Shareholders vs. stakeholders?
Performance-related effects and organizational outcomes of value-based management

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Abstract

This cumulative dissertation empirically analyzes performance-related effects and organizational outcomes of value-based management (VBM), a managerial practice focused on maximizing shareholder value. Even though VBM is widely used, explicit shareholder value orientation has been increasingly criticized while sustainability and stakeholder orientation have become increasingly popular. This dissertation investigates whether prioritizing shareholders remains legitimate in an era of pronounced stakeholder orientation by exploring legitimacy-constituting effects of VBM.

The first paper "Value-based management sophistication, corporate sustainability, and financial performance" investigates the relationship between VBM and Corporate Sustainability Performance (CSP) and their joint financial performance effects. The analysis reveals a positive influence of VBM on CSP. Further, positive joint effects of substantive, i. e., deeply implemented, VBM and CSP on operational and capital market performance are identified. These results indicate potential complementary effects of pursuing both shareholder- and stakeholder-oriented agendas.

The second paper "Management control systems and technological innovation: Empirical evidence on effects and context factors of value-based management and patent outputs" explores the association between VBM and technological innovation (TI). Analyzing effects on patent outputs as a proxy for TI, no significant direct impact of VBM is observed. However, positive moderating effects of people centricity and the share of long-term-oriented institutional investors are identified. These findings further support the compatibility of shareholder and stakeholder orientation and suggest varying mechanisms of VBM at operational and management levels.

The third paper "Aligning shareholder value creation with payouts: The impact of value-based management sophistication levels on payout policies" analyzes effects of VBM on dividends and share repurchases. Focusing on deeply implemented VBM systems reveals positive effects of high VBM levels on the likelihood of both payout types. Further, VBM is associated with higher share repurchase ratios but lower dividend ratios if promising investment opportunities exist. The results suggest more strategic payout policies of VBM users to align continuous shareholder value creation with its subsequent distribution and illustrate the importance of deep VBM implementation.

This dissertation supports the ongoing legitimacy of an explicit shareholder orientation by demonstrating beneficial organizational outcomes of VBM and highlighting the compatibility of shareholder and stakeholder orientation. It further extends VBM research and quantifies the previously qualitative debate on the shareholder orientation controversy.

Contents

(1)

Central theme of the cumulative dissertation

1 Introduction

The initial popularity of value-based management (VBM) was strongly tied to the market conditions in the United States (U.S.) during the late 1980s (Stiefl and Westerholt 2008). Dozens of takeovers were the result of so-called value gaps – the differences in market values under current versus efficient strategies. In this time, Alfred Rappaport (1986) released his seminal work "Creating shareholder value: The new standard for business performance" and proposed a management concept that is focused on shareholder value as the foundation for all management decisions and that appeared helpful in order to close these value gaps. By using value-based metrics to capture shareholder value creation through a comparison of returns with the cost of capital, this concept promised value generation and reduced information asymmetries between managers and shareholders. In the subsequent years, this concept became increasingly popular (e. g., Wallace 1997; Lovata and Costigan 2002; Malmi and Ikäheimo 2003). Its ultimate purpose – to facilitate shareholder value creation – remained unchanged ever since.

Despite its rapidly growing relevance, the anticipation of VBM's positive effects was initially based on its underlying principles and less sophisticated studies – often with univariate test results (Ittner and Larcker 2001). While consulting firms quickly reported positive project outcomes, it took several decades until scientific cross-sectional studies substantiated many of these claims. Today, VBM research is quite clear about several positive effects, such as improved operational performance (e. g., Firk et al. 2016; Ryan and Trahan 2007; Wallace 1997) as well as reduced information asymmetries and cost of capital (Schultze et al. 2018). However, empirical evidence on positive capital market effects remains mixed. Given the overall positive performance findings, rational value-oriented shareholders will still find a substantial majority of arguments in favor of using VBM. Nonetheless, the 2007/2008 global financial crisis prompted a reevaluation. Excessive

shareholder orientation was often perceived as a major cause of the global financial collapse (Carberry and Zajac 2021). Consequently, the concept's popularity declined and prompted a statement by 200 leading U.S. firms to refrain from the shareholder value concept (Business Roundtable 2019). This development resulted in another intensification of the debate on the compatibility of shareholder and stakeholder orientation. Previously, the controversial Friedman doctrine (Friedman 1970) declared profit orientation as the only social responsibility of a business while Freeman's (2010) contrasting stakeholder theory suggested to address the needs of all stakeholders. Despite these diverging arguments the academic discourse led to a consensus on the compatibility of both approaches. Famously, Jensen's (2010) enlightened stakeholder theory concludes that long-term shareholder value can only be maximized by considering the interests of all stakeholders. However, in practice, it remained unclear whether the combination of both approaches is a realistic strategy that ultimately leads to desirable outcomes. In times of an increasing focus on environmental, social and governance (ESG) aspects, which emphasize the consideration of all stakeholders, the question becomes even more pertinent: Is an explicit shareholder orientation a reasonable and legitimate strategy for both shareholders and all further stakeholders?

