the sources of value generation and implemented internal control processes may help in assessing management's commitment to act in the shareholders interest and determine the intrinsic value of the firm. Investors may use this information to improve monitoring and exert capital market pressures that provide incentives for managers to act in the shareholders' interest. Hence, we expect that higher levels of VBR are associated with lower levels

[7] For example, Welker (1995); Botosan (1997, 2006); Botosan & Pumlee (2005); Debrency & Rahman (2005); Lundholm & van Winkle (2006); Bhattacharya, Ecker, Olsson, & Schipper (2012); Barth, Konchitchki, & Landsman (2013). See Beyer et al. (2010) and Plumlee (2016) for further references.

of information asymmetries. Based on the stewardship effect of disclosure, we also expect a negative association with the cost of capital. We hypothesize:

H2a: High-quality VBR is associated with lower levels of information asymmetry.

H2b: High-quality VBR is associated with lower cost of equity capital.

Even though VBR is considered an integral part of VBM, disclosures on the value creation process and fundamental values potentially are effective devices for reducing information asymmetries even in the absence of VBM. To the extent that VBR captures aspects of internal control that are otherwise signalled to shareholders by implemented VBM, VBR can potentially substitute VBM. By providing transparency about the value generation process and the resulting accountability, managers may be incentivized to make value-enhancing decisions. Given that VBM is designed as an integrated system for decision-making, providing incentives and transparent reporting, we expect to find overall stronger reductions in information asymmetries and cost of capital when both instruments are used in conjunction. We hypothesize:

H3a: When used in conjunction, VBM and VBR are associated with lower levels of information asymmetry than when used individually.

H3b: When used in conjunction, VBM and VBR are associated with lower cost of equity capital than when used individually.

3 | RESEARCH METHODOLOGY

We test our hypotheses using regression models. In all models we integrate (1) a measure for the implementation of Value Based Management Systems (*VBMS*), (2) a measure of Value Based Reporting (*VBRSCORE*), and (3) the interaction term of these two variables. *VBMS* is a binary variable which equals 1 if a firm makes a statement in its annual report that its objective is the creation of shareholder value and, at the same time, is describing an internal control system relying on a value based management metric; 0 otherwise. We code each individual observation and allow for changes from one year to the other. *VBRSCORE* is a firm's achieved score of VBR disclosures. The measurement of these key variables *VBRSCORE* and *VBMS* is described in detail in Section 4. *VBMSxVBRSCORE* is the interaction variable. As dependent variables, we use different proxies for information asymmetries and cost of equity capital as outlined in the following subsections.

For all regression models we adopt a two-stage-least squares model with cross-section fixed effects[8] to capture the endogeneity of disclosure. The use of panel data permits us to control for unobserved heterogeneity. We use robust standard errors to mitigate potential heteroscedasticity problems in our panel regressions. We control for multicollinearity by computing the Variance Inflation Factors (VIF) for every regression. The values for the control variables are all below the conservative threshold of five.

3.1 | Information asymmetries

We measure information asymmetries (IAS) by bid-ask spreads (BAS), analysts' forecast errors (FE) and dispersion of analysts' forecasts (FD) (e.g. Blackwell & Dubins, 1962; Brown & Hillegeist, 2007; Krishnaswami & Subramaniam, 1999; Leuz & Verrecchia, 2000; Mohd, 2005). We adopt the following regression model:

$$BAS_{it+1} = \beta_0 + \beta_1 VBMS_{it} + \beta_2 VBRSCORE_{it} + \beta_3 VBMSxVBRSCORE_{it} + \beta_4 BETA_{it} + \beta_5 CHE_{it} + \beta_6 CL_{it} + \beta_7 FOL_{it} + \beta_8 ST_{it} + \sum ISTA_{it} + \sum IND_{it} + \sum YEAR_{it} + \varepsilon_{it} \quad (1)$$

[8] We include the variable α_i, which captures firm fixed effects and leads to firm-specific intercepts, with $\alpha_i = \beta_0 + \beta_1 Z_i$ (holding constant the unobserved firm characteristics *Z*). We apply the test of Hausman (1978) and find that the fixed effects model is the consistent model in comparison to a random effects model as alternative.

$$FE_{it+1}\ or\ FD_{it+1} = \beta_0 + \beta_1 VBMS_{it} + \beta_2 VBRSCORE_{it} + \beta_3 VBMSxVBRSCORE_{it} + \beta_4 BETA_{it} + \beta_5 CHE_{it} + \beta_6 CL_{it} + \beta_7 FOL_{it} + \sum ISTA_{it} + \sum IND_{it} + \sum YEAR_{it} + \varepsilon_{it} \quad (2)$$

The dependent variable *BAS* is measured by the annual average of the daily relative bid ask spread, that is, the absolute difference between the daily bid and ask closing prices scaled by the average price.[9] *FE* is measured as the absolute difference between actual reported earnings per share minus one-year consensus forecast of earnings per share. *FD* is measured as the standard deviation of analysts' forecasts scaled by end-of-period share price (Brown & Hillegeist, 2007). The control variables (with subscripts omitted) are as follows: The firm's CAPM beta (*BETA*) controls for the uncertainty of future performance reflected in the daily BAS and analyst forecasts. We run our tests with a two-year-beta calculated on a weekly basis and the HDAX index as reference. Further, we control for earnings change (*CHE*), measured as the natural logarithm of the absolute earnings change between two periods scaled by total assets, as higher earnings changes have been shown to be associated with higher spreads in the capital market (Chipalkatti, 2005). Also, a more volatile business presents additional challenges for forecasting (e.g., Graham, Harvey, & Rajgopal, 2005). We control for cross listing (*CL*), measured by an indicator variable which is coded 1 if a firm is listed on a foreign exchange or in the US OTC market, 0 otherwise. *CL* has been shown to be negatively related to bid-ask spreads (e.g., Lang, Raedy, & Yetman, 2003; Orens et al., 2009). *CL* has also been shown to facilitate the forecasting process (e.g., Hope, 2003). We include analyst following (*FOL*), measured as the number of analysts following a firm scaled by share price, because a higher number of analysts following a firm has been shown to be associated with a better information environment (Brown & Hillegeist, 2007; Mohd, 2005) and facilitates the forecasting process (e.g., Aboody & Lev, 1998). For the regression on *BAS*, we include the turnover of shares during a year scaled by number of shares (*ST*) as this variable has been shown to be inversely related to spreads due to the higher trading volume of shares (Leuz & Verrecchia, 2000; Mohd, 2005). We further control for reporting incentives associated with the voluntary adoption of international accounting standards (*ISTA*) in all regressions. From 1993 on, German firms had started adopting International Accounting Standards (IAS) as well as US-GAAP voluntarily. Early adopters of international standards likely have different reporting incentives compared to late and mandatory adopters (Daske, Hail, Leuz, & Verdi, 2008). Late adopters, i.e., firms that adopted IFRS after the EU had promulgated its regulation to make IFRS mandatory, may only adopt international standards on the surface without implementing material changes in accounting policies (Daske, Hail, Leuz, & Verdi, 2013). Also, our sample comprises observations of firms that voluntarily adopted US-GAAP early or late and have switched to IFRS voluntarily or mandatorily. We code our observations accordingly and integrate indicator variables in our regressions.[10]

We expect that the variables *VBRSCORE* (H1a) and *VBMS* (H2a) are negatively associated with our measures for information asymmetry. Following our hypothesis H3a, we expect higher reductions in IAS for firms using VBM and VBR in conjunction in comparison to firms providing high quality disclosures in the absence of VBM.

3.2 | Cost of equity capital (*COC*)

Our second main dependent variable is the cost of equity capital (*COC*). *COC* is measured by the implied cost of capital derived from the internal rate of return equating current share price to the present value of future cash flows. There are different approaches to deriving the implied cost of capital. The most commonly used approaches are Claus and Thomas (2001), Easton (2004), Gebhardt, Lee, and Swaminathan (2001), Gordon and Gordon (1997), and

[9] Leuz & Verrecchia (2000) point out that it is important to separate the news effect from the effect on information asymmetry: 'The latter is permanent and captures the reduction in information asymmetry and increase in liquidity. Thus, its direction is independent of the news content' (Leuz & Verrecchia, 2000, p. 100). We therefore model the effect of the independent variables on information asymmetry and cost of equity capital in the subsequent period.

[10] Firms are coded into the following groups: (1) early IAS adopters (before 2002); (2) late IAS adopters (2002–04); (3) mandatory IAS adopters (2005); (4) late US-GAAP adopters (2002–04) that switched to IFRS in 2005 or after; (5) early US-GAAP adopters (before 2002) that switched to IFRS in 2005 or after; (6) early US-GAAP adopters (before 2002) that switched to IFRS between 2002–04; (7) early US-GAAP adopters (before 2002) that switched to IFRS before 2002; (8) late US-GAAP adopters (2002–04) that switched to IFRS between 2002–04. There were no observations of group (7) and (8) in our final sample.

Ohlson and Juettner-Nauroth (2005). We follow Daske et al. (2013), Hail and Leuz (2006), Hou, van Dijk, and Zhang (2012), and compute the mean implied cost of capital (*COC*) based on the above-mentioned five different measures to ensure that our results are not driven by a particular method. Hail and Leuz (2006) and Hou et al. (2012) provide a detailed description of the components of these measures in their appendices. We adopt the following regression model:

$$COC_{it+1} = \beta_0 + \beta_1 VBMS_{it} + \beta_2 VBRSCORE_{it} + \beta_3 VBMSxVBRSCORE_{it} + \beta_4 BETA_t + \beta_5 CHE_{it} + \beta_6 CL_{it} + \beta_7 FOL_{it} + \beta_8 OWN_t + \sum ISTA_{it} + \sum IND_{it} + \sum YEAR_{it} + \varepsilon_{it} \quad (3)$$

We use the following control variables. We include BETA as a measure for systematic risk, which has been shown to be positively associated with cost of equity (Botosan & Plumlee, 2005; Hail & Leuz, 2006). We use the natural logarithm of the absolute earnings change between two periods scaled by total assets (*CHE*) as higher earnings changes are expected to be associated with higher cost of capital (e.g., Graham et al., 2005). We control for cross listing (*CL*) which has been shown to improve the information environment (e.g., Hope, 2003) and expect a negative association with *COC* (e.g., Orens et al., 2009). Further, we control for analyst following (*FOL*), which is associated with a higher information intermediation (Healy & Palepu, 2001) and therefore is expected to be negatively associated with *COC*. We follow Core et al. (2015) and include *OWN* to capture inside ownership, proxied by the natural logarithm of the percentage of total shares held by management and personnel. Disclosure quality and inside ownership work as substitutes and a failure to include inside ownership significantly underestimates the direct link between disclosure and the cost of capital (Core et al., 2015). Accordingly, we expect a positive relationship with *COC*. We further control for reporting incentives associated with the voluntary adoption of international accounting standards (*ISTA*).

