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Christine Reitmaier, Wolfgang Schultze

Angaben zur Veröffentlichung / Publication details:

Reitmaier, Christine, and Wolfgang Schultze. 2017. "Enhanced business reporting: value relevance and determinants of valuation-related disclosures." *Journal of Intellectual Capital* 18 (4): 832-67.
<https://doi.org/10.1108/jic-12-2016-0136>.

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Enhanced business reporting: value relevance and determinants of valuation-related disclosures

Christine Reitmaier and Wolfgang Schultze

Department of Accounting, Universitat Augsburg, Augsburg, Germany

Abstract

Purpose – Enhanced business reporting (EBR) seeks to address the information needs of investors when making company valuations for investment decisions. The purpose of this paper is to analyze the relevance for market valuation of EBR disclosures that are directly related to firm valuation (value-based reporting (VBR)).

Design/methodology/approach – Data are hand collected from annual reports of German publicly listed companies over five years. The content analysis is based on the valuation-related disclosure framework of the German Schmalenbach Society of Business Administration. A 2SLS approach accounts for potential endogeneity.

Findings – Share-based compensation, leverage, corporate size, and share volatility are significant determinants of VBR. The level of VBR is significantly associated with market values and provides additional market value explanatory power, indicating its relevance to investors in the process of valuation and decision making. Also, the relevance of book value and earnings for explaining market values increases for firms with better VBR. The findings are robust to the exclusion of banks and assurance companies and to alternative model and variable specifications.

Research limitations/implications – The research contributes to the literature on voluntary disclosures by testing an EBR framework explicitly derived from valuation theory. The results provide indirect evidence of the investors' use of respective valuation techniques in decision making. A contribution is made to the value relevance literature by showing that valuation-related disclosures constitute a suitable proxy for "other information" in the Ohlson's (1995) model. Such disclosures complement traditional accounting metrics, i.e. book value and earnings, as basis for valuations. Potential caveats relate to the content analysis of annual reports and the endogeneity of voluntary disclosures.

Originality/value – This paper informs the debate on further developments of EBR in helping to identify important components thereof.

Keywords Disclosure, Integrated reporting, Value relevance, Accounting choice, Business reporting, Value reporting, Valuation

Paper type Research paper

1. Introduction

Enhanced business reporting (EBR) has received much attention in both business practice and research. Based on the finding that the information provided in financial reporting is insufficient for effective decision making by investors (e.g. AICPA, 1994; FASB, 2001), various concepts of EBR have been developed by practitioners and in the academic literature (Boedker *et al.*, 2007, 2008). Concepts such as business reporting, intellectual capital (IC) reporting, value reporting, corporate social responsibility (CSR) reporting, and integrated reporting (IR) aim at extending financial reporting by additional information in order to meet the information needs of investors (e.g. Abeysekera, 2013; Zhou *et al.*, 2017; see Table I). The common idea of different EBR concepts is that the additional information disclosed can decrease information asymmetries and improve company valuation (Boedker *et al.*, 2008). Their main objective is to provide information that narrows the gap between a company's potential intrinsic market value and its current market value (Kristandl and Bontis, 2007; Ruhwedel and Schultze, 2002). However, it is to date unclear which information items are relevant for investors in valuing firms. To identify such information items is the purpose of this paper.

EBR concept	Background
Business reporting	The Jenkins Committee presented a model which is often referred to as business reporting. It was developed from models of intrinsic valuation and empirical surveys on the information needs of financial statement users (AICPA, 1994; Noll and Weygandt, 1997; FASB, 2001)
Intellectual capital reporting	The awareness for the increasing importance of intangibles not covered by traditional reporting led to the development of IC reporting (Edvinsson and Malone, 1997; Guthrie <i>et al.</i> , 2012)
Value reporting	Accounting and consulting firms marketed the idea of reporting specifically attributed to investor needs under the term “value reporting.” ValueReporting TM , for example, is a consulting concept and protected trademark of PwC (Eccles <i>et al.</i> , 2001; Ruhwedel and Schultze, 2002)
Corporate social responsibility reporting	The focus on the triple bottom line of sustainability induced CSR reporting. Well known frameworks include the Sustainability Reporting Standards by the Global Reporting Initiative (GRI) and the industry specific standards by the Sustainability Accounting Standards Board (SASB) (Cordazzo, 2005; Dhaliwal <i>et al.</i> , 2011; Rodrigue, 2014; GRI, 2016a; Khan <i>et al.</i> , 2016; SASB, 2017)
Integrated reporting	IR aims to integrate information on a firm’s past performance as well as its intended performance in the future. In a global initiative, the IIRC aspires to establish IR as corporate reporting norm and to enable informed decision making and efficient capital allocation. Its key element is integrated thinking, speaking to the relatedness of different financial and non-financial value-related aspects of businesses. With integrated thinking, IR goes beyond the mere combination of these components in reporting. Rather, it focuses on integration within a firm’s strategy development and implementation pursuing value creation (Abeysekera, 2013; IIRC, 2013; SG, 2013; Cheng <i>et al.</i> , 2014; Melloni, 2015; Adams, 2015; Flower, 2015; Thomson, 2015; Bernardi and Stark, 2017; Zhou <i>et al.</i> , 2017)

Table I.
Historical developments of EBR concepts

The primary aim of IR, the latest concept of EBR, is to provide information on “how an organization creates value over time” (IIRC, 2013, p. 4). The International Integrated Reporting Council (IIRC) finds that not all value drivers are equally relevant and applicable for each organization (IIRC, 2013). Since the decision-making process of investors generally involves valuation techniques (e.g. AICPA, 1994; Stowe *et al.*, 2002), this paper focuses on information items related to the investors’ valuation problem. Such disclosures are referred to here as value-based reporting (VBR)[1]. The study uses a comprehensive VBR score developed from valuation theory to identify a set of information items that is potentially relevant for investors (Ruhwedel and Schultze, 2002; SG, 2002). This information is empirically analyzed regarding its relevance for market valuation.

There is an extensive academic literature on the drivers and consequences of voluntary disclosure (e.g. Verrecchia, 2001; Hail, 2002; Botosan, 2006; Beyer *et al.*, 2010). Researchers have intensively analyzed the fundamental determinants of the firms’ choice to provide additional information as well as the potential benefits of greater disclosure regarding information asymmetries, cost of capital, and analysts’ forecast accuracy (e.g. Botosan, 1997, 2006; Healy *et al.*, 1999; Vanstraelen *et al.*, 2003; Lambert *et al.*, 2007; Gamerschlag *et al.*, 2011; Johnstone, 2016; Plumlee, 2016; Bernardi and Stark, 2017; Zhou *et al.*, 2017). Based on her review of the value relevance literature, Wyatt (2008) suggests that information on a firm’s intangibles considerably contributes to understanding value creation in the firm.

Voluntary disclosure has been found to be value relevant in different settings (e.g. Uyar and Kilic, 2012; Gamerschlag, 2013; Barth *et al.*, 2016; Lee and Yeo, 2016). Hail (2011) finds that voluntary disclosure may allow firms to convey additional information on their intrinsic value. However, firms will only choose to disclose when the marginal benefits of disclosure outweigh

its marginal costs (Hail, 2011). Therefore, the firm's disclosure decision is endogenous and needs to be considered when analyzing the consequences of disclosure. The benefits of voluntarily disclosed information for market valuation are *ex ante* unclear because it is largely unknown what valuation models investors actually use and if market valuation is indeed based on the models of intrinsic value (Bradshaw, 2004; Imam *et al.*, 2008; Gleason *et al.*, 2013). This study aims to inform this debate by investigating the value relevance of valuation-related disclosures. The underlying research questions are:

RQ1. What determines the choice to disclose VBR information in annual reports?

RQ2. Are voluntary annual report disclosures on the fundamental value of the firm (VBR) relevant for market valuation?

The sample comprises 118 publicly listed German firms from 2000 to 2004. This setting is particularly interesting since many German firms have implemented value-based management (VBM) systems and provide a wealth of valuation-related voluntary disclosures (e.g. Pellens *et al.*, 2000; Haller and Dietrich, 2001; Ruhwedel and Schultze, 2002; Koethner, 2005; Baetge and Solmecke, 2006). With its focus on valuation, this paper addresses one aspect of modern business reporting that is pivotal for all EBR models and also highly relevant for investors. The public debate about capital market needs for such additional valuation-related information led to the introduction of German Accounting Standard (GAS) 15 (2005) on management reporting in 2005, making many of these disclosures mandatory (Baetge and Solmecke, 2009). Due to its focus on voluntary disclosures, the analysis in this paper is limited to the period before 2005 when there was extensive voluntary VBR disclosure in Germany. Germany has long been considered an insider economy in which financing is less strongly affected by markets (e.g. Juergens *et al.*, 2000; Hackethal *et al.*, 2005). As a result, capital market pressures are less pronounced than in market-based economies like Anglo-American countries.

The study uses a measure of valuation-related disclosures based on the framework of the German Schmalenbach Society of Business Administration (Ruhwedel and Schultze, 2002; SG, 2002). The framework was explicitly developed to identify information that is relevant for investors' company valuations for investment decision purposes. The score systematically comprises additional non-financial information addressing a firm's value gap, i.e. the difference between its current value and its potential value if it were managed efficiently (Fruhan, 1988; Copeland *et al.*, 2000). It includes information on internal control mechanisms, fundamental drivers of business success, and sources of value generation within the firm such as IC. It contains 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).

The study identifies share-based compensation, leverage, corporate size, and share volatility as significant determinants of VBR disclosures. The findings show that the extent of VBR is positively and significantly related to market values. The results indicate that the information captured by the disclosure score is relevant to investors in the process of valuation. In particular, all four parts of the VBRSCORE are significantly related to market values. All sub-scores are highly correlated with the overall score, while there is only weak correlation among the sub-scores. This indicates that all parts contribute to the explanatory power of the score. The incremental value relevance of book value and earnings increases in the regression on market value as suggested by Ohlson (1995) when VBR is integrated in the regression as "other information." Also, value relevance of book value and earnings is higher for firms with higher VBR disclosures, indicating that VBR disclosures are informative for market valuation.