The research projects presented in this cumulative dissertation build on this overarching question. By identifying specific gaps in VBM research, collecting the required data and conducting empirical analyses, conclusions about several effects of VBM are derived. Altogether, they contribute to an objective empirical examination of VBM's expected organizational outcomes, which are the basis for the legitimacy of the shareholder value concept. Additionally, the studies also analyze the joint pursue of shareholder and stakeholder orientation from different angles and provide an indication on potential positive performance effects. On this note, the first presented paper directly investigates the association between shareholder and stakeholder orientation through the

analysis of VBM and corporate sustainability performance (CSP) as well as their joint effects on operational and capital market performance. The second paper examines the influence of VBM on technological innovation (TI) measured via patent outputs. While TI holds substantial importance for the long-term ambitions of shareholders and stakeholders, the study also investigates relevant moderating factors such as companies' people centricity (PEOPCENT) as another element of stakeholder orientation. The third paper analyzes VBM's influence on payout policy, a crucial but not yet explored instrument of shareholder value distribution. By differentiating between dividends and share repurchases, this study addresses a primary shareholder concern and extends the research on the effects of VBM.

The introducing chapter presents the relevant concepts of this dissertation and situates the respective research within the broader theoretical and practical context. The remainder is structured as follows. Section 2 provides the theoretical background by introducing the VBM concept as well as the overarching debate on shareholder and stakeholder orientation. Section 3 summarizes prior research on VBM-induced organizational outcomes and the shareholder orientation controversy. Situated within these research streams, section 4 presents the course of the dissertation and depicts the interconnections between the three projects. Section 5 summarizes theoretical and practical contributions and provides an outlook on potential future research resulting from this dissertation.

2 Theoretical background

The VBM concept

This dissertation builds on and extends existing research on organizational outcomes of VBM and the fundamental debate on the compatibility of shareholder and stakeholder orientation. Before

presenting the theoretical background and prior study results on these specific topics, this section provides an introduction to the VBM concept.

VBM describes a management concept that was shaped by the U.S. scholars Alfred Rappaport and William Fruhan in the 1980s. Based on Rappaport's (1986) "Creating shareholder value: The new standard for business performance", the approach of systematically monitoring and pursuing shareholder value creation was further specified by Copeland, Koller and Murrin (1990) and Stewart (1991). At its core, they outline a concept that aligns business processes and practices with the abstract goal of shareholder value creation (Rappaport 1998). By using value-based metrics that incorporate the cost of capital and associated value drivers, this goal can be quantified. Ideally, it should serve as a basis for decision-making and even influence organizational mindsets as a whole (Burkert and Lueg 2013). Due to this holistic approach, VBM is often referred to as VBM systems, emphasizing the interplay of various components for monitoring and evaluating business decisions (Brück et al. 2017; Rapp et al. 2011; Schultze et al. 2018).

Beyond the primary goal of maximizing shareholder value, the practical intentions behind the use of VBM can vary. While increasing shareholder value does benefit the owners' investment ambitions, reducing value gaps can protect companies against hostile takeovers (Schultze et al. 2018; Copeland et al. 2000). Another central objective is associated with the principal-agent theory, which describes relationships with an agent (e. g., management) acting on behalf of a principal (e. g., shareholders) with decision-making authority (Jensen and Meckling 1976). Divergent interests and information asymmetries can lead to agency problems if the agent prioritizes personal gain over the principal's interests. Accordingly, managers may not use their informational advantage in the best interests of non-managing shareholders. Various theories explain the causes of such agency problems. The empire building hypothesis suggests that managers might be primarily interested in