Following our hypotheses H1b and H2b, the regression coefficients on *VBMS* and *VBRSCORE* are expected to be negative. For hypothesis H3b, we expect a stronger negative association with *COC* for firms using VBM and VBR in conjunction in comparison to firms using either of them in isolation.

3.3 | Endogeneity of value based reporting

Previous research on disclosure emphasizes the potential endogeneity of voluntary disclosure (e.g., Healy & Palepu, 2001; Larcker & Rusticus, 2010). This endogeneity bias could be driven by firm incentives and proprietary costs as discussed in Section 2. We therefore adopt a two stage least squares (2SLS) approach. The instrumental variables are identified based on prior research as described in the following. We integrate these factors as instrumental variables in the first stage estimation of the 2SLS approach. We use the following equation for the first stage:

$$VBRSCORE_{it} = \beta_0 + \beta_1 AGE_{it} + \beta_2 AUDITOR_{it} + \beta_3 COMP_{it} + \beta_4 EQUAL_{it} + \beta_5 FNEED_{it} + \beta_6 INT_t + \beta_7 ISSUE_{it} + \beta_8 LEV_{it} + \beta_9 MBR_{it} + \beta_{10} PROF_{it} + \beta_{11} PROP_{it} + \beta_{12} SIZE_{it} + \beta_{13} VOLA_{it} + \alpha_{it} + \varepsilon_{it} \quad (4)$$

We model the firms' decision to disclose based on prior literature on the determinants of voluntary disclosure (e.g., Ahmed & Courtis, 1999; Boesso & Kumar, 2007; Depoers, 2000; Hail, 2003; Hossain, Perera, & Rahman, 1995; Lang & Lundholm, 1993, 1996; Prencipe, 2004; Raffournier, 1995; Reitmaier & Schultze, 2017). We integrate variables capturing the trade-off between the costs and benefits of disclosure faced by a firm when making a decision to disclose as suggested by Beyer et al. (2010). In particular, we include proprietary costs as a main cost component. We also include capital market transactions as well as stock-based compensation to model the motives for disclosure. We include the following variables as determinants of the disclosure decision:

a) *Firm Age* (*AGE*): The variable is measured by the number of years the firm has been listed on the Frankfurt stock exchange. Younger firms are subject to greater uncertainty and have incentives to disclose more. Also, age is

considered a proxy for reputation. Firms with higher reputation disclose more (Blanco, Garcia Lara, & Tribo, 2015). The expected relationship to *VBRSCORE* is therefore ambiguous.

b) *Audit firm* (*AUDITOR*) is a dummy variable taking the value of 1 if the auditor is a Big Four audit firm, and 0 otherwise. Large, well-known audit firms may induce companies to disclose a higher level of information (Firth, 1979; Hope, 2003; Raffournier, 1995; Verrecchia, 1990). In particular, Big Four Audit firms have considerably promoted the idea of investor-orientation and VBR.

c) *Share-based compensation* (*COMP*): The variable *COMP* is a dummy variable indicating the existence of share-based compensation. Managers have incentives to opportunistically use disclosure decisions to influence share price (e.g., Aboody & Kasznik, 2000).

d) *Earnings Quality* (*EQUAL*): Francis, Nanda, and Olsson (2008) find a positive relationship between earnings quality and overall disclosure. We use the ratio of the absolute value of total accruals to cash flow from operations (|TACC/OCF|) as in Leuz (2003). The measure is consistent with Dechow and Schrand (2004) arguing that focusing on the level of total accruals is a simple and easy way of identifying discretionary accruals. Total accruals and discretionary accruals are highly and positively correlated (Dechow, Richardson, & Tuna, 2003). We multiply the measure with −1 for ease of interpretation and expect a positive relationship.

e) *Financing Need* (*FNEED*): the financing need of a firm is measured by the ratio of cash flow for investing activities (ICF) to cash flow from operations (OCF). Firms in need of funds to finance their investment opportunities have incentives to disclose more (Healy & Palepu, 2001).

f) *Internationalisation* (*INT*) is proxied by foreign sales divided by total sales. Greater international activities may result in larger public scrutiny and hence induce a greater demand for information (e.g., Raffournier, 1995).

g) *Equity Issues* (*ISSUE*): The dummy variable *ISSUE* captures new equity raised in the following period. Literature shows that firms issuing new equity significantly increase their disclosures (e.g., Lang & Lundholm, 2000).

h) Leverage (*LEV*) (the ratio of total debt to total assets) captures effects of higher financial leverage on managerial incentives and can have a positive or negative effect on disclosure (e.g., Brown & Hillegeist, 2007; Orens et al., 2009). Leverage can increase disclosure due to higher agency cost. Alternatively, leverage can have a negative association with disclosure because firms in poor financial condition may not be able to gain benefits from disclosure (Cormier & Magnan, 2003; Cormier, Ledoux, Magnan, & Aerts, 2010).

i) *Market-to-book-ratio* (*MBR*). Firms with a higher market-to-book ratio are under pressure to meet the capital markets' expectations and have incentives to increase their voluntary disclosures in order to justify their high market valuation. At the same time, undervalued firms are more likely to be subject to hostile takeovers (Serafeim, 2011). Hence firms with relatively low market-to-book ratios have incentives to expand voluntary disclosures in order to increase valuation. The variable also captures growth opportunities and growing firms disclose more (Easton & Monahan, 2005). The relationship to *VBRSCORE* is therefore ambiguous.

j) *Profitability* (*PROF*): disclosures of highly profitable firms may be considered a signal of investment quality. According to agency theory, talented managers have an incentive to reveal their type through voluntary disclosures (Trueman, 1986). We therefore include the variable *PROF* measured by return on sales.

k) *Proprietary costs* (*PROP*) are proxied by relative market share, defined as market share of firm *i* divided by market share of the largest competitor in the industry. Market shares are computed based on ICB codes and sales data from Datastream. Relative market share has the advantage of being a firm-specific measure while other concentration measures typically used in empirical studies, such as the Herfindahl index, are industry-specific (e.g., Blanco et al., 2015). A higher value for relative market share captures a stronger competitive position for the firm. We therefore expect a negative relationship.

l) *Firm size* (*SIZE*) (the natural logarithm of market value) captures the effect of bigger firm size on disclosure related to their relatively lower costs of disclosure and lower risk (e.g., Cormier, Ledoux, & Magnan, 2009).

m) *Share volatility* (*VOLA*) reflects uncertainty of the business (e.g., Alford & Berger, 1999). Firms facing higher volatility in stock prices could have incentives to provide investors with additional information and signal a stable and profitable business. On the other hand, firms facing higher volatility could withhold disclosure because of proprietary costs.

All control variables of the second stage are also included in the first stage regression.

4 | MEASUREMENT OF KEY VARIABLES

4.1 | Implementation of value based management systems

We use content analysis of annual reports to determine whether a firm has implemented a VBM system (*VBMS*). We set the binary variable *VBMS* equal to 1 if a firm makes an explicit statement of shareholder value orientation in its annual report and describes an internal control system relying on a VBM metric that takes into account the cost of invested capital. We allow for changes from one year to the other and code each observation individually. We only set the variable to 1 if the VBM metric is explicitly stated as a top performance measure.[11] We use this condition to distinguish firms who actually have implemented VBM from those who only pretend to be shareholder value oriented.[12]

Since the implementation of VBM systems cannot be observed directly, the credibility of the information on VBM system is fundamentally based on the assumption that firms that report about the implementation actually have adopted a VBM system (Lovatta & Costigan, 2002). Similar strategies are applied by Lovatta and Costigan (2002) and Balachandran (2006). Another possibility is to collect the data on VBM implementation through surveys (e.g., Ryan & Trahan, 1999, 2007). However, this procedure has the disadvantage of a possible response bias. Compared to a filled survey, the objective information on the implementation of VBM in an annual report is more credible because of litigation risk as well as political costs (Rapp et al., 2011).

We do not determine a degree of implementation or sophistication of the VBM system (Burkert & Lueg, 2012). However, to the extent that improvements in the communication with shareholders are considered an integral part of VBM, our measure for the extent of VBR disclosures, described in the next subsection, can be considered an indirect measure of the sophistication of VBM implementation.

4.2 | Construction of the value based disclosure score (*VBRSCORE*)

Healy and Palepu (2001) find that a major problem of disclosure studies is the difficulty in measuring the level of disclosure. Chavent, Ding, Linghui, Stolowy, and Wang (2006) and Beretta and Bozzolan (2008) provide comprehensive overviews of disclosure studies and the scores employed. Early studies either measured the quality of disclosure by a disclosure index provided by analysts or business magazines or used a framework related to or derived from the Jenkins Committee (AICPA, 1994) report (e.g., Brown & Hillegeist, 2007; Daske & Gebhardt, 2006; Hail, 2003; Lang & Lundholm, 1993). Analysts' rankings can be problematic because of contained biases (Healy & Palepu, 2001). Daske and Gebhardt (2006) show that disclosure indexes of business magazines often do not warrant a consistent computation of the index over the years, making the comparison of the index results over several years almost impossible. As a consequence, more and more studies use self-constructed proxies, especially when the analysed disclosures are specific (Akhtaruddin, 2005; Beretta & Bozzolan, 2008; Blanco et al., 2015; Garcia-Meca, Parra, Larran, & Martinez, 2005; Patelli & Prencipe, 2007; Paugam & Ramond, 2015). Self-constructed proxies have the disadvantage of being

[11] See Ryan & Trahan (2007) for an overview and classification of value based management metrics.