This paper makes several contributions to the literature. First, the results contribute to the debate about elements and effects of VBR and inform further developments of EBR.

The results imply that the SG (2002) framework on value reporting can assist in identifying valuation-related information as part of a firm's extended reporting. Likewise, it can assist in further developing guidelines for IR and other concepts of EBR and in aligning the respective frameworks, standards and related requirements as aspired by the Corporate Reporting Dialogue (IIRC, 2017).

Second, this study contributes to the literature on the determinants and consequences of voluntary disclosures (e.g. Botosan, 1997, 2006; Hail, 2002, 2003, 2011; Francis *et al.*, 2008; Beyer *et al.*, 2010; Gamerschlag *et al.*, 2011; Serafeim, 2011, Barth *et al.*, 2016; Lee and Yeo, 2016; Bernardi and Stark, 2017; Zhou *et al.*, 2017). Despite the large body of literature, the measurement of voluntary disclosures is still an unresolved issue. Most of the self-constructed indices of the level of voluntary disclosure lack an underlying theoretical framework (Healy and Palepu, 2001; Holthausen and Watts, 2001). This paper makes a contribution by applying a disclosure framework explicitly derived from the valuation theory and analyzing its determinants and its relevance for market valuation. The results also provide indirect evidence of the investors' use of such valuation techniques in their decision making.

Third, this paper contributes to the value relevance literature on modeling "other information" in the Ohlson's (1995) model (e.g. Myers, 1999; Ohlson, 2001; Barth *et al.*, 2005; Bergmann and Schultze, 2017). The results imply that voluntary valuation-related disclosures constitute a suitable proxy for "other information." Such disclosures are found to increase the incremental value relevance of traditional accounting metrics like book value and earnings.

The paper proceeds as follows. Section 2 discusses the related literature and derives the hypotheses. Section 3 describes the research methodology and the key variables including the measurement of the disclosure score. Sections 4 and 5 provide the sample description and the empirical results of the study. Section 6 summarizes and concludes the paper.

2. Related literature and hypotheses development

2.1 EBR

Financial accounting serves to provide users of financial statements with information that is useful for making economic decisions (Staubus, 2000). In general, this decision-making process will involve valuations. Investors compare an asset's intrinsic value with its current price in order to determine whether to buy, hold, or sell it (e.g. AICPA, 1994; Stowe *et al.*, 2002; Penman, 2012). Researchers and practitioners agree that the information provided within the financial statements is often not sufficient for this purpose and that additional information, especially valuation-related information, is needed (e.g. AICPA, 1994; Edvinsson and Malone, 1997; Copeland *et al.*, 2000; FASB, 2001; Cordazzo, 2005; Striukova *et al.*, 2008; Koller *et al.*, 2010; Eccles *et al.*, 2011). As shown in Table I, different concepts of EBR have been developed over time to address these additional information needs (Boedker *et al.*, 2007, 2008).

IR as the latest concept has gained momentum as it builds on the ideas of various EBR concepts and integrates these concepts around the ultimate goal of value creation. It supposedly combines the most relevant information of a firm's various reporting strands in a coherent and concise report that shows the connectivity between important elements and their potential to create and sustain value (Zhou *et al.*, 2017). IR aims to fulfill investors' information needs in company valuation and resource allocation decisions (e.g. Beyhs and Barth, 2011; Churet and Eccles, 2014).

However, the concepts of EBR are under constant revision and partly intermingle. The GRI (2017) and the IIRC, for instance, launched the CLGir2017, the Corporate Leadership Group on IR, to further enhance the joint usage of their frameworks. Other reporting strands like performance reporting have started to incorporate the six IR capitals, i.e. financial, manufactured, intellectual, human, social and relationship, and natural capital.

They pursue the concept of integration, i.e. the idea to combine and relate information efficiently (Ramin and Lew, 2015). In order to align existing frameworks, standards and related requirements and to enhance corporate disclosures, many international institutions such as the CDP, CDSB, FASB, GRI, IASB, IOS, SASB, and IIRC jointly work on the Corporate Reporting Dialogue. They aim to “respond to market calls for greater coherence, consistency and comparability between corporate reporting frameworks, standards and related requirements” that follow different purposes and demand different scope and content (IIRC, 2017). The question which information items are useful for investors’ valuation and decision making and should hence be disclosed is still an unresolved issue.

Voluntary disclosures for valuation purposes have caused wide interest in Europe and especially in Germany (e.g. Mueller, 1998; Pellens *et al.*, 2000; Haller and Dietrich, 2001; Ruhwedel and Schultze, 2002; Baetge and Solmecke, 2006; Fischer and Klopfer, 2006; Laier, 2011). Many German corporations have been presenting information about their initiatives for increasing shareholder value, the performance of their shares, and other capital market-related information. However, the presentation of this voluntary information was often unstructured and inconsistent. Consequently, the working group on financial accounting of the German Schmalenbach Society of Business Administration developed a framework for valuation-related disclosures as a recommendation on how to structure additional information (SG, 2002). This framework was subsequently applied by many German firms (Hayn and Matena, 2005; Koethner, 2005). In 2005, the German Accounting Standards Board released GAS 15 “Management Report,” with the aim of incorporating and structuring “value-orientated reporting into the statutory group management report” (basis for Conclusion 2).

2.2 Disclosure theories and determinants

Outside investors delegate their decision rights to managers with the expectation that managers maximize the firm’s wealth on investors’ behalf (e.g. Abeysekera, 2008). This agency relationship is characterized by asymmetrically distributed information, i.e. managers have superior information compared to investors (e.g. Healy and Palepu, 2001). To communicate their concern about and compliance with expectations of outside investors, managers may use voluntary disclosures (e.g. Watson *et al.*, 2002; Chalmers and Godfrey, 2004; Guthrie *et al.*, 2004, 2007).

Disclosure theory as special case of signaling theory (Dye, 2001) states that information asymmetry can be reduced through effective signaling by the better informed party (e.g. Morris, 1987; Prencipe, 2004). Due to hidden characteristics, investors would value all firms at a discount if no information was provided. Efficiently managed firms would hence be undervalued and have an incentive to voluntarily disclose information on their true value (e.g. Morris, 1987; Inchausti, 1997; Lev, 2001). Voluntary disclosure serves as a signaling and communication tool for impression management (Melloni, 2015) and identity construction (Scott and Lane, 2000). Stakeholders that identify better with a firm develop greater commitment and evaluate companies more positively (Sen and Bhattacharya, 2001). Thus, voluntary disclosures enhance brands and reputation, especially in the case of professional stakeholders as non-professional stakeholders like consumers, employees, or the general public might be less informed about or less interested in a firm’s disclosures (e.g. Bebbington *et al.*, 2008; Cho *et al.*, 2012; Axjonow *et al.*, 2016; Duff, 2016; GRI, 2016b). As a consequence, voluntary disclosure prevents firm value reductions independent of how unfavorable the disclosed news are, since withholding information implies worse news (e.g. Akerlof, 1970; Grossman, 1981; Milgrom, 1981; Dye, 1985; Inchausti, 1997; Verrecchia, 2001; Lundholm and van Winkle, 2006; Einhorn and Ziv, 2012).

When certain conditions are met, a full disclosure equilibrium – in which all private information is disclosed – exists (Grossman and Hart, 1980; Grossman, 1981; Milgrom, 1981; Milgrom and Roberts, 1986). However, firms regularly do not disclose their private

information fully. Literature explains this partial disclosure by violations of the full disclosure conditions (e.g. Dye, 1985, 2001; Verrecchia, 2001; Prencipe, 2004; Beattie and Thomson, 2007). Violations may result from managers' private incentives to manipulate disclosures through real activities manipulation (Beyer and Guttman, 2012) or timing of disclosure (Guttman *et al.*, 2014). Overall, a firm's information environment develops being endogenously dependent upon various factors (Beyer *et al.*, 2010). This implies that the observable disclosure level is driven by factors that affect the costs and (private) benefits of disclosure. The following determinants of the VBR disclosure level are derived from extant literature.

Firm age – younger firms are subject to greater uncertainty and have incentives to disclose more. On the other hand, age is considered a proxy for reputation. Firms with higher reputation disclose more (Blanco *et al.*, 2015). Moreover, older firms might have more reporting experience (Camfferman and Cooke, 2002; Alsaeed, 2006) which could reduce reporting costs and, hence, increase disclosures. Without specifying the expected direction, it is hypothesized:

H1a. Firm age is related to VBR disclosures.

Size of the audit firm – agency theory suggests that effective outside monitoring reduces agency conflicts and provides firms with incentives to use voluntary disclosures to communicate that they are acting in an appropriate way (e.g. Watson *et al.*, 2002). Since big auditors audit many firms, they are more independent from their clients and have higher influence on their disclosure practices (e.g. Barako *et al.*, 2006). Auditors also benefit from their clients' disclosures as these can demonstrate the auditors' possession of good monitoring skills and help to preserve their reputation (Firth, 1979; Verrecchia, 1990; Raffournier, 1995; Inchausti, 1997; Hope, 2003; Barako *et al.*, 2006; Hail, 2011). In particular, Big Four audit firms have considerably promoted the idea of investor orientation and VBR. In accordance with signaling theory, being audited by one of the big audit firms may signal the commitment to greater transparency and investor orientation to local as well as international investors as these audit companies operate internationally (Alsaeed, 2006). Therefore, VBR disclosures are expected to be positively related to the size of the audit firm:

H1b. Size of audit firm is positively related to VBR disclosures.

Share-based compensation – managers have incentives to opportunistically use disclosure decisions to engage in impression management (Melloni, 2015) and to influence share prices (e.g. Aboody and Kasznik, 2000; Cormier *et al.*, 2009) when their compensation is based on firm shares. Therefore, a positive relation is expected between share-based compensation and VBR disclosures:

H1c. Share-based compensation is positively related to VBR disclosures.