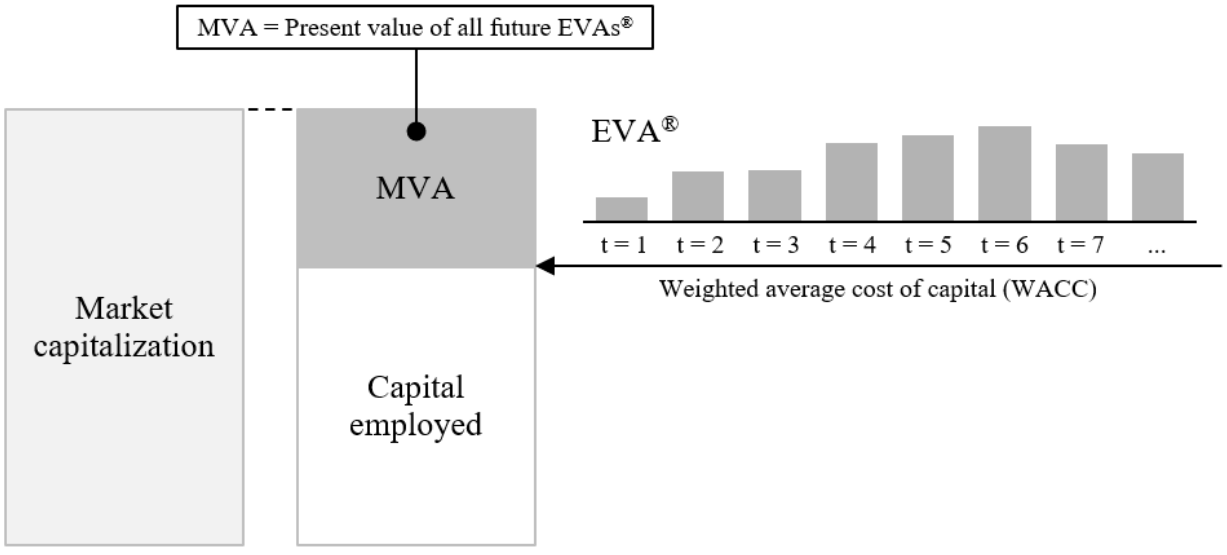
expanding the company to increase personal income, prestige and influence, regardless of the impact on shareholder value (Mueller 1969). In the context of mergers and acquisitions (M&A), the entrenchment hypothesis suggests that acquisitions may not always aim to increase firm value but rather to improve managers' personal positions within the company (Shleifer and Vishny 1989). Further, the managerial hubris describes the problem of overconfident decision-making, which can also lead to detrimental outcomes for shareholders (Roll 1986). VBM can mitigate such agency problems by increasing transparency through the disclosure of value-based metrics, facilitating monitoring of managers and motivating them to act in shareholders' best interests (Knauer et al. 2018). Furthermore, value reporting can reduce information asymmetries. This can facilitate the acquisition of risk capital, incentivize the optimization of capital use and, eventually, reduce the cost of capital (Schultze et al. 2018). Generally, the use of value-based metrics aims to improve decision-making in line with the shareholder value principle. Such advantageous effects incentivize VBM adoption or symbolic adoption – which describes the approach of proclaiming to focus on shareholder value creation without implementing VBM metrics (Firk et al. 2019b). Either way, committing to the shareholder maxim and/or reporting value-based metrics sends a signal to the capital market and various stakeholders, influencing the company's image and expectations.

Value-based metrics

VBM systems rely on the use of value-based metrics, which quantify shareholder value creation resulting from managerial decision-making. Depending on their calculation basis, value-based metrics are often classified as either cash-flow-based or earnings-based (e. g., Becker 2000). Their fundamental idea stems from limitations of traditional metrics and the discounted cashflow (DCF) method and is subsequently illustrated based on the Economic Value Added (EVA®) as potentially most well-known value-based metric.

Traditional accounting metrics are associated with several shortcomings (Rappaport 1998; Stiefl and Westerholt 2008): *First*, traditional metrics are prone to manipulations based on flexible accounting and valuation standards. *Second*, common periodization approaches can lead to resource misallocation and incentivize over- or underinvesting. *Third*, traditional accounting metrics only reflect past performance. *Fourth*, they often inadequately represent company-specific risk and associated opportunity costs for investors. However, calculating future cash flows using the DCF model should explain the shareholder value-constituting market capitalization if perfect capital markets are assumed (Modigliani and Miller 1958, 1961). While DCF values can fully reflect decision consequences, they also have shortcomings (Coenenberg et al. 2016): *First*, also the DCF method is prone to manipulations due to significant discretion in forecasting future cashflows. *Second*, not all influencing factors can be controlled by the management, given the strong future orientation (Faupel et al. 2010). *Third*, the reliance on internal accounting data raises concerns about transparency and communicability. *Fourth*, cashflow projections require significance resources.

FIGURE 1: Association between market capitalization, MVA and EVA®



Sources: Own illustration based on Crasselt et al. (2000).