[12] This condition is consistent with Malmi & Ikaheimo (2003) finding that 'A minimum requirement could be that the organisation aims for shareholder value creation and that either (1) decisions are taken at some levels of an organisation using EVA™ or VBM, or (2) the management control system (performance measurement, target setting and rewards) is based on economic profit metrics or value drivers'. This is also consistent with the definition of VBM in many studies. For a review see for example, Lueg & Schäffer (2010).

subjective and therefore difficult to replicate (Beyer et al., 2010). However, self-constructed disclosure indexes have the advantage of capturing what is intended to be measured in a better way (Healy & Palepu, 2001).

To quantify the extent to which firms provide value based disclosures in their annual report, we adopt a framework and disclosure index developed by the German Schmalenbach Society of Business Administration (SG) for value based reporting (Ruhwedel & Schultze, 2002; SG, 2002).[13] Based on this framework, Ruhwedel and Schultze (2002) descriptively analyse the reporting of the DAX30 companies from 1997 to 2000 and of MDAX firms in 2000. The authors find large heterogeneity in the level and quality of the information provided. The framework and score were subsequently applied by many German firms and researchers (e.g., Baetge & Solmecke, 2006; Hayn & Matena, 2005; Heidemann & Hofmann, 2009; Huefner, 2007; Koethner, 2005). In 2005, the German Accounting Standards Board released the GAS 15 'Management Report', with the aim to incorporate and structure 'value-orientated reporting into the statutory group management report',[14] making many of these disclosures mandatory.

The score is particularly useful for our study as it systematically comprises the additional non-financial information published in annual reports relevant for assessing market and fundamental value as well as internal control system design. The framework is derived from the objective of VBM to close value gaps i.e., the difference between a firm's current market value and its potential value if it were managed efficiently, by communicating additional information on the value creation process and the drivers of value (Copeland et al., 2000). AICPA (1994), FASB (2001) and Fruhan (1988) have found that there is a need for such additional information, and different reporting concepts have been developed by practitioners and researchers to meet the needs of market participants (e.g., Eccles et al., 2001, 2011). The SG-score is based on these concepts and designed to capture the voluntary information provided in the annual report that improves investors' abilities to make assessments of the potential intrinsic value of the firm and make comparisons to market valuation, that is, assess the value gap. The SG framework includes disclosures about implemented internal control processes relevant for assessing management's commitment to act in the shareholders' interests – and thereby the difference between potential value and current market value. The score measures the degree of transparency about internal control processes and the sources of internal value generation. This allows us to capture the information that investors may use to improve monitoring and exert capital market pressures that provide incentives for managers to act in the shareholders' interest.

The *SG* score differs from other frameworks of enhanced reporting in two ways: (1) It is derived from the theoretical framework of valuation models and focuses on the valuation problem of investors; (2) it contains information about internal control processes potentially inducing a shareholder value orientation. It captures information about the processes of value generation, the established control mechanisms and associated incentives, as well as the drivers of value not directly observable from the financial statements, such as intellectual capital and other non-financial information. The components of the *SG* score were derived from inputs to valuation models and validated based on previous research about investors' information needs, as well as the AICPA's and FASB's recommendations (AICPA, 1994; FASB, 2001; Ruhwedel & Schultze, 2002). The literature on the information processing of market participants has found that analysts use different valuation models in their analyses and consequently require different information as inputs to these models (Block, 1999; Bradshaw, 2004; Gleason, Johnson, & Li, 2013). It is largely unclear which models investors use (Bradshaw, 2004). The SG score comprises the existing three basic approaches to valuation: asset-based valuation, relative valuation based on multiples and present value-techniques (AICPA, 1994; Damodaran, 2002; Stowe, Robinson, Pinto, & McLeavey, 2002). The score consists of four main parts: Information for net asset valuation (Part 1), information for relative valuation (Part 2), information on internal value generation (Part 3), and information on future performance (Part 4). Reitmaier and Schultze (2017) find that the score is significantly associated with market values and that including the score in a regression of market values significantly increases the explanatory power of book values and earnings.

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[13] We thank the authors for providing the original questionnaire. Our items differ slightly from their analysis because of our different focus. We excluded some items that have since become mandatory (e.g., fair values of certain assets). Also, the score does not contain information on internal value-based management processes as in Reitmaier & Schultze (2017), because this information is contained in the variable *VBMS*.

[14] See Basis for Conclusions C2.

The score does not distinguish between good and bad news but rather asks for the level of detail of each item, focusing on the information effect rather than the news effect. We calculate the aggregate score (*VBRSCORE*) as the sum over all items in the list scaled by the maximum number of points achievable. Items are awarded score-points based on the level of information provided (e.g., Orens et al., 2009). In general, each item provided is awarded one point. One additional point is awarded for detailed, qualified information, two additional points for quantifiable information (if applicable). The items were each assigned a weight depending on their relevance. The maximum number of points achievable is 360 (a detailed description of the elements of the score and weights are provided in the Appendix). Generally, the items of disclosure can either be weighted or unweighted for inclusion in an index. The determination of weights is based on the perceived relative importance of the singular piece of information by a user group such as investors (Prencipe, 2004; Singhvi & Desai, 1971). The purpose of using an unweighted score is to reduce subjectivity in determining weights (Ahmed & Courtis, 1999). The items investigated are of quite different importance and level of detail; some ask broader questions like about a firm's competitive advantages while others ask for small details. Assigning an identical weight would in fact ascribe identical importance to all factors, which would be equally subjective. Adding an additional item with similar content would also increase the topic's relative weight. Therefore, we weight information according to its presumed relative importance. A similar approach is used for example by Boesso and Kumar (2007). To validate the internal consistency of our disclosure score, we calculate Cronbach's alpha for the components of the score. The resulting value of 0.7 is in accordance with the acceptable level of consistency between the items (Cronbach, 1951). The content analysis was undertaken by three different coders. To secure intercoder reliability, ten annual reports were randomly chosen and analysed by all three coders before starting the actual data collection. The proportion of consensual answers between coders A/B, B/C and A/C was above 90%, revealing high homogeneity between the coders.

5 | SAMPLE DESCRIPTION

5.1 | Sample

We obtained market data from Thomson Datastream database and firm information from companies' annual reports. Analysts' forecasts are retrieved from the Institutional Brokers Estimate System (IBES). Inside ownership data are from Hoppenstedt. The study is based on the annual reports for the years 2000 through 2004 of the 118 largest firms listed in the German HDAX (comprising the 30 largest firms (DAX) and the following 70 mid-cap firms (MDAX)) during the sample period. These companies are categorized in 19 different industries according to the classification of the Industry Classification Benchmark (ICB) (supersectors level). In order to compute change variables like the change in earnings, we also obtain data from annual reports in 1999. We further collect data for our measures for information asymmetries and cost of equity capital for the year 2005. Our initial sample comprises 590 observations. We lose 157 firm-years due to firms that have merged, gone bankrupt or were delisted during the sample period or the following year (while including them in their surviving years to avoid survivorship bias). We further removed 15 outliers.[15] The final sample therefore comprises 418 observations.

5.2 | Descriptive statistics

The descriptive statistics in Table 1 show that the percentage of firms with implemented VBM over the sample period is 45%. Notably, the percentage of firms giving a statement of shareholder value orientation in their annual reports is

[15] Prior research points out that outliers potentially have a large influence on the parameter estimates for the distributions of variables (e.g., Frecka & Hopwood, 1983), especially in small samples. We examine outliers with observations differing more than four standard deviations from the mean of the respective variable (e.g., Casey & Bartczak, 1985) and studentized residuals > 3 and < -3 in the respective regression. These procedures led to the removal of 15 observations. Keeping these outliers, however, does not change our main inferences.

TABLE 1 Descriptive statistics

Variable	N	Mean	Median	Std. Dev.	Min	Max
VBMS	418	0.4545	0	0.4985	0	1
VBRSCORE	418	0.2895	0.2833	0.0963	0.0750	0.5722
BAS	418	0.0078	0.0055	0.0071	0.0005	0.0420
FE	418	1.1430	0.4300	2.2447	0	19.9100
FD	418	0.0127	0.0094	0.0114	0	0.0804
COC	418	0.0922	0.0866	0.0371	0.0078	0.2186
BETA	418	0.8488	0.7100	0.5701	0.0070	3.3600
CHE	418	−4.6329	−4.4449	1.7798	−11.4880	2.7935
CL	418	0.2679	0	0.4434	0	1
FOL	418	0.8180	0.5891	0.7583	0.0133	5.9459
OWN	418	−8.2864	−9.2103	2.4342	−9.21034	0.8954
ST	418	0.0046	0.0029	0.0053	0.0000	0.0366
AGE	418	36.031	15	40.3407	0	135
AUDITOR	418	0.7847	1	0.4115	0	1
COMP	418	0.6196	1	0.4861	0	1
EQUAL	418	−1.1511	−0.7122	3.4215	−59.5876	−0.0059
FNEED	418	2.3983	0.6874	25.9794	−39.0064	514.8965
INT	418	0.4515	0.5024	0.3756	0	4.3441
ISSUE	418	0.0718	0	0.2584	0	1
LEV	418	0.6925	0.7018	0.1689	0.2349	0.9928
MB	418	2.3104	1.5359	2.6297	0.2046	25.3882
PROF	418	0.0337	0.0320	0.1053	−1.2170	0.6925
PROP	418	0.2560	0.0992	0.3128	0.0012	1.7422
SIZE	418	21.5207	21.3672	1.6398	18.0159	25.3130
VOLA	418	0.0240	0.0224	0.0087	0.0083	0.0692

Notes: *VBMS* is a binary variable which equals 1 if a firm makes a statement of shareholder value orientation in its annual report and is describing an internal control system relying on a value based management metric; 0 otherwise. *VBRSCORE* is the achieved score of VBR disclosures scaled by the maximum score of 360. *BAS* is the bid ask spread, measured by the annual average of the daily relative bid ask spread, that is the absolute difference between bid and ask closing prices deflated with the average price. *FE* is one year lagged analysts' consensus forecast errors, measured as the absolute difference between actual reported earnings per share minus one-year consensus forecast of earnings per share. *FD* is the dispersion of analysts' forecasts, measured as the standard deviation of the first analyst forecasts for the next fiscal year scaled by end-of-period share price. *COC* are the cost of equity capital, measured as a composite measure of five different measures, following Hail & Leuz (2006), Hou et al. (2012). *BETA* is the CAPM beta of a firm. *CHE* is the natural logarithm of the absolute change in earnings scaled by total assets. *CL* is a binary variable equal to 1 if a firm is listed on any foreign exchange or in the US OTC market, 0 otherwise. *FOL* is the number of analysts following scaled by end-of-period share price. *OWN* is inside ownership, measured by the natural logarithm of the percentage of total shares held by management and personnel. *ST* is share turnover, measured by the annual average of daily share turnover, computed as trading volume divided by number of shares. *AGE* is the number of years the firm has been listed on stock exchange. *AUDITOR* is a binary variable which equals 1 if the auditor is a Big Four audit firm; 0 otherwise. *COMP* is a binary variable which equals 1 if share-based compensation exists; 0 otherwise. *EQUAL* is earnings quality, measured by the absolute value of total accrual divided by cash flow from operations. *FNEED* is financing need, measured by the ratio of the cash flow for investing activities to cash flow from operations. *INT* is internationalization, measured by foreign sales divided by total sales. *ISSUE* is a binary variable which equals 1 if the firm raised new equity in the following period, 0 otherwise. *LEV* is leverage of a firm, computed as (total assets – book value of equity) divided by total assets. *MB* is market-to-book-ratio of a firm. *PROF* is profitability of a firm, measured by return on sales. *PROP* are proprietary costs, measured by firm's market share divided by market share of the largest competitor in the industry, based on ICB codes; the market share is computed as firm's sales divided by industry sales. *SIZE* is the natural logarithm of market value. *VOLA* is share volatility, measured by the standard deviation of daily stock returns.