Earnings quality – according to Francis *et al.* (2008), earnings quality can be interpreted as a proxy for information quality. Information quality models the probability that a manager has private information and thus increases the disclosure probability since managers wish to avoid discounts on firm value when the market interprets nondisclosure as bad news (Dye, 1985; Jung and Kwon, 1988). A positive relation to the disclosure probability is also found when information quality models the quality of a manager's private information (Verrecchia, 1990). Consistent with these theoretical studies, Francis *et al.* (2008) empirically find a positive relation between earnings quality and overall disclosure. Regarding valuation-related disclosures, a positive relationship is expected as well:

H1d. Earnings quality is positively related to VBR disclosures.

Financing need – firms in need for funds to finance their investment opportunities have incentives to disclose more in order to reduce external financing costs (Healy and Palepu, 2001). Therefore, a positive relation is expected:

H1e. Financing need is positively related to VBR disclosures.

Internationalization – a higher share of international activities may result in larger public scrutiny and hence induce a greater demand for information (e.g. Raffournier, 1995; Depoers, 2000; Hail, 2003). Firms can fulfill this demand by voluntarily disclosing additional information. Therefore, a positive association between internationalization and VBR disclosures is expected:

H1f. Internationalization is positively related to VBR disclosures.

Equity issues – firms that rely on capital markets for new financing and access capital markets continuously need to communicate openly and directly to prevent future surprises and high agency costs (e.g. Cormier *et al.*, 2009). Accordingly, literature shows that firms issuing new equity significantly increase their disclosures (e.g. Lang and Lundholm, 2000; Cormier *et al.*, 2009). A positive relation is expected:

H1g. Equity issues are positively related to VBR disclosures.

Leverage – higher financial leverage is related to managerial incentives and can have a positive or negative effect on disclosure (e.g. Brown and Hillegeist, 2007; Orens *et al.*, 2009). Since agency costs increase with financial leverage (Jensen and Meckling, 1976), managers may have incentives to reduce those by voluntarily disclosing information (e.g. Watson *et al.*, 2002; Orens *et al.*, 2009; Kang and Gray, 2011). Increased disclosures may loosen constraints resulting from debt covenants and, thus, ease servicing of existing and accessing of further debt (e.g. Watson *et al.*, 2002; Wyatt, 2005; Barako *et al.*, 2006). 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 and Magnan, 2003; Cormier *et al.*, 2010) or may not have sufficient financial resources to cover reporting costs (Orens *et al.*, 2009). Without specifying the expected direction, it is hypothesized:

H1h. Leverage is related to VBR disclosures.

Market-to-book-ratio – the market-to-book-ratio represents the relative difference between the book value and market value of equity for a given firm. Firms with a higher market-to-book-ratio are under pressure to meet capital market expectations. This creates incentives to increase voluntary disclosures in order to justify their high market valuation (e.g. Kang and Gray, 2011). The market-to-book-ratio also captures growth opportunities. Growing firms disclose more in order to inform about their potential (Easton and Monahan, 2005; Kang and Gray, 2011). At the same time, hostile takeovers are more likely for undervalued firms (Serafeim, 2011). Hence, firms with relatively low market-to-book-ratios also have incentives to expand voluntary disclosures in order to increase valuation. The relationship to VBR disclosures is therefore ambiguous. It is hypothesized:

H1i. Market-to-book-ratio is related to VBR disclosures.

Profitability – disclosures of highly profitable firms may be considered a signal of good performance and investment quality (e.g. Watson *et al.*, 2002; Alsaeed, 2006; Cerbioni and Parbonetti, 2007; Wang *et al.*, 2008; Orens *et al.*, 2009). Highly profitable firms disclose voluntarily to ensure continued strong performance and to keep external regulation at a low level (e.g. Inchausti, 1997; Watson *et al.*, 2002). According to agency theory, talented managers have an incentive to reveal their type through voluntary disclosures (Trueman, 1986).

Less profitable firms disclose less in order to obscure their results (e.g. Raffournier, 1995; Alsaeed, 2006; Barako *et al.*, 2006; Wang *et al.*, 2008). However, managers have incentives to disclose bad news including low profitability voluntarily in order to avoid reputational or litigation costs (Skinner, 1994) as well as to provide relevant contextual information, explain the circumstances of low profitability (Orens *et al.*, 2009), and enhance credibility (Wang *et al.*, 2008). Without specifying the expected direction, it is hypothesized:

H1j. Profitability is related to VBR disclosures.

Proprietary costs – proprietary costs are included as the main cost component in the cost-benefit trade-off of the disclosure decision. Proprietary cost theory suggests that firms face costs from the disclosure process itself (e.g. Jovanovic, 1982; Verrecchia, 1983, 2001), i.e. direct or indirect costs arising from the preparation, dissemination, and auditing of the disclosed information (e.g. Prencipe, 2004). Also, proprietary costs can be a result of strategic reasons (Wagenhofer, 1990). They arise if the information disclosed is unfavorable or if favorable information is either “useful to competitors, shareholders, or employees in a way which is harmful to a firm’s prospects” (Verrecchia, 1983, pp. 181-182) or causes actions of regulatory authorities (Lambert *et al.*, 2007). Therefore, companies have an incentive to withhold information if they can avoid disadvantageous reactions (Wagenhofer, 1990). VBR disclosures are expected to be lower for higher proprietary costs:

H1k. Proprietary costs are negatively related to VBR disclosures.

Corporate size – corporate size is negatively related to disclosure cost and disclosure risk (e.g. Cormier *et al.*, 2009). Agency costs are higher for larger firms since stakeholders are more widespread (Alsaeed, 2006). Also, larger firms have higher incentives to avoid legal and political costs which increase with firm size (e.g. Lang and Lundholm, 1993; Raffournier, 1995; Inchausti, 1997; Ballester *et al.*, 2002; Watson *et al.*, 2002). In addition, the information demand and the likelihood of public scrutiny and litigation increases with firm size (e.g. Hossain *et al.*, 1995; Depoers, 2000; Prencipe, 2004; Lakhali, 2005; Alsaeed, 2006). Since larger firms are typically characterized by a high number of activities and business units, such firms need to disclose more information in order to provide a complete picture of their success factors and value creation potential (e.g. Depoers, 2000; Bozzolan *et al.*, 2003). Overall, larger firms face higher benefits and lower costs from voluntarily disclosing additional information (Brown and Hillegeist, 2007). Therefore, a positive relation to VBR disclosures is expected:

H1l. Size is positively related to VBR disclosures.

Share volatility – share volatility reflects the uncertainty of the business (e.g. Alford and Berger, 1999). This indicates information asymmetries between managers and investors and increases the investors’ difficulty to accurately assess the firm value (e.g. Cormier *et al.*, 2009). Following agency theory, managers have incentives to disclose additional information to communicate their actions’ alignment with outside requirements (e.g. Watson *et al.*, 2002) and to signal stability and profitability. On the contrary, highly volatile firms with less stable and profitable businesses may withhold disclosures because of potential competitive disadvantages to which they are particularly vulnerable. Hence, the relation between share volatility and VBR disclosures is ambiguous. It is hypothesized:

H1m. Share volatility is related to VBR disclosures.

2.3 Value relevance of disclosure

The relevance of additional voluntary information disclosure has been subject to numerous studies. Most studies confirm value relevance of such disclosure in different settings

(e.g. Amir and Lev, 1996; Healy *et al.*, 1999; Riley *et al.*, 2003; Karamanou and Nishiotis, 2009; Orens *et al.*, 2009; Uyar and Kilic, 2012; Gamerschlag, 2013; Barth *et al.*, 2016; Lee and Yeo, 2016). Mandatory accounting practices, in contrast, are found to be less relevant (Ahmed and Falk, 2006; Cheung *et al.*, 2010). The usage of voluntarily disclosed non-financial information in the valuation process was confirmed regarding analysts (Floehstrand and Stroem, 2006). Voluntary disclosures can reduce analysts' forecast errors (Zhou *et al.*, 2017) and forecast dispersion (Vanstraelen *et al.*, 2003), and improve forecast accuracy (Bernardi and Stark, 2017) and market efficiency (Dietrich *et al.*, 2001). Despite the notable body of value relevance studies focusing on investors, no study has analyzed VBR disclosures so far. To address investors' information need in company valuations for investment decision purposes, this study analyzes the value relevance of a disclosure score explicitly derived from valuation theory.

The VBM literature argues that value gaps, i.e. differences between a firm's current value and the maximum value possible given a sole focus on shareholder-value (Fruhan, 1988), can be reduced by improving operations, asset ownership, and financial structure and communication with shareholders (Copeland *et al.*, 2000). VBM systems provide firms with important information on their fundamental "true" value and on relevant value drivers. Additionally disclosing such information can align market value and fundamental value (Koller *et al.*, 2010) and, hence, improve market valuation (Copeland *et al.*, 2000). Information on internal value drivers and control processes is expected to improve investors' assessment of managers' commitment and to increase the investors' firm valuation for investment decision purposes.

By moderating the estimation risk of investors, voluntary disclosures can also reduce the cost of equity capital (Healy and Palepu, 2001; Botosan, 2006). There is a large body of empirical literature on the (positive) effects of disclosure on the cost of capital (e.g. Welker, 1995; Botosan, 1997, 2006; Botosan and Plumlee, 2002; Debrecny and Rahman, 2005; Lundholm and van Winkle, 2006; Francis *et al.*, 2008; Bhattacharya *et al.*, 2012; Barth *et al.*, 2013)[2]. However, the theoretical link between disclosure and the cost of capital has lately been subject to much debate. Contrary to prior beliefs, the cost of capital contains a separate component for information risk only under imperfect competition (Armstrong *et al.*, 2011; Lambert *et al.*, 2012; Lambert and Verrecchia, 2015). Moreover, the stewardship effect is distinct from the direct information effect (Lambert *et al.*, 2007). With increased information, the cost of capital can either directly decrease due to higher precision of investors' estimates of future cash flows (Lambert *et al.*, 2007) or increase in case of unfavorable information reducing expected payoffs (Johnstone, 2015, 2016). In contrast, the stewardship effect describes the indirect effect of disclosures on real decisions which improves the alignment of managers' and shareholders' interests. The reduced agency costs increase expected future payoffs and, hence, reduce the cost of capital (Lambert *et al.*, 2007; Core *et al.*, 2015).