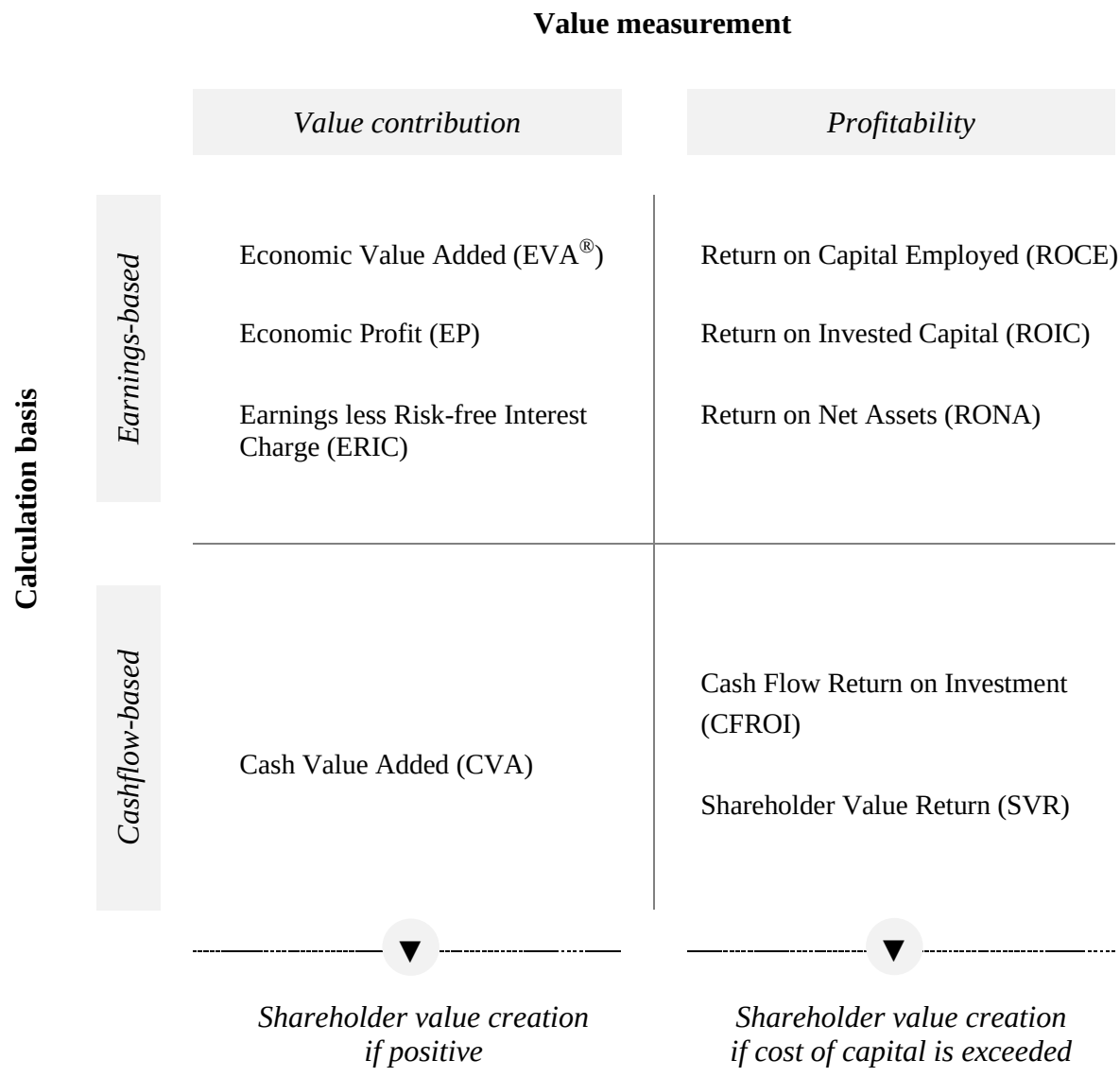
Building on these weaknesses, value-based metrics such as the EVA® bridge the gap between traditional accounting metrics and investor return expectations (Rapp et al. 2011). In the case of the EVA® this is achieved by typically calculating shareholder value changes based on the net operating profit after taxes (NOPAT) less a capital charge, which describes the product of the cost of capital and the capital employed. Based on this so-called capital charge formula, the residual income, i. e., the portion of income exceeding the cost of capital, of a period is calculated.