64% (not tabulated). The firms giving a statement of shareholder value orientation without describing a VBM metric are coded as zero for our variable *VBMS*. The average *VBRSCORE* over the sample period is around 104 points out of 360 (29%) and the maximum is 206 points (57%).

The results of the univariate analysis in Table 2 show a positive and significant correlation between the variables *VBRSCORE* and *VBMS*. The correlations of *VBMS* and *VBRSCORE* with the dependent variables have the expected sign of direction in all cases. For *VBRSCORE* we observe a significantly negative correlation with *BAS* for both Bravais-Pearson and Spearman rank correlations (−0.40 and −0.41). For *VBMS* we find a significantly negative correlation with *BAS* (−0.28 and −0.30), but not for the other dependent variables.

6 | EMPIRICAL RESULTS

6.1 | Endogeneity of value based reporting

The results of the first stage regressions for the different dependent variables are tabulated in Table 3. The results indicate a significant influence of compensation *COMP* in all regressions. Share volatility *VOLA* is significant for all regressions on information asymmetry, but not for *COC*. Size is significant for *COC* and marginally significant for our three proxies of information asymmetries. Financing need *FNEED* is marginally significant for *BAS*. The F-statistic for the joint significance of the instruments is high and significant in all cases. In addition, the partial R^2 of 0.1416 and 0.1565 is relatively high implying that weak instruments are not a problem (e.g., Stock, Wright, & Yogo, 2002). Economically, compensation can be considered exogenous and is our main instrument (Larcker & Rusticus, 2010). We use the specific panel regression test of Durbin, Wu and Hausmann to test for potential endogeneity of our disclosure score (Larcker & Rusticus, 2010). The test of endogeneity is highly significant in all regression models. Moreover, we run tests for the validity of our instruments. The tests for weak instruments, under- and over-identification restrictions suggest a well identified first stage of the 2SLS regression in all cases.[16]

6.2 | Regression results

6.2.1 | Information asymmetry

Table 4 presents the regression results for information asymmetry (*BAS*, *FE* and *FD*). Consistent with expectations, we find that the coefficients on the variables *VBRSCORE* and *VBMS* are highly significant and have the expected sign for all three proxies. This implies that both the implementation of VBM systems and VBR are individually associated with lower information asymmetries, providing support for H1a and H2a. Further, we find that the coefficient on the interaction variable between *VBRSCORE* and *VBMS* is significant and positive for *BAS*, *FE* and *FD*. This indicates a substitution of VBM by VBR.

To analyse the economic significance of the results, we compute the marginal effects of the relationships (Williams, 2012). Table 5 reports average marginal effects ey/ex, that is, elasticities at mean. To interpret the economic significance of the joint effects of *VBRSCORE* and *VBMS* on information asymmetry, we calculate the simple intercept, equal to ($\beta_0 + \beta_1$**VBMS*) and the simple slope, equal to ($\beta_2 + \beta_3$**VBMS*).[17] The simple intercept is 0 for *VBMS* = 0 and −0.9811 for *VBMS* = 1. The simple slope is −2.5995 for *VBMS* = 0 and (−2.5995 + 1.26761 =) −1.3319 for *VBMS* = 1. Overall, we receive a relationship of *BAS* = 0 – 2.5995**VBRSCORE* for *VBMS* = 0 and of *BAS* = – 0.9811 – 1.3319**VBRSCORE* for

[16] The test statistics for over-identification are high but reduce to normal levels when we eliminate all non-significant variables, leaving our main results unaffected. We include the full set of variables to present the results for all variables.

[17] Another possibility is to dichotomize the continuous variable by exercising a median split followed by an analysis of variance (ANOVA). As prior literature (e.g., Aiken & West, 1991) has found that this solution is accompanied with a loss of statistical power, we do not pursue this approach in this paper.

TABLE 2 Correlation matrix (Bravais-Pearson correlations above the diagonal and Spearman rank correlations below the diagonal)

	VBMS	*VBR-SCORE*	*BAS*	*FE*	*FD*	*COC*	*BETA*	*CHE*	*CL*	*FOL*	*OWN*	*ST*	*AGE*	*AUD-ITOR*	*COMP*	*EQUAL*	*FNEED*	*INT*	*ISSUE*	*LEV*	*MB*	*PROF*	*PROP*	*SIZE*	*VOLA*
VBMS	**1.00**	0.59*	−0.28*	0.10*	0.03	0.08	0.01	0.01	0.33*	0.03	−0.21*	0.14*	0.13*	0.19*	0.41*	0.00	−0.02	0.12*	−0.07	0.09	−0.13*	0.02	0.29*	0.33*	−0.15*
VBRSCORE	0.61*	**1.00**	−0.40*	0.02	0.04	0.08	0.09	−0.02	0.25*	0.12*	−0.20*	0.22*	0.02	0.17*	0.50*	0.01	0.01	0.14*	0.03	0.08	−0.13*	0.02	0.34*	0.35*	−0.19*
BAS	−0.30*	−0.41*	**1.00**	0.05	0.08	0.04	−0.22*	0.09	−0.36*	−0.10*	0.14*	−0.41*	−0.16*	−0.08	−0.33*	−0.01	−0.04	−0.11*	−0.03	−0.14*	−0.00	−0.15*	−0.39*	−0.58*	0.22*
FE	0.13*	0.10	−0.11*	**1.00**	0.15*	0.15*	−0.04	−0.01	0.03	−0.15*	−0.10*	0.10*	0.06	0.03	0.03	−0.01	−0.03	−0.08	0.06	0.13*	−0.07	−0.04	0.08	0.04	0.04
FD	0.10*	0.15*	0.04	0.21*	**1.00**	0.48*	0.22*	0.09	0.05	0.44*	−0.10*	−0.03	0.10*	0.03	0.04	−0.01	−0.02	0.05	0.06	0.22*	−0.19*	−0.24*	0.04	−0.18*	0.23*
COC	0.10*	0.10*	0.04	0.14*	0.53*	**1.00**	0.13*	0.02	0.07	0.28*	−0.07	−0.02	0.13*	0.08	0.07	−0.02	0.02	0.04	0.14*	0.29*	−0.41*	−0.27*	0.09	−0.19*	0.12*
BETA	0.05	0.14*	−0.33*	0.05	0.23*	0.13*	**1.00**	0.18*	0.23*	0.31*	0.04	0.20*	0.11*	0.08	0.20*	0.02	−0.04	0.02	0.04	0.14*	0.02	−0.17*	0.18*	0.18*	0.41*
CHE	0.01	−0.02	0.06	0.05	0.04	0.00	0.15*	1.00	0.08	0.12*	0.08	0.05	−0.12*	−0.09	0.07	−0.06	−0.08	0.04	0.07	−0.40*	0.17*	−0.11*	−0.18*	−0.15*	0.33*
CL	0.33*	0.26*	−0.45*	0.14*	0.11*	0.06	0.26*	0.11*	**1.00**	0.22*	−0.12*	0.37*	0.15*	0.20*	0.34*	−0.01	−0.03	0.05	−0.00	−0.01	0.01	−0.01	0.34*	0.48*	0.05
FOL	0.08	0.21*	−0.16*	−0.11*	0.48*	0.33*	0.29*	0.07	0.20*	**1.00**	−0.03	0.01	−0.04	0.12*	0.09	−0.01	0.03	0.04	−0.02	0.16*	−0.16*	−0.18*	0.13*	0.04	0.29*
OWN	−0.19*	−0.18*	0.08	−0.12*	−0.12*	−0.05	0.02	0.06	−0.10*	−0.04	**1.00**	−0.08	−0.02	−0.19*	−0.09	−0.07	−0.02	−0.12*	0.04	−0.03	0.22*	−0.10*	−0.10*	−0.10*	0.20*
ST	0.27*	0.37*	−0.68*	0.23*	0.03	−0.00	0.32*	0.09	0.47*	0.12*	−0.09	**1.00**	−0.03	0.10*	0.26*	0.01	−0.04	0.06	0.06	−0.07	0.18*	0.08	0.25*	0.36*	0.05
AGE	0.14*	0.05	−0.21*	0.08	0.10*	0.15*	0.08	−0.15*	0.11*	0.00	−0.02	0.11*	**1.00**	0.14*	−0.03	0.06	−0.02	0.05	0.07	0.26	−0.15*	−0.07	0.23*	0.31*	−0.14*
AUDITOR	0.19*	0.19*	−0.14*	0.01	0.16*	0.09	0.10	−0.11*	0.20*	0.14*	−0.14*	0.06	0.07	**1.00**	0.18*	−0.00	0.02	0.09	0.03	0.18*	−0.21*	0.06	0.17*	0.17*	−0.13*
COMP	0.41*	0.51*	−0.35*	0.05	0.09	0.07	0.20*	0.07	0.34*	0.16*	−0.07	0.32*	−0.06	0.18*	**1.00**	−0.06	0.04	0.18*	0.01	0.08	−0.00	−0.06	0.26*	0.26*	0.01
EQUAL	0.06	0.15*	−0.04	−0.05	−0.25*	−0.23*	−0.17*	−0.02	−0.03	−0.20*	−0.09	0.10*	0.07	−0.03	−0.03	**1.00**	−0.38*	−0.03	−0.02	−0.06	−0.05	0.05	0.05	0.09	−0.08
FNEED	−0.01	−0.09	0.07	−0.07	0.04	0.06	0.01	−0.13*	0.00	0.09	0.07	−0.05	0.03	0.04	−0.09	−0.04	**1.00**	−0.05	−0.02	0.09	−0.01	0.04	−0.04	0.03	−0.02