The revised conceptual frameworks of IASB and FASB describe stewardship as the usefulness of information to assess "how efficiently and effectively the entity's management and governing board have discharged their responsibilities to use the entity's resources" (IFRS, 2015, 1.4b; FASB, 2016, PR8; Pelger, 2016). Investors are expected to particularly use firms' disclosures on internal value drivers and control processes (VBR) when evaluating firms' real decisions concerning internal value generation in order to generate justified valuations as the basis for decision making.

In summary, the increase in expected future payoffs, the reduction in firms' cost of capital as well as investors' profound basis of information are expected to enhance market valuation and finally increase the firms' market value. Based on VBR disclosures, investors are able to better analyze and interpret the information provided in annual reports, reducing the uncertainty surrounding these numbers. It is hypothesized:

H2a. The extent of VBR is positively related to current market values of equity.

It is often claimed that the value relevance of accounting information has deteriorated in the last decades due to the increasing importance of intangibles (Lev and Zarowin, 1999; Vafaei *et al.*, 2011). Francis and Schipper (1999) investigate the relevance of financial statement information to investors for valuation purposes over time. They find that the relevance of earnings information decreases while the relevance of balance sheet and book value information increases. Vafaei *et al.* (2011) find a moderating effect of IC disclosures on the incremental value relevance of IFRS adjustments in book value of equity and earnings. They conclude that investors use IC disclosures to complement their balance sheet analyses. Hence, if the information contained in the financial statements is insufficient for valuation purposes, then the additional VBR information that was disclosed to assist investors in their decision making should improve company valuation. The expectation is that additional value-related disclosures improve the explanatory power of book values and earnings for market values because the information gap between the firm and the investors decreases. It is hypothesized:

H2b. Adding VBR disclosures as “other information” in the Ohlson’s (1995) model increases its market value explanatory power.

3. Research methodology

3.1 Determinants of VBR

In order to identify the determinants driving a firm’s choice to provide VBR information, i.e. to test hypotheses *H1a-H1m*, the following model is run:

$$\begin{aligned} \text{VBRSCORE}_{it} = & \beta_0 + \beta_1 \text{AGE}_{it} + \beta_2 \text{AUDITOR}_{it} + \beta_3 \text{COMP}_{it} + \beta_4 \text{EQUAL}_{it} \\ & + \beta_5 \text{FNEED}_{it} + \beta_6 \text{INT}_{it} + \beta_7 \text{ISSUE}_{it} + \beta_8 \text{LEV}_{it} + \beta_9 \text{MB}_{it} \\ & + \beta_{10} \text{PROF}_{it} + \beta_{11} \text{PROP}_{it} + \beta_{12} \text{SIZE}_{it} + \beta_{13} \text{VOLA}_{it} \\ & + \text{YEAR} + \text{IND} + \varepsilon_{it} \end{aligned} \quad (1)$$

VBRSCORE is the achieved score of VBR disclosures scaled by the maximum score. AGE is firm age, measured as the number of years the firm has been listed on the Frankfurt stock exchange. AUDITOR is the size of the audit firm, proxied by a binary variable which equals 1 if a firm is audited by a Big Four audit firm; 0 otherwise. COMP is a binary variable indicating the use of share-based compensation. EQUAL is earnings quality, measured as the absolute value of the ratio of total accruals to cash flow from operations following Leuz (2003). The measure is consistent with Dechow and Schrand (2004) who argue that 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 *et al.*, 2003). The measure is multiplied by -1 for ease of interpretation.

FNEED is financing need, measured as the ratio of cash flow for investing activities to cash flow from operations. INT is internationalization, proxied by foreign sales divided by total sales. ISSUE is a dummy variable what is equal to one if new equity was raised in the following period. LEV is leverage, measured as the ratio of total debt to total assets. MB is the market-to-book-ratio. PROF is profitability, measured as return on sales.

Proprietary costs (PROP) are proxied by the relative market share, defined as market share of firm *i* divided by market share of the largest competitor in the industry. The measure is multiplied by -1 for ease of interpretation, since proprietary costs decrease with higher values of relative market share as an indicator of a stronger competitive position. Market shares are computed based on Industry Classification Benchmark (ICB) codes and sales data from the Thomson Reuters Datastream database. One advantage of using relative market share as a concentration measure is firm-specificity, while other measures typically used in

empirical studies, such as the Herfindahl index, are industry-specific (e.g. Blanco *et al.*, 2015). SIZE is corporate size, measured as the natural logarithm of total assets. VOLA is share volatility, measured as share price deviation on a daily basis during one period, lagged by one period. Model (1) controls for year fixed effects (YEAR) as well as industry membership (IND). Prior literature finds significant differences in disclosure behavior between industries (Robb *et al.*, 2001; Vanstraelen *et al.*, 2003; Simpson, 2008); e.g. firms might increase disclosures in highly regulated industries due to more protection and less competitive concerns (Ballester *et al.*, 2002) or in order to reduce agency costs by showing compliance with legislation (Watson *et al.*, 2002).

3.2 Value relevance of VBR

To test hypotheses *H2a* and *H2b*, the association of reported book values and earnings with market values (Collins *et al.*, 1999; Ohlson, 1995) is examined. Ohlson (1995) derives a closed-form valuation model based on the assumption of linear information dynamics, that is, a first-order autoregressive process of residual income. Consequently, observable accounting information and “other information” are the only required inputs. “Other information” captures information beyond the information contained in financial statements, i.e. beyond the information contained in book value and earnings. Integrating “other information” in the regression model has been a particular challenge for researchers (Ohlson, 2001). As a result, “other information” is rarely specified and tested in empirical studies (Ohlson, 2001). Instead, the Ohlson’s (1995) model is often applied in a simplified way, based on the empirical model of Collins *et al.* (1999) (e.g. Aboody and Lev, 1998; Barth *et al.*, 1998; Ballester *et al.*, 2002, 2003; Zhao, 2002; Ahmed and Falk, 2006; Cazavan-Jeny and Jeanjean, 2006):

$$MV_{it+3months} = \beta_0 + \beta_1 BV_{it-1} + \beta_2 E_{it} + \varepsilon_{it} \quad (2)$$

where the dependent variable MV is the market value of equity three months after the end of the fiscal year, when annual reports become available, BV is the hypothetical book value of equity at the beginning of the fiscal year, i.e. book value before earnings, and E is earnings at the end of the fiscal year. All variables are deflated by the number of shares outstanding.

Model (2) describes the market value regression without “other information.” According to Barth (2000), “other information” can either be other financial statement information or any additional information depending on the specific research question. To overcome the problem of specifying “other information,” different approaches have been proposed, e.g. to use the residual of a regression without “other information” (Barth *et al.*, 2005) or analyst forecasts as a proxy (Ohlson, 2001). These approaches have the disadvantage of not specifying the source of “other information.” This study is interested in the information content of “other information” provided by the firm’s annual report disclosures. Therefore, the VBR score is included as a direct proxy for “other information” that captures the extent of valuation-related disclosures in firms’ annual reports:

$$MV_{it+3months} = \beta_0 + \beta_1 BV_{it-1} + \beta_2 E_{it} + \beta_3 VBRSCORE_{it} + \varepsilon_{it} \quad (3)$$

The expectation following *H2a* is a positive and significant coefficient for VBRSCORE confirming a significant relation to market valuation. Previous research emphasizes the potential endogeneity of voluntary disclosure (e.g. Healy and Palepu, 2001; Larcker and Rusticus, 2010). We therefore employ a 2SLS approach.

Following *H2b*, we expect that the market value explanatory power of the regression increases when VBR disclosures are included as “other information.” The explanatory power is measured by several information criteria: the coefficient of determination (R^2), root mean squared errors (RMSE) as well as the Akaike (AIC) and Schwarz

(BIC) information criteria. We expect better information criteria resulting from Model (3) as compared to Model (2).

Also, for firms providing better valuation-related information (higher VBRSCORE), the accounting information on book value and earnings is expected to have higher explanatory power for market values, because the information gap between the firm and investors is smaller. Therefore, for firms with higher values for VBRSCORE (identified by a median split) we expect better information criteria in Model (2).

3.3 Measurement of valuation-related disclosures

To quantify the extent of VBR in firms' annual reports, a framework developed by the German Schmalenbach Society of Business Administration (SG, 2002) is used. The advantage of this score is that, in contrast to many other self-constructed indices (Holthausen and Watts, 2001), it relies on a comprehensive theoretical framework directly related to the investors' valuation problem. Even though self-constructed proxies have been criticized for being subjective and difficult to replicate (Beyer *et al.*, 2010), they have the important advantage of appropriately capturing what is intended to be measured (Healy and Palepu, 2001). Recently, most studies use self-constructed proxies, especially when specific disclosures are analyzed (e.g. Akhtaruddin, 2005; Garcia-Meca *et al.*, 2005; Patelli and Prencipe, 2007; Beretta and Bozzolan, 2008; Blanco *et al.*, 2015; Paugam and Ramond, 2015). Earlier studies, in contrast, relied on disclosure indices provided by analysts, business magazines, or frameworks related to or derived from the Jenkins Committee's (AICPA, 1994) report (e.g. Lang and Lundholm, 1993; Hail, 2003; Daske and Gebhardt, 2006; Brown and Hillegeist, 2007). The use of such indices has decreased as analysts' rankings can contain biases (Healy and Palepu, 2001) and indices of business magazines might not be computed consistently over the years (Daske and Gebhardt, 2006).