By using such straightforward calculation logics, these metrics provide a viable solution for the difficulties of the DCF model to explain the current market capitalization (Becker 2000; Fischer et al. 2015; Stern et al. 2001). As illustrated in Figure 1, calculating the present value of all future EVAs® results in the Market Value Added (MVA). By considering MVA and capital employed, the current market capitalization can finally be reconciled (Fischer et al. 2015). In this way, considering the EVA® and further value-based metrics can contribute to a shareholder value-oriented management by providing decision support, facilitating performance monitoring, easing internal and external communication and influencing behavior through incentive systems (Ryan and Trahan 1999). They focus on the value contribution of all actions and decisions, holding managers accountable for non-value-adding business areas and reducing potential conflicts of interest between management and shareholders (Knauer et al. 2018).

Value-based metrics can be systematized in various ways. Intuitively, they can be classified based on the two dimensions *calculation basis* (i. e., earnings-based vs. cashflow-based) and *value measurement* (i. e., value contribution/absolute metrics vs. profitability/relative metrics) (e. g., Langguth 2008). Figure 2 provides an overview of popular value-based metrics based on this classification. The EVA® is based on period earnings and reflects the absolute value contribution, while the Cash Value Added (CVA) presents its counterpart based on cashflows. Widely used relative

value-based metrics include the Return on Capital Employed (ROCE) – compared to company-specific cost of capital – and, among cashflow-based relative value-based metrics, the Shareholder Value Return (SVR).

FIGURE 2: Classification of value-based metrics



Sources: Own illustration based on Langguth (2008).

Despite several advantages, value-based metrics are not free from criticism. Concerning residual income metrics, the so-called conversions, i. e., the adjustments from accounting figures to

the economic model, are particularly debatable (Horster and Knauer 2012). While these conversions allow for realistic and appropriate adjustments, they also reduce transparency and entail significant time and cost efforts (Lovata and Costigan 2002; Firk et al. 2019b). Further, forward-looking estimations of value-based metrics bear the same manipulation risk as the DCF method (Coenenberg et al. 2016). Lastly, relative value-based metrics, value spreads, are only partially suitable for management purposes, as they inadequately reflect value creation opportunities due to the lack of a capital base.

VBM sophistication

The empirical analysis of determinants and effects of VBM requires the operationalization of this management practice. With value-based metrics as the foundation of VBM, prior research mostly relied on a binary classification of VBM users, depending on the use of such metrics (Firk et al. 2019b). Accordingly, empirical VBM research classified firms into the two distinct groups "VBM adopters" or "VBM non-adopters". As case-based studies clearly demonstrated that this allocation does not reflect the variation of VBM systems in practice (e. g., Lueg and Schäffer 2010; Malmi and Ikäheimo 2003; Claes 2006), several approaches have been proposed to capture the use of VBM more holistically. Accordingly, Malmi and Ikäheimo (2003) and Burkert and Lueg (2013) proposed six-dimensional frameworks for a differentiated assessment of VBM usage. Since these were designed for assessments through interviews and document analyses, respectively questionnaires, both approaches were limited in their applicability for the empirical analysis of larger datasets.

A framework by Firk et al. (2019b) filled this gap as it allows to determine the so-called VBM sophistication based on an analysis of annual reports and enables the assessment of larger samples. The five equally weighted and binary scored VBM elements capture the commitment to

the overall objective of value creation (*value orientation*), the use of value-based metrics (*value-based metric adoption)*, the associated target setting based on value-based metrics (*target setting*), linking compensation to value-based metrics (*compensation linking*) and the operational integration of value-based metrics into lower levels of the organization (*operational integration*). Accordingly, VBM sophistication ranges from zero to five, with higher values indicating more implemented VBM elements. Due to its straightforward logic and the possibility to evaluate larger numbers of firm-years, this framework is the chosen basis for the empirical analysis of VBM effects in the projects of this dissertation. Section 4 will detail the compilation of the VBM dataset based on this framework.

Shareholder and stakeholder orientation

Beyond addressing research gaps regarding the effects and organizational outcomes of VBM, the projects of this dissertation also explicitly examine the benefits for shareholders and stakeholders. For example, they investigate whether shareholder orientation, which is directly associated with VBM, is compatible with stakeholder orientation, as proxied by CSP (chapter 3) or PEOPCENT (chapter 4) – and how these orientations impact various performance parameters.

This discussion has a stellar theoretical relevance considering the strategic alignment debate triggered by Milton Friedman's (1970) shareholder maxim and its contrast with stakeholder theory (Freeman 2010). While Friedman's advocacy for profit orientation as the social responsibility of a business explicitly favors shareholders, Freeman's stakeholder theory does not necessarily prioritize the interests of shareholders over other groups associated with the company, such as employees, customers, suppliers, creditors, public interest groups or governmental entities. Accordingly, the interests of all stakeholders must be considered for long-term success. Despite this diverging beliefs, theoretical discussions outlined ways to reconcile both approaches. Michael Jensen's

(2010) enlightened stakeholder theory posits that maximizing total long-term market value, the stellar shareholder interest, is only achievable if the interests of all stakeholder groups are addressed. Thus, both perspectives could be compatible.