(Continues)

TABLE 2 (Continued)

	VBMS	*VBR-SCORE*	*BAS*	*FE*	*FD*	*COC*	*BETA*	*CHE*	*CL*	*FOL*	*OWN*	*ST*	*AGE*	*AUD-ITOR*	*COMP*	*EQUAL*	*FNEED*	*INT*	*ISSUE*	*LEV*	*MB*	*PROF*	*PROP*	*SIZE*	*VOLA*
INT	0.15*	0.17*	−0.08	0.01	0.04	0.02	0.05	0.07	0.08	0.15*	−0.07	0.12*	0.12*	0.08	0.19*	0.14*	−0.03	**1.00**	−0.10*	−0.09	0.01	0.00	0.14*	0.08	−0.02
ISSUE	−0.07	0.03	−0.03	0.03	0.10*	0.13*	0.05	0.04	−0.00	0.01	0.05	0.04	0.06	0.03	0.01	0.03	0.01	−0.11*	**1.00**	0.08	−0.07	−0.02	0.01	0.00	−0.04
LEV	0.07	0.05	−0.12*	0.08	0.31*	0.32*	0.15*	−0.38*	−0.02	0.24*	0.02	−0.03	0.19*	0.14*	0.08	−0.42*	0.15*	−0.15*	0.07	**1.00**	−0.16*	−0.18*	0.34*	0.19*	−0.05
MB	−0.13*	−0.15*	−0.10*	−0.12*	−0.45*	−0.56*	−0.11*	0.15*	0.00	−0.24*	0.20*	0.13*	−0.17*	−0.24*	−0.01	0.24*	0.04	0.04	−0.05	−0.23*	**1.00**	0.16*	−0.13*	0.11*	0.20*
PROF	−0.03	−0.02	−0.07	−0.07	−0.42*	−0.38*	−0.19*	0.04	−0.03	−0.30*	0.01	0.10*	−0.08	−0.02	−0.06	0.50*	−0.13*	−0.04	−0.04	−0.47*	0.38*	**1.00**	−0.06	0.10*	−0.21*
PROP	0.36*	0.39*	−0.54*	0.15*	0.13*	0.10*	0.20*	−0.21*	0.39*	0.24*	−0.12*	0.37*	0.30*	0.26*	0.29*	0.04	0.02	0.14*	0.02	0.34*	−0.16*	−0.19*	**1.00**	0.67*	−0.16*
SIZE	0.34*	0.35*	−0.67*	0.09	−0.12*	−0.21*	0.21*	−0.16*	0.47*	0.13*	−0.09*	0.47*	0.24*	0.16*	0.25*	0.10*	0.04	0.10*	0.01	0.16*	0.21*	0.12*	0.69*	**1.00**	−0.17*
VOLA	−0.11*	−0.17*	0.31*	0.05	0.20*	0.08*	0.29*	0.29*	0.05	0.22*	0.17*	0.01	−0.18*	−0.12*	0.01	−0.18*	0.09	−0.01	−0.03	−0.00	0.02	−0.16*	−0.20*	−0.17*	**1.00**

Notes: *indicates $p \leq 0.05$ significance. *VBMS* is a binary variable which equals 1 if a firm makes a statement of shareholder value orientation in its annual report and is describing an internal control system relying on a value based management metric; 0 otherwise. *VBRSCORE* is the achieved score of VBR disclosures scaled by the maximum score of 360. *BAS* is the bid ask spread, measured by the annual average of the daily relative bid ask spread, that is the absolute difference between bid and ask closing prices deflated with the average price. *FE* is one year lagged analysts' consensus forecast errors, measured as the absolute difference between actual reported earnings per share minus one-year consensus forecast of earnings per share. *FD* is the dispersion of analysts' forecasts, measured as the standard deviation of the first analyst forecasts for the next fiscal year scaled by end-of-period share price. *COC* is the cost of equity capital, measured as a composite measure of five different measures, following Hail & Leuz (2006), Hou et al. (2012). *BETA* is the CAPM beta of a firm. *CHE* is the natural logarithm of the absolute change in earnings scaled by total assets. *CL* is a binary variable equal to 1 if a firm is listed on any foreign exchange or in the US OTC market, 0 otherwise. *FOL* is the number of analysts following scaled by end-of-period share price. *LEV* is leverage of a firm, computed as (total assets − book value of equity) divided by total assets. *OWN* is inside ownership, measured by the natural logarithm of the percentage of total shares held by management and personnel. *ST* is share turnover, measured by the annual average of daily share turnover, computed as trading volume divided by number of shares. *AGE* is the number of years the firm has been listed on stock exchange. *AUDITOR* is a binary variable which equals 1 if the auditor is a Big Four audit firm, 0 otherwise. *COMP* is a binary variable which equals 1 if share-based compensation exists, 0 otherwise. *EQUAL* is earnings quality, measured by the absolute value of total accrual divided by cash flow from operations. *FNEED* is financing need, measured by the ratio of the cash flow for investing activities to cash flow from operations. *INT* is internationalization, measured by foreign sales divided by total sales. *ISSUE* is a binary variable which equals 1 if the firm raised new equity in the following period; 0 otherwise. *MB* is market-to-book-ratio of a firm. *PROF* is profitability of a firm, measured by return on sales. *PROP* are proprietary costs, measured by firm's market share divide by market share of the largest competitor in the industry, based on ICB codes; the market share is computed as firm's sales divided by industry sales. *SIZE* is the natural logarithm of market value. *VOLA* is share volatility, measured by the standard deviation of daily stock returns.

TABLE 3 First stage instrumental variables regression of *VBRSCORE*

Dependent variable *VBRSCORE*					
Main model dependent variable		***BAS***	***FE***	***FD***	***COC***
AGE	?	−0.00010	−0.00011	−0.00011	−0.00010
		(− 1.27)	(− 1.47)	(− 1.47)	(− 1.43)
AUDITOR	+	−0.00242	−0.00232	−0.00232	−0.00468
		(− 0.36)	(− 0.34)	(− 0.34)	(− 0.70)
COMP	+	0.03956***	0.04086***	0.04086***	0.04139***
		(5.95)	(6.09)	(6.09)	(6.27)
EQUAL	+	0.00092	0.00090	0.00090	0.00072
		(1.18)	(1.23)	(1.23)	(1.19)
FNEED	+	0.00008*	0.00007	0.00007	0.00004
		(1.67)	(1.48)	(1.48)	(1.06)
INT	+	0.00444	0.00400	0.00400	0.00216
		(0.61)	(0.54)	(0.54)	(0.30)
ISSUE	+	0.00300	0.00445	0.00445	0.00542
		(0.27)	(0.41)	(0.41)	(0.53)
LEV	+/-	−0.00626	−0.00596	−0.00596	−0.00892
		(− 0.35)	(− 0.33)	(− 0.33)	(− 0.49)
MBR	?	−0.00018	−0.00002	−0.00002	0.00050
		(− 0.17)	(− 0.02)	(− 0.02)	(0.55)
PROF	?	−0.00869	−0.00769	−0.00769	−0.01229
		(− 0.38)	(− 0.33)	(− 0.33)	(− 0.62)
PROP	-	−0.01254	−0.01037	−0.01037	−0.01099
		(− 1.03)	(− 0.85)	(− 0.85)	(− 0.92)
SIZE	+	0.00507*	0.00554*	0.00554*	0.00559**
		(1.78)	(1.91)	(1.91)	(2.00)
VOLA	-	−1.18505**	−1.13640**	−1.13640**	−0.84319
		(− 2.21)	(− 2.12)	(− 2.12)	(− 1.53)
Constant		0.13945**	0.14175**	0.14175**	0.10481
		(2.11)	(2.12)	(2.12)	(1.58)
N		418	418	418	418
R^2 adjusted		77.2 %	77.0 %	77.0 %	77.6 %
Partial R^2		14.16 %	15.65 %	15.65 %	15.64 %
F-statistic		89.16***	89.88***	89.88***	86.06***
time fixed effects		included	included	included	included
industry fixed effects		included	included	included	included

2SLS first stage diagnostics				
	BAS	***FE***	***FD***	***COC***
Durbin-Wu-Hausman Chi^2 statistic: test of endogenity	18.77	5.93	14.70	10.77
(p-value)	0.000***	0.015***	0.000***	0.001***
Kleinbergen-Paap LM statistic: test of underidentification	47.07	48.91	48.91	50.42
(p-value)	0.000***	0.000***	0.000***	0.000***

(Continues)

TABLE 3 (Continued)

2SLS first stage diagnostics				
	BAS	*FE*	*FD*	*COC*
Sanderson-Windmeijer F statistic: test of under- and weak identification	4.22	4.38	4.38	4.32
(p-value)	0.000***	0.000***	0.000***	0.000***
Anderson-Rubin Wald test F-statistic	13.88	2.40	4.59	9.72
(p-value)	0.000***	0.004***	0.000***	0.000***
Hansen J statistic: test of overidentification	81.53	17.99	39.24	55.62
(p-value)	0.000***	0.116	0.000***	0.000***

Notes:

$$VBRSCORE_{it} = \beta_0 + \beta_1 AGE_{it} + \beta_2 AUDITOR_{it} + \beta_3 COMP_{it} + \beta_4 EQUAL_{it} + \beta_5 FNEED_{it} + \beta_6 INT_t + \beta_7 ISSUE_{it} + \beta_8 LEV_{it} + \beta_9 MBR_{it} + \beta_{10} PROF_{it} + \beta_{11} PROP_{it} + \beta_{12} SIZE_{it} + \beta_{13} VOLA_{it} + \alpha_{it} + \varepsilon_{it} \quad (4)$$

2SLS regression estimates with cross section fixed effects and robust standard errors *t*-statistics in parentheses (two tailed significance $^{*}p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$)
VBRSCORE is the achieved score of VBR disclosures scaled by the maximum score of 360. *AGE* is the number of years the firm has been listed on the stock exchange. *AUDITOR* is a binary variable which equals 1 if the auditor is a Big Four audit firm, 0 otherwise. *COMP* is a binary variable which equals 1 if share-based compensation exists, 0 otherwise. *EQUAL* is earnings quality, measured by the absolute value of total accrual divided by cash flow from operations. *FNEED* is financing need, measured by the ratio of the cash flow for investing activities to cash flow from operations. *INT* is internationalization, measured by foreign sales divided by total sales. *ISSUE* is a binary variable which equals 1 if the firm raised new equity in the following period; 0 otherwise. *LEV* is leverage of a firm, computed as (total assets – book value of equity) divided by total assets. *MBR* is market-to-book-ratio of a firm. *PROF* is profitability of a firm, measured by return on sales. *PROP* are proprietary costs, measured by firm's market share divide by market share of the largest competitor in the industry, based on ICB codes; the market share is computed as firm's sales divided by industry sales. *SIZE* is the natural logarithm of market value. *VOLA* is share volatility, measured by the standard deviation of daily stock returns. Industry dummies based on ICB codes supersector level. The first stage regression also includes the variables of the original regression model (not tabulated).