A second advantage of the score used in this study is that, in contrast to other concepts of EBR, it contains information about internal control processes and may thus induce shareholder value-orientation. Since it is explicitly derived from valuation theory, it systematically comprises the additional non-financial information published in annual reports that is relevant for assessing market and fundamental value as well as internal control system designs. 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 IC and other non-financial information. It provides transparency about internal control processes, internal value drivers, relative valuation, and expected future performance. This transparency is supposed to improve the investors' ability to evaluate managers' commitment to shareholder interests and to assess the intrinsic value of the firm as compared to its market value.

The score focuses on the information effect rather than the news effect of disclosures, i.e. it asks for the level of detail and does not distinguish between good and bad news. Inputs to valuation models served as basis for identifying relevant components of the score. The literature on information processing found that analysts use different valuation models that require different information as inputs (Block, 1999; Bradshaw, 2004; Gleason *et al.*, 2013). It is largely unclear which valuation models investors use (Bradshaw, 2004). The score is therefore based on a variety of valuation models, focusing on the existing three basic approaches: asset-based valuation, relative valuation based on multiples, and present value techniques (AICPA, 1994; Damodaran, 2002; Stowe *et al.*, 2002). The identified components are validated based on previous research about investors' information needs as well as the AICPA's and FASB's recommendations (AICPA, 1994; FASB, 2001; Ruhwedel and Schultze, 2002).

Analyzing the reporting of the DAX30 companies from 1997 to 2000 and of MDAX firms in 2000 based on the SG (2002) framework, Ruhwedel and Schultze (2002)[3] find large

heterogeneity in the level and quality of the information provided. The framework and disclosure scores were subsequently applied by many German firms and researchers (e.g. Hayn and Matena, 2005; Koethner, 2005; Baetge and Solmecke, 2006; Huefner, 2007; Kristandl and Bontis, 2007; Heidemann and Hofmann, 2009; Schultze *et al.*, 2016).

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). The aggregation of all four parts, scaled by the maximum number of points achievable (378), constitutes the VBRSCORE.

Each item is awarded score points based on the level of information provided (e.g. Orens *et al.*, 2009). One point is awarded for general information, one additional point for detailed, qualified information, and two additional points for quantifiable information (if applicable). In addition, the items were assigned weights depending on their presumed relevance to a specific user group (see Ruhwedel and Schultze, 2002), i.e. the relative importance as, for instance, perceived by investors (Singhvi and Desai, 1971; Prencipe, 2004). While assigning weights may induce subjectivity (Ahmed and Courtis, 1999), not doing so would be equally subjective, since the items are of quite different importance and level of detail. Adding an additional item with similar content would also increase the topic's relative weight. Therefore, the items are weighted according to their presumed relative importance. Boesso and Kumar (2007), for example, use a similar weighting system in their voluntary disclosure framework.

In order to identify VBR information, a content analysis of annual reports was conducted. Content analysis of annual reports in the context of intangible value drivers such as IC has been criticized to be subjective and not comparable due to different definitions and categorizations of seemingly equivalent content (e.g. Abeysekera, 2006; Beattie and Thomson, 2007). Content analysis is therefore deemed unsuitable for transformational IC research (Dumay and Cai, 2014, 2015). However, Goebel (2015) analyzed IC scores as combinations of IC items and found a remarkable extent of comparability amongst IC studies based on content analyzed data. Moreover, this study focuses on a broader score that comprises further valuation-related data in addition to IC value drivers to test the relevance of valuation-related information for investors' decision making. Therefore, it is suitable to rely on annual reports which have been identified to be the most important source of information for financial analysts and investors' investment decisions (Hail, 2002).

Three different coders conducted the content analysis. To ensure intercoder reliability, the coders met continuously to exchange information and questions during the data collection process. Before starting the actual data collection, ten annual reports were randomly selected and analyzed by all three coders. The proportion of consensual answers between coders A/B, B/C and A/C was above 90 percent, indicating high homogeneity between the coders.

Cronbach's (1951) α with a value of 0.7 reveals an acceptable level of consistency between the items and confirms the internal consistency of the disclosure score. A detailed description of the items and the points assigned is provided in Appendix 1.

The following example illustrates the general idea of the VBRSCORE: When comparing the reporting practices of two direct competitors, DaimlerChrysler and VW (both ICB super sector 3,300, automotive and parts) in 2004, large differences are found. VW provides a higher level of information and achieves higher VBR scores than DaimlerChrysler (18 > 12 points on Part 1, 29 > 14 points on Part 2, 91 > 69 points on Part 3, 51 > 40 points on Part 4, i.e. 189 > 135 points in total). The score includes information on, for example, IC and rewards transparency about non-financial value drivers. VW achieves same or better scores on each of the 7 ICs, e.g. 3 > 1 points on human capital. While DaimlerChrysler provides rather general information on its employees, VW discloses detailed and quantitative information of high quality. For example, it describes an idea-management process that aims at engaging employees in the development of their working environment. The consequences of this

process are also outlined in detail: in 2004, employees submitted 76,492 proposals in Europe. With the implementation of 38,180 of these proposals, VW saved €132.6 million.

Moreover, the VBRSCORE, for instance, focuses on consistency regarding internal VBM processes and indirectly rewards compliance with the concept of integration: the use of VBM systems for management purposes fits the concept of integrated thinking, which asks for integration and value-orientation as a basis for firms' strategy development and implementation. Reporting on both the use of VBM systems as well as associated targets aligns internal operations and external communication and thus achieves another objective of IR. VW achieves 18 points opposed to 6 points for DaimlerChrysler. Both companies describe the use of VBM systems based on the EVA concept. However, only VW explicitly outlines its targets: efficient resource allocation, access to capital markets, financing of new projects, and ultimately an increase in market value, and consistently describes how performance measures are used to meet these targets. Overall, the information captured should help investors evaluate a firm's future potential which in turn is incorporated in their valuation. Hence, such information supports the objectives of the VBR score as it decreases the information gap between the firm and its investors.

4. Sample description

Data are retrieved from the Thomson Reuters Datastream database and hand collected from the companies' annual reports.

4.1 Sample

This study investigates annual reports of 118 firms listed in the German HDAX (comprising the 30 largest firms (DAX) and the following 70 mid-cap firms (MDAX)) in the years 2000-2004. These companies are categorized in 19 different industries according to the ICB (super sectors level). The initial sample comprises 590 observations. In total, 127 firm year observations are lost due to merger, bankruptcy or delisting during the sample period (included in the surviving years to avoid survivorship bias) as well as due to missing values. 14 outliers are removed[4]. The final sample comprises 449 observations.

4.2 Descriptive statistics

The descriptive statistics in Table II show that the average level of VBRSCORE is about 114 points (29.4 percent), the minimum is 27 points (7.1 percent), and the maximum is 229 points (59.3 percent). The lowest average level of VBRSCORE (22.8 percent) is found for personal and household goods companies (ICB super sector 3,700), while travel and leisure companies (ICB super sector 5,700) show the highest mean (34.0 percent). Notably, a Big Four auditor was engaged in 78.2 percent of firm year observations, and share-based compensation was used in almost 61 percent of firm year observations.

The correlation matrix is provided in Table III. Both, Spearman rank as well as Bravais-Pearson correlations between VBRSCORE and MV are positive and significant as expected (*H2a*). With respect to the proposed factors influencing the disclosure behavior, in the regarded sample, VBRSCORE shows a significant Spearman rank correlation with AGE, AUDITOR, COMP, EQUAL, INT, MB, PROP, SIZE, and VOLA in the expected direction (*H1a, H1b, H1c, H1d, H1f, H1i, H1k, H1l, H1m*). FNEED, ISSUE, LEV, and PROF are not significantly correlated with VBRSCORE. The Bravais-Pearson coefficients show quite similar results except for insignificant correlations of VBRSCORE with AGE and EQUAL. This might be due to the fact that the parametric Bravais-Pearson correlation test assumes normal distribution. The Shapiro-Wilk test rejects normal distribution of VBRSCORE at the 1 percent level. Therefore, the non-parametric Spearman rank correlation test is more appropriate. Overall, results support most of the predicted associations.

Variable	<i>n</i>	Mean	Median	SD	Min.	Max.
VBRSCORE	449	0.2936449	0.28835979	0.1055544	0.0714286	0.5925926
MV	449	32.31165	24.65	28.64323	0.2599068	200.4519
BV	449	17.67058	13.01111	15.75793	0.3227273	107.84
E	449	1.923233	1.554054	2.855698	-8.089639	16.1875
AGE	449	34.06904	14	39.24491	0	135
AUDITOR	449	0.7817372	1	0.4135275	0	1
COMP	449	0.6057906	1	0.4892253	0	1
EQUAL	449	-1.163338	-0.72137934	3.324676	-59.58761	-0.005913
FNEED	449	3.004863	0.68626535	29.44944	-39.00644	514.8965
INT	449	0.4444451	0.5	0.3743965	0	4.344051
ISSUE	449	0.0712695	0	0.2575614	0	1
LEV	449	0.6390027	0.70328921	1.127838	-22.91844	0.9967529
MB	449	2.298831	1.503033	2.671201	0.1602492	25.38815
PROF	449	0.0255315	0.03163461	0.2158199	-3.077.938	2.256448
PROP	449	-0.2364113	-0.09340493	0.299154	-1.742205	-0.0005175
SIZE	449	22.41889	22.155443	2.070083	17.22272	27.62571
VOLA	449	0.0249682	0.02284792	0.0103407	0.008338	0.0911241

Table II.
Descriptive statistics

Note: All variables are defined as in Table AI

5. Empirical results

5.1 Determinants of VBR

Panel A of Table IV displays the univariate analyses of determinants, i.e. 13 individual Tobit regressions for one of the determinants each. AUDITOR, COMP, INT, LEV, MB, PROF, PROP, SIZE, and VOLA are significantly related to VBRSCORE with $p \leq 5$ percent. This represents univariate confirmation of *H1b*, *H1c*, *H1f*, *H1h*, *H1i*, *H1j*, *H1k*, *H1l*, and *H1m*. AUDITOR, COMP, INT, and SIZE show positive coefficients, PROP shows a negative coefficient as expected. Regarding LEV, MB, PROF, and VOLA, expectations were ambiguous.