In practice, shareholder orientation's popularity declined significantly after the 2008/2009 financial crisis, as excessive profit focus, often equated with the shareholder value idea, was considered as a primary cause of the global economic collapse (Carberry and Zajac 2021). At the same time, public awareness for companies' sustainability efforts increased continuously. Focusing on ESG aspects, as described in the Triple Bottom Line (Elkington 1994), further reinforced the shift towards stakeholder orientation. The associated decreased popularity of shareholder orientation also led to a decline in VBM usage, as shown in the analyses of this dissertation (e. g., chapter 3). This development culminated in a public letter from U.S. business leaders, officially rejecting shareholder orientation as a guiding principle (Business Roundtable 2019).

But once again, another shift of thinking can be observed in theory and practice. A recently emerged stream of research explicitly examines the primacy of shareholder- versus stakeholder-oriented management approaches (e. g., DesJardine et al. 2023; Inkpen and Sundaram 2022; Goranova and Ryan 2022). Many of these studies demonstrate that even traditionally profit-oriented stakeholders, such as institutional investors, often pursue long-term- and stakeholder-oriented agendas recently (Inkpen and Sundaram 2022). Practically, also the prevalence of VBM has stabilized. In 2020, 25% of the 200 largest non-financial firms in the STOXX Europe 600 still reported a value-based metric in their annual reports (chapter 3). This share underscores the continued relevance of the shareholder value concept in practice.

Despite the significance of both concepts, empirical evidence on their association and joint effects is scarce. Previous research on aspects such as the interaction between corporate governance

and CSP indicates positive performance effects (e. g., Cai et al. 2012; Jo and Harjoto 2012; Ntim and Soobaroyen 2013). However, difficulties in measuring shareholder orientation apparently impede supporting empirical analyses. The extended VBM dataset used in this dissertation allows to address this gap and advance both VBM research and the general understanding of the compatibility and joint effects of shareholder and stakeholder orientation.

3 Prior research

The projects of this dissertation extend empirical research on VBM effects that eventually determine the management concept's legitimacy. Primarily, VBM was introduced to maximize shareholder value. Accordingly, achieving this goal, or at least generating performance effects conducive to this goal, is essential. Beyond these (financial) performance effects, the growing sustainability focus requires that VBM does not conflict with the ESG principles, but ideally even aligns with them. The studies in this dissertation are situated within this thematic area. To understand how existing research is incorporated and gaps are addressed, the current state of (empirical) research is briefly summarized. Following an overview of previously identified organizational outcomes of VBM, this section will then explore the less extensive empirical research on the interaction between shareholder and stakeholder orientation, respectively ESG-related aspects.

Research on organizational outcomes of VBM

VBM research is frequently divided into two streams (Firk et al. 2019b; Knauer et al. 2018; Lueg and Schäffer 2010). One stream examines the determinants or antecedents of VBM adoption (e. g., Nowotny et al. 2022; Brück et al. 2023; Fiss and Zajac 2004; Lovata and Costigan 2002), while the other analyzes performance effects (e. g., Firk et al. 2016; Ryan and Trahan 2007; Rapp et al. 2011; Wallace 1997; Knauer et al. 2018; Firk et al. 2021). Given the focus on effects and

organizational outcomes in this dissertation, this study review limits on the second stream. Figure 3 proposes a structural overview of prior VBM research in this stream and provides exemplary studies for each cluster. Fundamentally, this stream can be further subdivided into research that investigates direct (financial) performance-related effects or further organizational effects, mostly indirectly associated with performance. Before summarizing the findings of the various clusters, it should be noted that this categorization simplifies prior research, as many studies also examine numerous contingency factors and are more complex. However, this section will focus on the relevant results for the projects of this dissertation.