VBMS = 1.[18] The results are shown in Figure 1 for values of one standard deviation to the left and to the right of the mean of *VBRSCORE*.[19]

The results indicate that firms without implemented VBM systems (*VBMS* = 0) are exposed to relatively higher information asymmetries than firms with implemented VBM systems (*VBMS* = 1). As *VBRSCORE* increases, *BAS* decreases more strongly for non-VBM firms. For the average VBM firm at mean, a 1% increase in *VBRSCORE* reduces *BAS* by 1.33% while it reduces by 2.6% for the average non-VBM firm. When moving by 1 SD from the mean, *BAS* decreases by 25.81% for the average non-VBM firm. For VBM firms, *BAS* decreases by 13.23%. This indicates that VBR has a stronger effect for firms not having adopted a VBM system and VBR can partly substitute for VBM. Overall, however, firms with implemented VBM systems have lower *BAS* for both low and high *VBRSCORE*, indicating that the joint use is associated with lower information asymmetries than the isolated use. The results for the other two measures of information asymmetries are equivalent (Figure 1). For *FE* we find a relationship for *VBMS* = 0 of *FE* = 0 – 3.31046**VBRSCORE* and for *VBMS* = 1 of *FE* = −1.06286 – 1.67915**VBRSCORE*. For *FD* we find *FD* = 0 – 1.77781**VBRSCORE* for *VBMS* = 0 and *FD* = −0.60696 – 0.90715**VBRSCORE* for *VBMS* = 1. In all cases, the combination of VBM and VBR yields the strongest reduction in information asymmetries (see Figure 1), supporting H3a.

[18] Please note that the resulting graphs illustrate the association with the dependent variables without taking the effects of the controls into account. The interpretation focuses on the interaction effect between *VBRSCORE* and *VBMS* and does not intend to predict absolute values of the dependent variables. Further, prior research highlights that it is important to assure that the interaction plot is not dependent on extreme values, especially in presence of a binary moderator which, by nature, takes on extreme values (e.g., McClelland, 2000).

[19] We plot one standard deviation to each side of the mean of our continuous variable *VBRSCORE*, thereby forming two subgroups of low (approx. 25% quartile of the distribution of *VBRSCORE*) and high (approx. 75% quartile) values of *VBRSCORE*.

TABLE 4 Instrumental variables regression main model: Cost of equity capital and information asymmetries

Dependent variable		*BAS*	*FE*	*FD*	*COC*
VBMS	-	−0.01672***	−2.67277**	−0.01700**	−0.05812***
		(− 3.78)	(− 2.33)	(− 2.53)	(− 3.31)
VBRSCORE	-	−0.06954***	−13.07013**	−0.07816***	−0.23616***
(instrumented)		(− 3.99)	(− 2.31)	(− 2.96)	(− 3.47)
VBMS x VBRSCORE	?	0.06140***	11.66268**	0.06931***	0.21644***
		(3.67)	(2.48)	(2.72)	(3.31)
BETA	+	−0.00055	−0.15534	0.00214**	0.00391
		(− 0.92)	(− 0.79)	(1.97)	(1.53)
CHE	+	0.00053***	0.05081	0.00014	0.00012
		(2.95)	(0.68)	(0.48)	(0.15)
CL	-	−0.00222***	0.12253	−0.00044	0.00053
		(− 3.83)	(0.44)	(− 0.35)	(0.15)
FOL	+	0.00003	−0.39104***	0.00607***	0.00817***
		(0.06)	(− 2.75)	(5.77)	(3.52)
ST	-	−0.20247***			
		(− 3.27)			
OWN	-				−0.00131**
					(− 2.08)
ISTA1		−0.00181**	−0.13041	−0.00279	−0.01225**
		(− 2.03)	(− 0.26)	(− 1.50)	(− 2.08)
ISTA2		−0.00240**	−0.45050	−0.00611**	−0.01997***
		(− 2.20)	(− 0.79)	(− 2.57)	(− 2.94)
ISTA3		−0.00367**	−1.84584***	−0.00539**	−0.03099***
		(− 2.54)	(− 3.20)	(− 2.08)	(− 4.01)
ISTA4		0.00280	0.33493	0.00212	0.00785
		(1.32)	(0.44)	(0.65)	(0.73)
ISTA5		−0.00353***	0.06566	−0.00393*	−0.01138
		(− 3.33)	(0.11)	(− 1.77)	(− 1.58)
Constant		0.03001***	4.82266***	0.02490***	0.11651***
		(5.82)	(2.70)	(3.02)	(5.56)
N		418	418	418	418
time fixed effects		included	included	included	included
industry fixed effects		included	included	included	included
F statistic		12.85***	1.74***	6.42***	10.95***
Highest VIF		7.71	7.01	7.01	7.25

Notes:

$$BAS_{it+1} = \beta_0 + \beta_1 VBMS_{it} + \beta_2 VBRSCORE_{it} + \beta_3 VBMSxVBRSCORE_{it} + \beta_4 BETA_{it} + \beta_5 CHE_{it} + \beta_6 CL_{it} + \beta_7 FOL_{it} + \beta_8 ST_{it} + \sum ISTA_{it} + \sum IND_{it} + \sum YEAR_{it} + \varepsilon_{it} \quad (1)$$

$$FE_{it+1} \text{ or } FD_{it+1} = \beta_0 + \beta_1 VBMS_{it} + \beta_2 VBRSCORE_{it} + \beta_3 VBMSxVBRSCORE_{it} + \beta_4 BETA_{it} + \beta_5 CHE_{it} + \beta_6 CL_{it} + \beta_7 FOL_{it} + \sum ISTA_{it} + \sum IND_{it} + \sum YEAR_{it} + \varepsilon_{it} \quad (2)$$

$$COC_{it+1} = \beta_0 + \beta_1 VBMS_{it} + \beta_2 VBRSCORE_{it} + \beta_3 VBMSxVBRSCORE_{it} + \beta_4 BETA_t + \beta_5 CHE_{it} + \beta_6 CL_{it} + \beta_7 FOL_{it} + \beta_8 OWN_t + \sum ISTA_{it} + \sum IND_{it} + \sum YEAR_{it} + \varepsilon_{it} \quad (3)$$

(Continues)

TABLE 4 (Continued)

2SLS regression estimates with cross section fixed effects and robust standard errors: coefficient estimates z-statistics in parentheses (two tailed significance $^{*}p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$).
VBMS is a binary variable which equals 1 if a firm makes a statement of shareholder value orientation in its annual report and is describing an internal control system relying on a value based management metric, 0 otherwise. *VBRSCORE* is the achieved score of VBR disclosures scaled by the maximum score of 360. *BAS* is the bid ask spread, measured by the annual average of the daily relative bid ask spread, that is the absolute difference between bid and ask closing prices deflated with the average price. *FED* is *FE* or *FD*. *FE* is one year lagged analysts' consensus forecast errors, measured as the absolute difference between actual reported earnings per share minus one-year consensus forecast of earnings per share. *FD* is the dispersion of analysts' forecasts, measured as the standard deviation of the first analyst forecasts for the next fiscal year scaled by end-of-period share price. *COC* is the cost of equity capital, measured as a composite measure of five different measures, following Hail & Leuz (2006) and Hou et al. (2012). *BETA* is the CAPM beta of a firm. *CHE* is the natural logarithm of the absolute change in earnings scaled by total assets. *CL* is binary variable equal to 1 if a firm is listed on any foreign exchange or in the US OTC market, 0 otherwise. *FOL* is the number of analysts following scaled by end-of-period share price. *OWN* is inside ownership, measured by the natural logarithm of the percentage of total shares held by management and personnel. *ST* is share turnover, measured by the annual average of daily share turnover, computed as trading volume divided by number of shares. ISTA is: (1) early IAS adopters (before 2002); (2) late IAS adopters (2002–04); (3) mandatory IAS adopters (2005); (4) late US-GAAP adopters (2002–04) that switched to IFRS in 2005 or after; (5) early US-GAAP adopters (before 2002) that switched to IFRS in 2005 or after; (6) early US-GAAP adopters (before 2002) that switched to IFRS between 2002–04; (7) early US-GAAP adopters (before 2002) that switched to IFRS before 2002; (8) late US-GAAP adopters (2002–04) that switched to IFRS between 2002–04. There were no observations of group (7) and (8) in our sample. Industry dummies are based on ICB codes supersector level.