The positive coefficient for LEV indicates that managers use voluntary disclosures to reduce the high agency cost induced by financial leverage (e.g. Watson *et al.*, 2002; Orens *et al.*, 2009; Kang and Gray, 2011) or to loosen constraints imposed by debt covenants and, thus, ease servicing of existing and accessing of further debt (e.g. Watson *et al.*, 2002; Wyatt, 2005; Barako *et al.*, 2006). The negative coefficient for MB implies that firms with relatively low market-to-book-ratios have incentives to expand voluntary disclosures in order to increase valuation and, hence, avoid hostile takeovers (Serafeim, 2011). The positive coefficient for PROF indicates that highly profitable firms want to ensure continued superior performance and keep external regulation at a low level via increased disclosures (e.g. Inchausti, 1997; Watson *et al.*, 2002). An alternative explanation following agency theory is that talented managers have an incentive to reveal their type through voluntary disclosures (Trueman, 1986). Moreover, less profitable firms seem to disclose less in order to obscure their results (e.g. Raffournier, 1995; Alsaed, 2006; Barako *et al.*, 2006; Wang *et al.*, 2008). For VOLA, results show a negative relation indicating that firms facing higher volatility withhold disclosures, e.g. because of potential competitive disadvantages that are more harmful in times of unstable businesses. AGE, EQUAL, FNEED, and ISSUE are not significantly related to VBRSCORE in individual tobit regressions (contrasting *H1a*, *H1d*, *H1e*, and *H1g*).

Panel B of Table IV shows the multivariate analysis of determinants. Model (1) is highly significant with an *F*-statistic of 15.51. COMP, LEV, SIZE, and VOLA are highly significant confirming *H1c*, *H1h*, *H1l*, and *H1m*, in line with the univariate results. The positive sign for COMP indicates that managers have incentives to opportunistically use disclosures to execute impression management (Melloni, 2015) and to influence

	VBScore	MV	BV	E	AGE	AUDI- TOR	COMP	EQUAL	FNEED	INT	ISSUE	LEV	MB	PROF	PROP	SIZE	VOLA
VBScore	1.000																
MV	0.0999*	1.000															
BV	0.1718*	0.4164*	1.000														
E	0.1867*	0.5424*	0.4111*	1.000													
AGE	0.0822	0.1128*	0.3235*	0.0740	1.000												
AUDITOR	0.1859*	0.0148	0.2291*	0.0894	0.1386*	1.000											
COMP	0.4898*	0.0535	0.0191	-0.0243	-0.0476	0.1254*	1.000										
EQUAL	0.0155	0.0226	0.0123	0.0885	0.0600	0.0050	-0.0665	1.000									
FNEED	-0.0117	0.0026	0.0145	0.0082	-0.0303	0.0268	0.0528	-0.3589*	1.000								
INT	0.1824*	0.0925	0.0418	0.0606	0.0717	0.1141*	0.1733*	-0.0274	-0.0716	1.000							
ISSUE	0.0256	-0.0153	0.0740	-0.0239	0.0982*	0.0416	0.0286	-0.0154	-0.0232	-0.0885	1.000						
LEV	0.0472	0.0333	0.0697	0.0138	0.0576	0.0014	0.0625	-0.0131	0.0239	0.0384	0.0234	1.000					
MB	-0.1350*	0.3563*	-0.3042*	0.0057	-0.1484*	-0.2193*	-0.0107	-0.0467	-0.0142	0.0015	-0.0589	0.0134	1.000				
PROF	0.0344	0.1422*	0.0236	0.2846*	-0.0094	0.1126*	-0.0739	0.0741	0.0184	0.0368	0.0048	-0.0010	0.0830	1.000			
PROP	-0.3804*	-0.1707*	-0.2727*	-0.0961*	-0.2108*	-0.1671*	-0.2473*	-0.0570	0.0479	-0.1652*	-0.0291	-0.0734	0.1208*	0.0007	1.000		
SIZE	0.3414*	0.2277*	0.4842*	0.1128*	0.3669*	0.3082*	0.1557*	-0.0048	0.1050*	0.0045	0.0600	0.1612*	-0.2581*	0.0438	0.6490*	1.000	
VOLA	-0.2228*	-0.1826*	-0.2046*	-0.2830*	-0.1681*	-0.1719*	0.0214	-0.0833	-0.0124	-0.0749	0.0089	-0.0861	0.2020*	-0.2414*	-0.1855*	-0.2633*	1.000

Notes: Bravais-Pearson correlations are shown below the diagonal and Spearman rank correlations are shown above the diagonal. All variables are defined as in Table AI. $^{*p} < 0.05$

Table III.
Correlation matrix

	Exp. sign	VBRSCORE
<i>Panel A: Univariate analyses</i>		
$VBRSCORE_{it} = \beta_0 + \beta_1 DETERMINANT_{it} + YEAR + IND + \varepsilon_{it}$		
AGE	?	0.00012 (0.00013)
AUDITOR	+	0.03728 (0.01160)***
COMP	+	0.09991 (0.00900)***
EQUAL	+	-0.00026 (0.00195)
FNEED	+	0.00008 (0.00008)
INT	+	0.04492 (0.02226)**
ISSUE	+	0.00832 (0.01645)
LEV	?	0.00296 (0.00115)**
MB	?	-0.00332 (0.00131)**
PROF	?	0.03696 (0.01712)**
PROP	-	-0.12440 (0.02440)***
SIZE	+	0.01824 (0.00259)***
VOLA	?	-2.73907 (0.60782)***
Industry dummies		Included
Year dummies		Included
<i>Panel B: Multivariate analysis</i>		
$VBRSCORE_{it} = \beta_0 + \beta_1 AGE_{it} + \beta_2 AUDITOR_{it} + \beta_3 COMP_{it} + \beta_4 EQUAL_{it} + \beta_5 FNEED_{it} + \beta_6 INT_{it} + \beta_7 ISSUE_{it} + \beta_8 LEV_{it} + \beta_9 MBR_{it} + \beta_{10} PROF_{it} + \beta_{11} PROP_{it} + \beta_{12} SIZE_{it} + \beta_{13} VOLA_{it} + YEAR + IND + \varepsilon_{it}$ (1)		
AGE	?	0.00002 (0.00012)
AUDITOR	+	0.00775 (0.00956)
COMP	+	0.08899 (0.00942)***
EQUAL	+	0.00020 (0.00179)
FNEED	+	-0.00001 (0.00007)
INT	+	0.01886 (0.02121)
ISSUE	+	0.00148 (0.01446)
LEV	?	-0.00388 (0.00119)***
MB	?	-0.00061 (0.00121)
PROF	?	0.01789 (0.01184)
PROP	-	-0.02981 (0.02481)
SIZE	+	0.01009 (0.00343)***
VOLA	?	-2.08167 (0.53136)***
Industry dummies		Included
Year dummies		Included
<i>n</i>		449
<i>F</i> -statistic		15.51***
Notes: Robust standard errors are shown in parentheses. All variables are defined as in Table AI. ** <i>p</i> < 0.05, *** <i>p</i> < 0.01		

Table IV.
Analyses of
determinants of value-
based reporting

share prices (e.g. Aboody and Kasznik, 2000; Cormier *et al.*, 2009) as the determinant of their compensation. While the univariate analysis finds a significantly positive association for LEV, the multivariate analysis finds a negative sign. The negative sign indicates that firms in poor financial condition may not be able to gain benefits from disclosure (Cormier and Magnan, 2003; Cormier *et al.*, 2010) or may not have sufficient financial resources to cover reporting costs (Orens *et al.*, 2009). The positive sign for SIZE indicates that larger firms face higher benefits and lower costs from voluntarily disclosing additional information (Brown and Hillegeist, 2007). Finally, the negative sign for VOLA indicates that firms facing higher volatility withhold disclosures, e.g. because of potential competitive disadvantages that are more harmful in times of unstable businesses. Overall, the multivariate analysis of determinants implies that large firms with low levels of leverage, low share price volatility, and share-based compensation tend to voluntarily disclose more valuation-related information.

While AUDITOR, INT, MB, PROF, and PROP are significantly related to VBRSCORE in the univariate analysis, they do not show a significant association in the multivariate

analysis. AGE and EQUAL show significant Spearman rank correlations with VBRSCORE but no significant association is found for neither univariate nor multivariate analyses. Regarding FNEED and ISSUE, no significant results are found.

5.2 Value relevance of VBR

Table V presents the results of the value relevance regression. The Durbin-Wu-Hausman test on endogeneity is significant at $p \leq 1$ percent ($\chi^2 = 7.42$). Therefore, a 2SLS approach is adopted. In the first stage, a Tobit regression based on Model (1) is run. The results are displayed in Table IV, panel B. Fitted values of VBRSCORE calculated from the results of Model (1) are then included in the second stage.