Initial studies in the 1990's, often conducted by consulting firms, concluded that VBM positively influences financial performance. In the following years, numerous academic studies generally supported this positive view. Nonetheless, the results vary depending on the type of performance measurement. While most studies investigating the impact of VBM on operational/accounting-based (e. g., Firk et al. 2016; Ryan and Trahan 2007; Balachandran 2006) or self-rated performance (e. g., Ittner et al. 2003; Riceman et al. 2002) find significant positive associations, the results concerning the impact on capital market performance, directly gauging shareholder value, are more mixed. Arguably, most non-positive results (e. g., Ittner et al. 2003; Wallace 1997; Biddle et al. 1997) stem from earlier studies with – as compared with today's VBM research standards – conceptual limitations such as binary measurement of VBM adoption and/or lacking consideration of potential endogeneity issues. More recent VBM studies tend towards positive impact findings (Rapp et al. 2011; Knauer et al. 2018; Firk et al. 2021; Firk et al. 2019a; Duh et al. 2009; Eugster and Wagner 2020). Besides this overarching performance-related evidence, several studies identified moderators that influence the relationship between VBM and performance. For example, prior research identified the level of agency conflicts, industry competition and equity availability (Firk

et al. 2019a) as well as the dispersion of portfolio risks and managerial decision-making interests (Firk et al. 2021) as important moderators for the influence on capital market performance. Regarding operational performance, for example the share of financially oriented owners and national shareholder orientation have proven to be relevant contingency factors (Firk et al. 2016).

In addition to studies examining the impact of VBM on traditional performance measures, analyses of further organizational outcomes also demonstrate potential roles of VBM systems and how they indirectly affect financial performance. For instance, increased sensitivity for capital costs (Woods et al. 2012) and their reduction as well as decreased information asymmetries (Schultze et al. 2018) are important prerequisites for long-term shareholder value creation. Further observed organizational effects of VBM include decreased credit risk through rating upgrades (Schölzel and Sommer 2024), lower levels of accrual-based earnings management (Hörner and Sommer 2023), improved capital allocations with lower working capital (Mavropulo et al. 2021) as well as changes in performance evaluation (Du et al. 2018) and management compensation (Shin and You 2017). Beyond these studies, various organizational outcomes of VBM remain unexplored.

Research on the association between shareholder and stakeholder orientation

Besides prior evidence on the organizational outcomes of VBM, the projects in this dissertation are particularly associated with research on the impacts of and compatibility between shareholder and stakeholder orientation. As discussed in section 2, previous contributions are primarily based on a qualitative debate regarding fundamental viewpoints as represented in shareholder and stakeholder theory. Empirical examinations of these relationships are restricted by the complexity of measuring organizational orientations. While there are various approaches of quantifying sustainability efforts concerning the ESG pillars, particularly shareholder orientation is difficult to capture. Although available data on the degree of VBM within a company might address this issue,

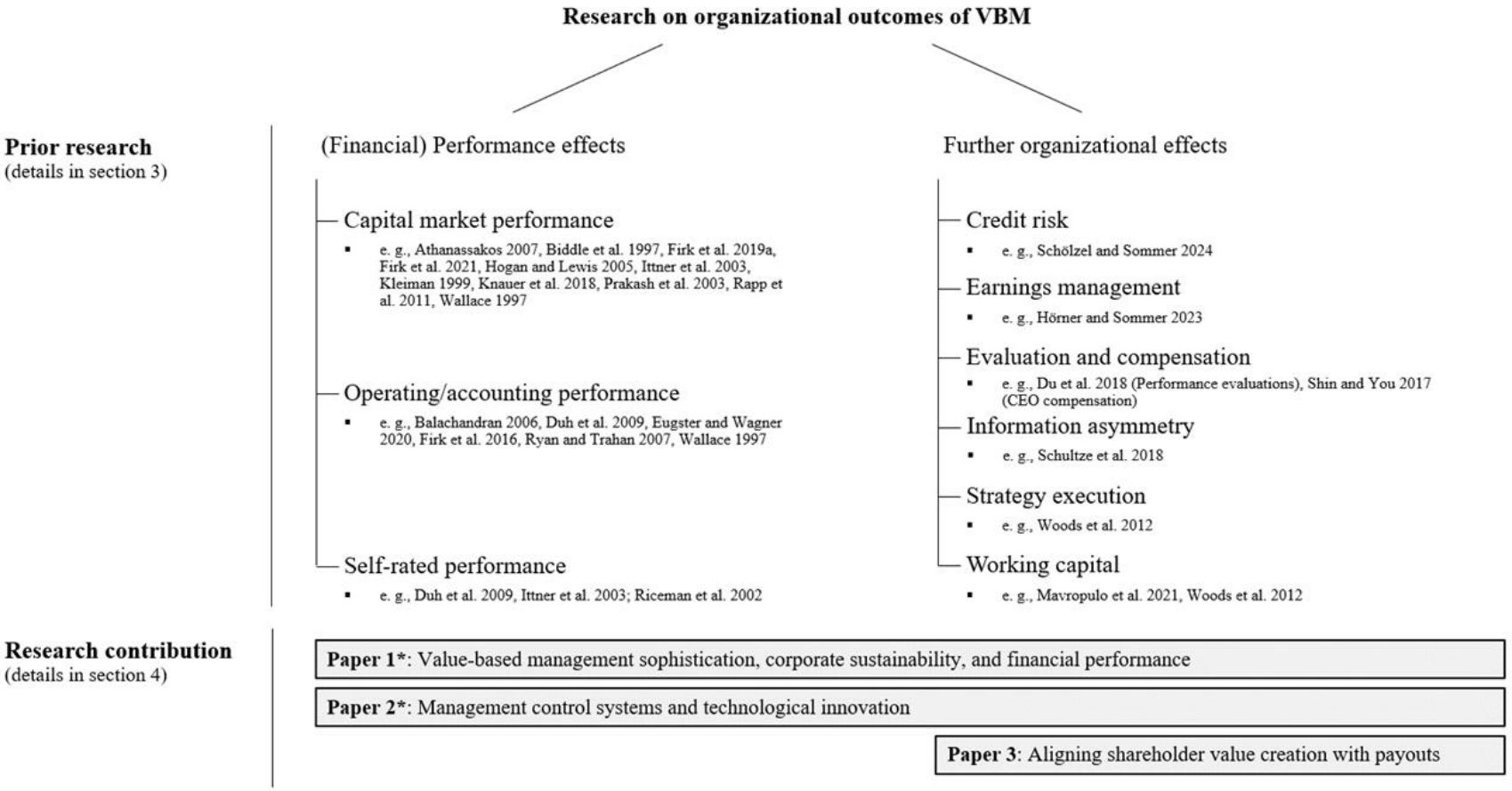
it has not been used to investigate the relationship between these approaches yet. However, further research streams beyond VBM studies offer results that are relevant to this dissertation.