6.2.2 | Cost of equity capital (*COC*)

The results for our regression on the cost of equity capital are presented in the last column of Table 4. The coefficients on the variables *VBRSCORE* and *VBMS* are significant and negative. In line with the results for information asymmetries, the implementation of VBM systems and VBR are individually associated with lower cost of equity capital, supporting H1b and H2b. We further find that the coefficient on the interaction variable between *VBRSCORE* and *VBMS* is significant and positive. Marginal effects on these relationships are presented in the last column of Table 5. We use the procedure described above to analyse and plot the joint effect of *VBMS* and *VBRSCORE* on the cost of equity capital in Figure 1. We obtain $COC = 0 - 0.7419{*}VBRSCORE$ for $VBMS = 0$ and $COC = -0.2867 - 0.3664{*}VBRSCORE$ for $VBMS = 1$. In line with the results for information asymmetries, firms without implemented VBM systems ($VBMS = 0$) experience relatively higher cost of equity capital than firms with implemented VBM systems ($VBMS = 1$). As *VBRSCORE* increases, *COC* decreases more strongly for firms without implemented VBM systems. When moving by 1 SD around the mean, *COC* decreases by 7.37% for the average non-VBM firm. For VBM firms, *COC* decreases by 3.64%. This finding indicates a substitution effect of VBR for VBM. However, when used in conjunction, the joint use of VBM and VBR is associated with lower cost of equity capital in comparison to firms not having adopted a VBM system. The results support H1b, H2b and H3b.

6.3 | Additional analyses and robustness checks

In order to assure that our results can be uniquely attributed to VBM systems, we perform several additional analyses. We run separate regressions on the variable *VBMS* to assure that our results are not driven by the composition of our disclosure score. *VBMS* measures the implementation of a VBM system and is independent of *VBRSCORE*. We find that *VBMS* is significantly related to lower information asymmetries and cost of capital also in the absence of *VBRSCORE*, indicating that the information on the implementation of VBM itself is relevant for market participants. However, VBR may be used by firms not employing VBM to signal their shareholder commitment. Therefore the joint analysis of *VBMS* and *VBRSCORE* is a better estimate of the consequences of *VBMS* (Aiken & West, 1991).

VBRSCORE captures the information available for investors for assessing the degree of implementation of VBM and management's shareholder value commitment. We run regressions on the four components of *VBRSCORE*, that is, for net asset valuation (1), relative valuation (2), internal value generation (3), and future performance (4). While the strongest results are found for the overall score, we find qualitatively identical results as presented above for all

TABLE 5 Instrumental variables regression main model: Information asymmetries and cost of equity capital marginal effects

Dependent variable		*BAS*	*FE*	*FD*	*COC*
VBMS	-	**−0.98112*****	**−1.06286****	**−0.60696*****	**−0.28666*****
		(− 3.97)	**(− 2.47)**	**(− 2.60)**	**(− 3.32)**
VBRSCORE	-	**−2.59949*****	**−3.31046****	**−1.77781*****	**−0.74191*****
(instrumented)		**(− 4.14)**	**(− 2.49)**	**(− 3.04)**	**(− 3.49)**
VBMS x VBRSCORE	?	**1.26761*****	**1.63131*****	**0.87066*****	**0.37550*****
		(3.82)	**(2.66)**	**(2.79)**	**(3.32)**
N		418	418	418	418
Controls		included	included	included	included
Time fixed effects		included	included	included	included
Industry fixed effects		included	included	included	included
F statistic		12.85***	1.74***	6.42***	10.95***
Highest VIF		7.71	7.01	7.01	7.25

Notes:

$$BAS_{it+1} = \beta_0 + \beta_1 VBMS_{it} + \beta_2 VBRSCORE_{it} + \beta_3 VBMSxVBRSCORE_{it} + \beta_4 BETA_{it} + \beta_5 CHE_{it} + \beta_6 CL_{it} + \beta_7 FOL_{it} + \beta_8 ST_{it} + \sum ISTA_{it} + \sum IND_{it} + \sum YEAR_{it} + \varepsilon_{it} \quad (1)$$

$$FE_{it+1} \text{ or } FD_{it+1} = \beta_0 + \beta_1 VBMS_{it} + \beta_2 VBRSCORE_{it} + \beta_3 VBMSxVBRSCORE_{it} + \beta_4 BETA_{it} + \beta_5 CHE_{it} + \beta_6 CL_{it} + \beta_7 FOL_{it} + \sum ISTA_{it} + \sum IND_{it} + \sum YEAR_{it} + \varepsilon_{it} \quad (2)$$

$$COC_{it+1} = \beta_0 + \beta_1 VBMS_{it} + \beta_2 VBRSCORE_{it} + \beta_3 VBMSxVBRSCORE_{it} + \beta_4 BETA_t + \beta_5 CHE_{it} + \beta_6 CL_{it} + \beta_7 FOL_{it} + \beta_8 OWN_t + \sum ISTA_{it} + \sum IND_{it} + \sum YEAR_{it} + \varepsilon_{it} \quad (3)$$

2SLS regression estimates with cross section fixed effects and robust standard errors: average marginal effects z-statistics in parentheses (two tailed significance $^{*}p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$).
VBMS is a binary variable which equals 1 if a firm makes a statement of shareholder value orientation in its annual report and is describing an internal control system relying on a value based management metric, 0 otherwise. *VBRSCORE* is the achieved score of VBR disclosures scaled by the maximum score of 360. *BAS* is the bid ask spread, measured by the annual average of the daily relative bid ask spread, that is the absolute difference between bid and ask closing prices deflated with the average price. *FED* is *FE* or *FD*. *FE* is one year lagged analysts' consensus forecast errors, measured as the absolute difference between actual reported earnings per share minus one-year consensus forecast of earnings per share. *FD* is the dispersion of analysts' forecasts, measured as the standard deviation of the first analyst forecasts for the next fiscal year scaled by end-of-period share price. *COC* is the cost of equity capital, measured as a composite measure of five different measures, following Hail & Leuz (2006) and Hou et al. (2012). Industry dummies are based on ICB codes supersector level.

subscores. In particular, all subscores are significantly related to lower information asymmetries and cost of capital. In some instances, Part 1 (net asset valuation) and Part 4 of the score (future performance) display slightly weaker relationships with *BAS*, *FE*, *FD* and *COC* on the 5% significance level only, indicating that Part 2 (relative valuation) and Part 3 (internal value generation) are more relevant for our results. However, all subscores are highly correlated with the overall score, while not being strongly correlated among each other (Table 6), indicating that all parts contribute to the explanatory power of the score.

We conduct several robustness checks to detect the sensitivity of our results to model specifications and potential measurement errors. All *COC* regressions were run with the individual implied cost of capital measures rather than the composite measure, leaving the inferences unaffected. We also test for the potential endogeneity of *VBMS* with the following instrumental variables: *CAPEX* (capital expenditures), *INT*, *ISTA*, *LEV*, *MB*, *PROF*, *SIZE*, *VBMS_lag* (the value of *VBMS* in *t*−1) and *VOLA*. The identification tests of the first stage indicate a well-identified first stage. Nevertheless, we do not pursue a 2SLS for *VBMS* as the test on endogeneity is insignificant for all regression models. The results are robust to alternative deflators. We also use different proxies for size (total assets, sales) and profitability (return on assets, return on equity), leaving our main inferences unaffected. We also rerun all our regressions with all variables winsorized at the 1% level. Our main results remain unaffected. Moreover, we rerun our regressions excluding financial

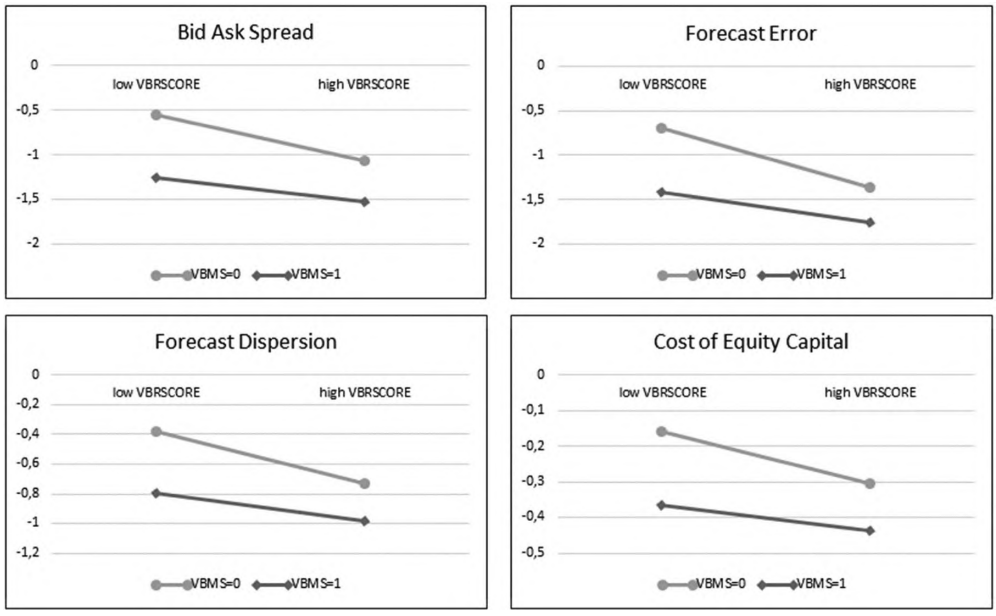

FIGURE 1 Interpretation of regression results for interaction of *VBMS* and *VBRSCORE* on cost of equity capital information asymmetries (from Table 5)

TABLE 6 Correlation matrix: VBR-Score and subscores

	VBRSCORE	*PART1*	*PART2*	*PART3*	*PART4*
VBRSCORE	**1.00**	0.53*	0.56*	0.85*	0.83*
PART1	0.51*	**1.00**	0.18*	0.37*	0.44*
PART2	0.57*	0.19*	**1.00**	0.30*	0.28*
PART3	0.86*	0.35*	0.34*	**1.00**	0.52*
PART4	0.78*	0.44*	0.27*	0.48*	**1.00**

Note: Bravais-Pearson correlations above the diagonal and Spearman rank correlations below the diagonal.

firms because of their special structures and accounting. While this reduces sample size to 381 observations, our main findings are unaffected.