By definition, the instruments should be correlated with the endogenous variable, VBRSCORE, but uncorrelated with the error term of the original regression (Model (3)). In order to justify the instruments used, Larcker and Rusticus (2010) recommend evaluating economic theory as well as regression results and diagnostics. Literature provided in Section 2.2 identifies theoretical associations between the instruments and VBRSCORE. Regarding most instruments, it seems unlikely that they are systematically directly associated with the absolute market value. For example, share-based compensation (COMP) only seems to be associated with MV via voluntary disclosures since managers have been shown to

Panel A: 2SLS First-stage diagnostics (instrumental variable regression of VBRSCORE)

$$\text{VBRSCORE}_{it} = \beta_0 + \beta_1 \text{AGE}_{it} + \beta_2 \text{AUDITOR}_{it} + \beta_3 \text{COMP}_{it} + \beta_4 \text{EQUAL}_{it} + \beta_5 \text{FNEED}_{it} + \beta_6 \text{INT}_{it} + \beta_7 \text{ISSUE}_{it} + \beta_8 \text{LEV}_{it} + \beta_9 \text{MBR}_{it} + \beta_{10} \text{PROF}_{it} + \beta_{11} \text{PROP}_{it} + \beta_{12} \text{SIZE}_{it} + \beta_{13} \text{VOLA}_{it} + \text{YEAR} + \text{IND} + \varepsilon_{it} \quad (1)$$

Durbin-Wu-Hausman χ^2 statistic: test of endogeneity	7.42032 (0.00645)***
Kleinbergen-Paap LM statistic: test of underidentification	108.55 (0.0000)***
Sanderson-Windmeijer F statistic: test of under- and weak identification	16.04 (0.0000)***
Anderson-Rubin Wald F statistic: test of joint significance and weak instruments	4.31 (0.0000)***
Stock-Wright χ^2 statistic: test of weak instruments	59.39 (0.0000)***
Hansen J statistic: test of overidentification	30.533 (0.0023)***

Panel B: Second-stage regression of market value

$$\text{MV}_{it+3 \text{ months}} = \beta_0 + \beta_1 \text{BV}_{it-1} + \beta_2 \text{E}_{it} + \beta_3 \text{VBRSCORE}_{it} + \varepsilon_{it} \quad (3)$$

	Exp. sign	MV
BV	+	0.50105 (6.41)***
E	+	3.46587 (8.96)***
VBRSCORE (instrumented)	+	46.3527 (2.74)***
Constant		-15.00895 (-0.99)
Industry dummies		Included
Year dummies		Included
n		449
R^2		0.5382
Adj. R^2		0.5132
AIC		3987.05
BIC		4,085.619
RMSE		19.985
F-statistic		21.53***
Highest VIF		6.92
Mean VIF		2.33

Panel C: 2SLS regression marginal effects

	Exp. sign	Marginal effects
BV	+	0.26984 (4.16)***
E	+	0.18792 (4.77)***
VBRSCORE (instrumented)	+	0.44454 (2.72)***
n		449

Notes: Panel A: p -values are shown in parentheses; Panel B: z -values are shown in parentheses; Panel C: z -values are shown in parentheses. all variables are defined as in Table AI. *** $p < 0.01$

Table V.
Value relevance
2SLS regression

opportunistically use disclosure decisions to influence share prices (e.g. Aboody and Kasznik, 2000; Cormier *et al.*, 2009). Therefore, COMP is used as the main instrument. For other variables, exogeneity is more questionable. For example, corporate size (SIZE) will likely also directly influence market value. However, when size is excluded as an instrument and included in the second stage to control for a potential direct influence on market value, the main inferences remain unaffected.

Since all independent variables in Model (1), apart from FNEED and ISSUE, are either significantly correlated with VBRSCORE or significant in the univariate determinants analyses they reflect the firm's trade-off decision between costs and benefits not only from a theoretical perspective. Even though FNEED and ISSUE are not significantly related, they are included in the first stage in order to present the results for all variables. The main results are not affected when FNEED and ISSUE are excluded from the analysis.

Following Larcker and Rusticus (2010), this study conducts several tests of weak instruments, underidentification and overidentification. The results are provided in Table V, panel A. In addition to a number of robustness analyses (see Section 6.3), these tests assure the validity of the instruments with $p \leq 1$ percent.

Panel B of Table V presents the second stage regression results. The coefficients for BV and E are positive and significant as expected. The positive and significant coefficient of VBRSCORE confirms *H2a*, indicating that the information captured by the disclosure score is relevant to investors in the valuation process. The use of panel data allows controlling for unobserved heterogeneity. Using robust standard errors further mitigates potential heteroscedasticity problems. The variance inflation factor (VIF) controls for multicollinearity. The values for the variables of interest are consistently below the conservative threshold of five. Overall, the model is highly significant with an *F*-statistic of 21.53.

The marginal effects of the relationships are used to analyze the economic significance of the results (Williams, 2012). Panel C of Table V reports average marginal effects (*ey/ex*), i.e. elasticities at mean. All marginal effects are significant at $p \leq 1$ percent. For the average firm at mean, an increase by 1 percent in VBRSCORE is associated with an increase in MV by 0.4445 percent, while an increase by 1 percent in BV and E is associated with an increase in MV by 0.2698 and 0.1879 percent, respectively.

To investigate *H2b*, we compare the explanatory power of Model (2) and Model (3), that is, we compare the explanatory power of the model with and without VBRSCORE as "other information." We expect the information criteria for Model (3), that includes the instrumented score, to be better than for Model (2). The higher adjusted R^2 for Model (3) compared to Model (2) (51.32 > 50.57 percent) suggests higher market value explanatory power for the Ohlson's (1995) model including VBRSCORE as "other information." Similarly, the RMSE is lower for Model (3) compared to Model (2) (19.985 < 20.138). Consistent with our expectation, both AIC and BIC are lower for Model (3) (AIC: 3,987.05 < 3,992.92 and BIC: 4,085.619 < 4,087.382). All information criteria confirm *H2b*: explanatory power is higher when VBR disclosures are included as "other information" in the Ohlson's (1995) model.

To corroborate these findings, we analyze two subsamples that differ in the extent of VBRSCORE. We compare the explanatory power of book values and earnings for market values of equity in two subsamples of higher and lower VBRSCORE (median split). Higher explanatory power is expected for firms with higher VBR disclosures. The reduced Ohlson's (1995) model without "other information" (Model (2)) is run for both subsamples to compare their relative explanatory power. The results are shown in Table VI. In addition, Table VI provides the results of Model (2) for the total sample. While book value and earnings are significantly related to market value in all cases, the subsample of high VBRSCORE yields higher coefficients of determination, lower RMSE as well as lower values for AIC and BIC than the subsample of low VBRSCORE. This indicates that the VBR disclosures help investors to analyze and interpret the accounting

	Exp. sign	Subsample high VBRSCORE	Subsample low VBRSCORE	Total sample
$MV_{it+3months} = \beta_0 + \beta_1 BV_{it-1} + \beta_2 E_{it} + \varepsilon_{it} \quad (2)$				
BV	+	0.48369 (4.09)***	0.56592 (5.09)***	0.53145 (6.81)***
E	+	2.85223 (5.78)***	4.29076 (6.44)***	3.54490 (9.12)***
Constant		1.20610 (0.09)	24.63569 (1.18)	-5.24595 (-0.36)
Industry dummies		Included	Included	Included
Year dummies		Included	Included	Included
<i>n</i>		225	224	449
<i>R</i> ²		0.6071	0.5507	0.5300
Adjusted <i>R</i> ²		0.5643	0.5065	0.5057
AIC		1,977.202	2,004.465	3,992.921
BIC		2,055.773	2,076.110	4,087.382
RMSE		18.663	20.303	20.138
<i>F</i> -statistic		14.19***	12.44***	21.84***
Notes: <i>t</i> -Values are shown in parentheses. All variables are defined as in Table AI. *** <i>p</i> < 0.01				

Table VI.
Incremental value
relevance

information of book value and earnings to derive estimates of firm value and confirms the expectation that such disclosures decrease the information gap between the firm and the investors.

In addition, the VBR score is split into its four main components. The 2SLS regression is re-run four times for each component individually. Untabulated results show that information for relative valuation (Part 2) and information on future performance (Part 4) are highly significant at $p \leq 1$ percent. Information for net asset valuation (Part 1) as well as information on internal value generation and control systems (Part 3) are significant at $p \leq 10$ percent. As shown in Table VII, all sub-scores are highly correlated with the overall VBRSCORE but not highly correlated with each other, indicating that all parts significantly contribute to the explanatory power of the score.

5.3 Robustness checks

Several robustness checks are conducted in order to detect the sensitivity of the results to model specifications, potential measurement errors in the variables, and sample composition. Using the residual income specification of the Ohlson's (1995) model instead of the total earnings specification does not change the main inferences. Although the instruments seem to be exogenous and appropriate based on several tests of week, under- and over-identification, different variables are included as control variable in the second stage instead of instruments in the first stage to assure that the results are not driven by a direct influence on market value. The main inferences remain unaffected.

To ensure that the results are not driven by associations between the variables included in the first stage, the 2SLS regressions are re-run with one variable excluded at a time.

	VBRSCORE	Part 1	Part 2	Part 3	Part 4
VBRSCORE	1.000	0.5001*	0.51134*	0.8924*	0.7543*
Part 1	0.5225*	1.000	0.1540*	0.3528*	0.4485*
Part 2	0.5094*	0.1598*	1.000	0.3136*	0.2462*
Part 3	0.8858*	0.3640*	0.2851*	1.000	0.4750*
Part 4	0.7971*	0.4538*	0.2558*	0.5081*	1.000

Notes: Bravais-Pearson correlations are shown below the diagonal and Spearman rank correlations are shown above the diagonal. * $p < 0.05$

Table VII.
Correlation matrix:
VBRSCORE and
sub-scores

For example, there might be interrelations between earnings quality and profitability since those show a significant Spearman rank correlation (the Bravais-Pearson correlation coefficient is not significant). Moreover, financing need and equity issues, for example, might be related, since financing need could lead firms to raise new equity in the following period. The inferences remain unchanged.

Different proxies, e.g. the natural logarithm of sales instead of the natural logarithm of total assets for size or return on equity or return on assets instead of return on sales for profitability, do not affect the inferences. Moreover, the regressions are re-run excluding banks and assurance companies because of their special structures and accounting. While this reduces the sample size to 413 observations, the main findings remain unaffected.

6. Conclusion

Various concepts of EBR have been developed to align the firms' reporting with investors' information needs. Based on the conjecture that these needs comprise information for company valuation purposes and due to the identification of value creation as the ultimate goal by IR, this paper analyzes valuation-related disclosures with regard to the following research questions:

RQ1. What determines the choice to disclose VBR information in annual reports?