7 | SUMMARY AND CONCLUSIONS

Value based management provides an integrated management control system designed to mitigate agency conflicts and increase shareholder value (Ittner & Larcker, 2001). This is accomplished by providing managers with a set of decision-making tools identifying value-generating alternatives (Ryan & Trahan, 2007). Improving communication with shareholders by providing additional information on value generation and the fundamental value of the firm (VBR) is considered an integral part of implementing VBM (Copeland et al., 2000). We analyse the firm's disclosures regarding two related research questions: *1) Does the implementation of VBM systems (as reported in the annual report) reduce information asymmetries and the cost of capital? 2) Does the voluntary disclosure of information on the fundamental value of the firm and its drivers (VBR) have a moderating effect in this process?*

The main objective of VBM has been the closing of value gaps, that is, the difference between a firm's current value and its potential value (Copeland et al., 2000; Fruhan, 1988). Investors in firms with hidden characteristics are faced

with an adverse selection problem and such firms are traded at below their potential values. Disclosures on implemented VBM systems can be considered signals of management's commitment to act in the shareholders' best interest, reducing their adverse selection problem. The analysed disclosures can be used by investors to verify the degree to which control systems have been implemented and how extensively they are used. Disclosures on the value-generation process and on the sources of value generation (VBR) can be used by investors to make assessments of firm value and management's commitment to act in their interest. Investors can use this information to improve monitoring and exert capital market pressures that provide incentives for managers to act in the shareholders' interest. Disclosed information on VBM systems and VBR help align managers' and shareholders' interests by reducing agency problems (Jensen, 1986; Jensen & Meckling, 1976). Based on the stewardship effect, we expect these real effects of disclosure to result in lower cost of capital (Lambert et al., 2007).

We find that both the implementation of VBM systems and higher VBR are individually significantly related to lower information asymmetries and lower cost of capital. We find a slight moderation of the effect of VBM by VBR. For increasing VBR, we find that information asymmetries and cost of capital decrease more strongly for firms without implemented VBM systems. This indicates that VBR can to some extent substitute for VBM. Overall, however, firms with implemented VBM systems have lower information asymmetries and cost of capital for both low and high levels of VBR, indicating that the joint use of VBM and VBR is associated with lower information asymmetries than the isolated use.

These results contribute to the discussion on the effectiveness of implementing VBM systems (e.g., Biddle et al., 1997; Ryan & Trahan, 2007). Our results establish that implementing VBM systems is an important means for mitigating agency conflicts. The results demonstrate that the reporting on VBM initiatives as well as on the sources of value generation play an important role in implementing VBM, significantly reducing information asymmetries and the cost of capital. Our findings imply that disclosures on internal control processes and related valuation-based information can be used by investors to verify the degree of the implementation of internal control processes and management's commitment to act in the shareholders' interest. This improves monitoring and leads to a better alignment of shareholders' and management's interests, as suggested by the theoretical literature (Lambert et al., 2007). Our results hence provide evidence for the real effects of disclosure by showing that disclosures on internal control systems serve as a governance mechanism, reducing information asymmetries and the cost of capital via the stewardship effect (Core et al., 2015). We also contribute to the literature on enhanced business reporting, such as intellectual capital (IC) reporting (e.g., Boedker et al., 2008; Guthrie et al., 2012; Orens et al., 2009) by showing that VBR can, to some extent, replace VBM systems and their effect on information asymmetries and the cost of capital.

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APPENDIX

Description of the disclosure index framework

The components of the SG's VBR concept are based on previous research and the AICPA's and FASB's recommendations (AICPA, 1994; FASB, 2001) and are derived from inputs to valuation models. In general, three basic approaches to the valuation of companies exist: asset-based valuation, relative valuation based on multiples and present value-techniques (e.g., the Discounted Cash Flow (DCF)-method) (AICPA, 1994; Damodaran, 2002; Stowe et al., 2002). Asset valuation attempts to value the entire company by adding up its separate components (assets less liabilities). The other two approaches to valuation determine the value of the company as a whole. Multiples are mainly used for valuation relative to other comparable companies (Damodaran, 2001). Present value techniques derive the intrinsic value of the company from its expected future cash distributions to the investors. VBR should therefore enable the investor to perform such calculations. These approaches to valuation constitute the foundation for the SG's VBR framework.

Part 1: Information for net asset valuation

Financial reports generally present data on historical performance. The difference between book value of equity and intrinsic value constitutes an information gap, which can be addressed by additional information on the elements that make up this gap. If all assets and liabilities of a firm, including assets generally not recognized under current accounting standards like some self-generated intangibles and goodwill, were recognized at their fair values, their net worth would ideally be identical to the firm's market value. The difference between market value and book-value of equity can therefore be explained by: (1) gains from higher (lower) fair values of on-balance-sheet assets (liabilities), (2) off-balance-sheet assets and liabilities at their fair value, (3) self-generated (unrecognized, implicit) goodwill.

Part 2: Information for relative valuation

Investors want to assess their investment in the firm by comparing its performance among firms in order to decide whether to buy or hold a firm's shares. For the investor, company performance is measured relative to the investment by Total Return to Shareholders (TRS). For this purpose they need information on its past performance and its future prospects relative to a representative benchmark. Multiples are used by analysts to compare a company's value relative to comparables and are useful to detect over- or underpricing relative to those comparable firms. The presented information is useful when it is not easily available from other sources. It becomes relevant particularly when contrasting the market's expectations with management's. Stock-market-data can be used to derive the implicit assumptions,

such as the growth rate, the market uses in pricing the shares. As value can only be generated when those expectations are met or exceeded, they constitute the relevant benchmark for evaluating the management's performance. Management therefore needs to evaluate those expectations and contrast it with its own. A discussion is useful for the investors as well as for management, as it may realign both perspectives by reducing overly optimistic or improving overly pessimistic expectations of the market.

Part 3: Information on internal value generation

Financial forecasts are based on performance and liquidity measures, especially from the income and cash flow statements. To evaluate the firm's ability to generate value, information on how much value was generated in the past period and what measures were taken to generate value in the future is necessary. Disclosures in this context should also allow for an evaluation of the impact of past decisions on shareholder value. Additionally, incentive systems that provide managers with incentives to create long-term value for shareholders are an important signal for market participants about the growth prospects of the firm.

Part 4: Information on future performance

Prospective information constitutes the core of VBR. Investors need information to derive forecasts of future cash receipts as well as the cost of capital to enable them to use present value techniques. The value drivers as identified by Rappaport (1986) can be derived from the inputs into a strategic analysis of competitive advantages and market structures according to Porter (1985). The value drivers – growth, profit margin, tax rate, investment and cost of capital – can be derived from fundamental analysis by analysing the two main dimensions of information: information about the environment (economy, industry) on the one hand and about the company on the other.

Summary of weighting system (max. points achievable per item and category in brackets):

Part 1: Information for net asset valuation (max. 26 points)

1. Voluntary fair values of assets and liabilities (3 points)
2. Intellectual capital
   - **2.1** Human capital (3 points)
   - **2.2** Customer capital (3 points)
   - **2.3** Supplier capital (3 points)
   - **2.4** Investor capital (3 points)
   - **2.5** Process capital (3 points)
   - **2.6** Location capital (3 points)
   - **2.7** Innovation capital (3 points)
3. Original goodwill (2 point)

Part 2: Information for relative valuation (max. 84 points)

1. Share
   - **1.1** Development of share price (2 points)
   - **1.2** in comparison with the stock market (4 points)
   - **1.3** in comparison with the industry or peer group (6 points)
   - **1.4** Stock returns (6 points)
   - **1.5** Development of an example portfolio (4 points)
   - **1.6** Transaction volume of the share (2 points)

2. Dividend
   - **2.1** Development of dividends (2 points)
   - **2.2** Dividend yield (4 points)
   - **2.3** in comparison with the stock market (6 points)
   - **2.4** in comparison with the industry or peer group (6 points)
3. Key performance measures
   - **3.1** cash flow per share (2 points)
   - **3.2** free cash flow per share (6 points)
   - **3.3** Basic/diluted cash flow per share (2 points)
   - **3.4** Price-earnings-ratio (4 points)
   - **3.5** in comparison with the industry or peer group (6 points)
   - **3.6** Price-cash flow-ratio (4 points)
   - **3.7** in comparison with the industry or peer group (6 points)
   - **3.8** Price-book value-ratio (6 points)
   - **3.9** in comparison with the industry or peer group (6 points)

Part 3: Information on internal value generation (max. 110 points)

1. Performance measures of control concept
   - **1.1** Applied performance measures (value based, traditional) (14 points)
   - **1.2** Description of applied performance measures (nature, reasoning, monitoring) (18 points)
   - **1.3** Performance measures by segment (6 points)
   - **1.4** Development of performance measures over time (6 points)
   - **1.5** Benchmarking performance measures (industry or peer group) (6 points)
   - **1.6** Target level of performance measures (6 points)
   - **1.7** Consequences if performance measures miss the target level (6 points)
2. Incentive system
   - **2.1** Participants (4 points)
   - **2.2** Terms and conditions (terms, conditions, bonus) (12 points)
   - **2.3** Description of performance measure tied to the incentive system (4 points)
   - **2.4** Description of individual target agreements tied to the incentive system (4 points)
3. Cash Flow generation
   - **3.1** Gross cash flow (6 points)
   - **3.2** Free cash flow (6 points)
   - **3.3** Explanation of cash flow statement (6 points)
   - **3.4** Value added statement (6 points)

Part 4: Information on future performance (max. 140 points)

1. Information on Strength, Weaknesses, Opportunities and Threats (SWOT)
   - **1.1** Future opportunities and threats (economic trend, industry structure, market volume, market growth) (20 points)

- **1.2** Corporate strength and weaknesses (competitive advantage, market shares, new business segments) (14 points)
- **1.3** Information by segments (SWOT) (12 points)

2. Future investments

- **2.1** Tangible and intangible assets (4 points)
- **2.2** Acquisitions (4 points)
- **2.3** Strategic alliances, cooperations (4 points)
- **2.4** Other information (4 points)
- **2.5** Information by segments (6 points)

3. Future financing

- **3.1** Financial risks (4 points)
- **3.2** Financing opportunities (4 points)
- **3.3** Financing activities (4 points)
- **3.4** Other information (4 points)
- **3.5** Information by segments (6 points)

4. Financial planning

- **4.1** Planned values for the financial statements (4 points)
- **4.2** Information by segments (6 points)
- **4.3** Planned values for the key performance measures (4 points)
- **4.4** Information by segments (6 points)
- **4.5** Planning horizon (4 points)

5. Cost of capital

- **5.1** Current cost of capital (4 points)
- **5.2** Expected future cost of capital (6 points)
- **5.3** Calculation of the cost of capital (current and expected) (10 points)
- **5.4** Cost of capital by segments (6 points)