RQ2. Are voluntary annual report disclosures on the fundamental value of the firm (VBR) relevant for market valuation?

The analysis builds on the SG (2002) disclosure framework that was derived from valuation theory with the explicit aim to identify information relevant for the investors' firm valuation. The items included in the disclosure score constitute information relevant for the use of valuation techniques such as net asset valuation, relative valuation and DCF valuation. Because it is largely unknown what valuation models are used by investors and if market valuation is based on such models of intrinsic value, it is *ex ante* unclear, whether information relevant for intrinsic valuation is indeed used by investors and related to market valuation.

Our evidence confirms the value relevance of VBR disclosures. Using these as "other information" in the Ohlson's (1995) model, the score is found to be significantly associated with market values even after controlling for potential endogeneity. Including VBR disclosures in the regression significantly increases the explanatory power for market values. The results indicate that the information captured by the disclosure score is relevant to the investors in their valuation process. All parts of the score are found to contribute to its value relevance. For firms with higher VBR disclosures, book value and earnings have higher explanatory power, confirming the expectation that such disclosures decrease the information gap between the firm and the investors. The determinants analyzes identify share-based compensation, leverage, corporate size, and share volatility as factors affecting firms' decision to disclose VBR information. In summary, large firms with low levels of leverage, low share price volatility, and share-based compensation tend to voluntarily disclose more valuation-related information.

A limitation of this study is the specific and detailed data necessary to build the disclosure score via content analysis of annual reports which constrains sample size and may be affected by subjectivity. Focusing on annual reports neglects other information channels like press releases, homepages, or analyst conference calls. However, content analysis of annual reports is regarded as the most suitable approach since content analysis allows to measure what is intended to be measured (Healy and Palepu, 2001) based on a theoretical framework on valuation techniques, and annual reports are the most important

source of information for financial analysts and investors to base their investment decision on (Hail, 2002). A further caveat is the endogeneity of voluntary valuation-related disclosures. While a number of tests support the employed 2SLS approach, the possibility that endogeneity of voluntary valuation-related disclosures explains their market relevance cannot be completely ruled out.

The contribution of this study is threefold. First, it contributes to the further development of EBR by showing that the information identified by the SG (2002) framework is relevant to the investors. Since VBR is considered a major part of IR and other concepts of EBR (Eccles *et al.*, 2001; Boedker *et al.*, 2007), this study aids in the derivation of important disclosure elements within these concepts and in their alignment as aspired by the Corporate Reporting Dialogue. The findings establish that the disclosure of valuation-related information is useful for investors in their valuation and decision-making process. This also provides indirect evidence of the investors' use of fundamental valuation techniques in their decisions making. Second, the findings contribute to the literature on voluntary disclosures by establishing a link between information useful for investors and market values. This also provides indirect evidence of the investors' use of fundamental valuation techniques in their decision making. With share-based compensation, leverage, corporate size, and share volatility, this study further identifies the fundamental drivers of the decision to provide such information. Third, this study contributes to the value relevance literature by showing the voluntary valuation-related disclosure score to be a suitable proxy for "other information" in the Ohlson's (1995) model increasing its explanatory power. Furthermore, traditional accounting information of book value and earnings has higher explanatory power if VBR disclosures are higher. This indicates that VBR disclosures decrease the information gap between the firm and the investors.

Notes

1. The term VBR is used here to highlight the connection to value-based management and to distinguish it from consulting concepts (e.g. ValueReportingTM is a consulting concept and protected trademark of PricewaterhouseCoopers (PwC)).
2. See Beyer *et al.* (2010) or Plumlee (2016) for further references.
3. The provision of their original questionnaire is thankfully acknowledged. The items differ slightly from the original items of Ruhwedel and Schultze (2002) because some items are excluded that have become mandatory (e.g. fair values of certain assets) since the study was published.
4. Prior research points out that outliers potentially have a large influence on the parameter estimates for the distributions of variables (e.g. Frecka and Hopwood, 1983), especially in small samples. Detecting outliers with observations differing more than four standard deviations from the mean of the respective variable (e.g. Casey and Bartczak, 1985) leads to the removal of 14 observations. Keeping these outliers, however, does not change the main inferences.

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Appendix 1. Description of the disclosure score framework

The components of the SG's VBR concept are based on the previous research and the AICPA's (1994) and FASB (2001) recommendations 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 bookvalue of equity can therefore be explained by: gains from higher (lower) fair values of on-balance-sheet assets (liabilities), off-balance-sheet assets and liabilities at their fair value, and 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. 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, e.g. 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. Disclosures on VBM should reflect consistency between proposed targets and actually applied performance measures. 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 analyzing 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 (maximum points achievable per item and category in round brackets):

Part 1: information for net asset valuation (maximum 26 points)

- (1) Voluntary fair values of assets and liabilities (3 points)
- (2) Intellectual capital:
 - Human capital (3 points)
 - Customer capital (3 points)
 - Supplier capital (3 points)
 - Investor capital (3 points)
 - Process capital (3 points)
 - Location capital (3 points)
 - Innovation capital (3 points)
- (3) Original goodwill (2 points)

Part 2: information for relative valuation (maximum 84 points)

- (1) Share:
 - Development of share price (2 points)
 - In comparison with the stock market (4 points)
 - In comparison with the industry or peer group (6 points)
 - Stock returns (6 points)

- Development of an example portfolio (4 points)
 - Transaction volume of the share (2 points)
- (2) Dividend:
- Development of dividends (2 points)
 - Dividend yield (4 points)
 - In comparison with the stock market (6 points)
 - In comparison with the industry or peer group (6 points)
- (3) Key performance measures:
- Cash flow per share (2 points)
 - Free cash flow per share (6 points)
 - Basic/diluted cash flow per share (2 points)
 - Price-earnings-ratio (4 points)
 - In comparison with the industry or peer group (6 points)
 - Price-cash flow-ratio (4 points)
 - In comparison with the industry or peer group (6 points)
 - Price-book value-ratio (6 points)
 - In comparison with the industry or peer group (6 points)

Part 3: information on internal value generation (maximum 128 points)

- (1) Performance measures of control concept:
- Applied performance measures (value-based, traditional) (14 points)
 - Description of applied performance measures (nature, reasoning, monitoring) (18 points)
 - Performance measures by segment (6 points)
 - Development of performance measures over time (6 points)
 - Benchmarking performance measures (industry or peer group) (6 points)
 - Target level of performance measures (6 points)
 - Consequences if performance measures miss the target level (6 points)
- (2) Internal value-based management processes:
- Increase in market value as explicit firm target (6 points)
 - Value-based management systems (6 points)
 - Consistency regarding value-orientation (6 points)
- (3) Incentive system:
- Participants (4 points)
 - Terms and conditions (terms, conditions, bonus) (12 points)
 - Description of performance measure tied to the incentive system (4 points)
 - Description of individual target agreements tied to the incentive system (4 points)

- (4) Cash flow generation:
- Gross cash flow (6 points)
 - Free cash flow (6 points)
 - Explanation of cash flow statement (6 points)
 - Value added statement (6 points)

Part 4: information on future performance (maximum 140 points)

- (1) Information on strength, weaknesses, opportunities and threats (SWOT):
- Future opportunities and threats (economic trend, industry structure, market volume, market growth) (20 points)
 - Corporate strength and weaknesses (competitive advantage, market shares, new business segments) (14 points)
 - Information by segments (SWOT) (12 points)
- (2) Future investments:
- Tangible and intangible assets (4 points)
 - Acquisitions (4 points)
 - Strategic alliances, cooperations (4 points)
 - Other information (4 points)
 - Information by segments (6 points)
- (3) Future financing:
- Financial risks (4 points)
 - Financing opportunities (4 points)
 - Financing activities (4 points)
 - Other information (4 points)
 - Information by segments (6 points)
- (4) Financial planning:
- Planned values for the financial statements (4 points)
 - Information by segments (6 points)
 - Planned values for the key performance measures (4 points)
 - Information by segments (6 points)
 - Planning horizon (4 points)
- (5) Cost of capital:
- Current cost of capital (4 points)
 - Expected future cost of capital (6 points)
 - Calculation of the cost of capital (current and expected) (10 points)
 - Cost of capital by segments (6 points)

Appendix 2. List of variables

Variable	Definition
VBRSCORE _{it}	VBRSCORE is the achieved score of VBR disclosures scaled by the maximum score of 378
MV _{it+3months}	MV is the market value of equity three months after the end of the fiscal year, deflated by number of shares
BV _{it-1}	BV is the book value of equity at the beginning of the fiscal year, deflated by number of shares
E _{it}	E is earnings at the end of the fiscal year, deflated by number of shares
AGE _{it}	AGE is the number of years the firm has been listed on the Frankfurt stock exchange
AUDITOR _{it}	AUDITOR is a binary variable which equals 1 if the auditor is a Big Four audit firm; 0 otherwise
COMP _{it}	COMP is a binary variable which equals 1 if share-based compensation exists; 0 otherwise
EQUAL _{it}	EQUAL is earnings quality, measured as the absolute value of total accrual divided by cash flow from operations
FNEED _{it}	FNEED is financing need, measured as the ratio of the cash flow for investing activities to cash flow from operations
INT _{it}	INT is internationalization, measured as foreign sales divided by total sales
ISSUE _{it}	ISSUE is a binary variable which equals 1 if the firm raised new equity in the following period; 0 otherwise
LEV _{it}	LEV is leverage, computed as (total assets – book value of equity) divided by total assets
MB _{it}	MB is the market-to-book-ratio of a firm
PROF _{it}	PROF is profitability, measured as return on sales
PROP _{it}	PROP are proprietary costs, measured as a 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 a firm's sales divided by industry sales
SIZE _{it}	SIZE is firm size, measured as the natural logarithm of total assets
VOLA _{it}	VOLA is share volatility, measured as the standard deviation of daily stock returns

Table AI.
List of variables

Corresponding author

Wolfgang Schultze can be contacted at: wolfgang.schultze@wiwi.uni-augsburg.de