Most specifically, the increased ESG awareness resulted in numerous papers discussing how shareholders influence stakeholders' interests (e. g., DesJardine et al. 2023; Goranova and Ryan 2022; Inkpen and Sundaram 2022). Previous research indicates that even shareholders, who are motivated by financial objectives, are often interested in long-term social returns (DesJardine et al. 2023). This contradicts prior images of purely profit-focused groups (Sundaram and Inkpen 2004). In line with enlightened stakeholder theory, empirical evidence indicates that particularly the long-term orientation bridges the two interests and regularly even leads to increased CSR efforts and improved outcomes (e. g., DesJardine et al. 2023; Velte 2023; Neubaum and Zahra 2006; Chen et al. 2020; Azar et al. 2021). Also relevant for the shareholder versus stakeholder debate are studies examining the relationship between good corporate governance and CSP levels. Assuming that shareholder orientation in the form of VBM, and for instance subsequently reduced information asymmetries, is associated with good corporate governance, previous evidence indicates at least the possibility of a successful coexistence of both approaches. Accordingly, several empirical studies demonstrate positive joint financial performance effects of good corporate governance and CSP (Ntim and Soobaroyen 2013; Cai et al. 2012; Jo and Harjoto 2012).

Lastly, there is a substantial body of empirical evidence indicating that certain aspects of stakeholder orientation yield positive effects for financially oriented shareholders. Successful stakeholder orientation, for example measured through ESG ratings, can offer various economic advantages in the long-term. Although empirical findings on the overarching effects on capital market performance are mixed (e. g., Brammer and Millington 2008; Clacher and Hagendorff 2012; Surroca et al. 2010), there is broad consensus on the positive impact on operational performance

(e. g., Barnett and Salomon 2012; Tang et al. 2012; Wu and Shen 2013). Also on a more granular level, prior research highlights desirable mechanisms of CSP for shareholders, such as an improved customer reputation (Bhattacharya et al. 2009; Lev et al. 2010) or greater attractiveness to employees (Greening and Turban 2000; Porter and Kramer 2006) and investors (Dhaliwal et al. 2011; Ioannou and Serafeim 2015). Also in line with a pronounced shareholder orientation are empirical findings that CSP can reduce (perceived) firm risks (El Ghoul et al. 2011; Goss and Roberts 2011; Sassen et al. 2016), lower the cost of equity capital (Dhaliwal et al. 2011) and information asymmetries (Diebecker and Sommer 2017) and improve financing opportunities (Cheng et al. 2014; Raimo et al. 2021).

FIGURE 3: Categorization of empirical research on organizational outcomes of VBM



* Both dependent variables CSP (Paper 1) and TI (Paper 2) are no traditional financial performance measures – hence, contributions of Paper 1 and 2 are attributable to both research streams.

4 Approach and course of the dissertation

Context

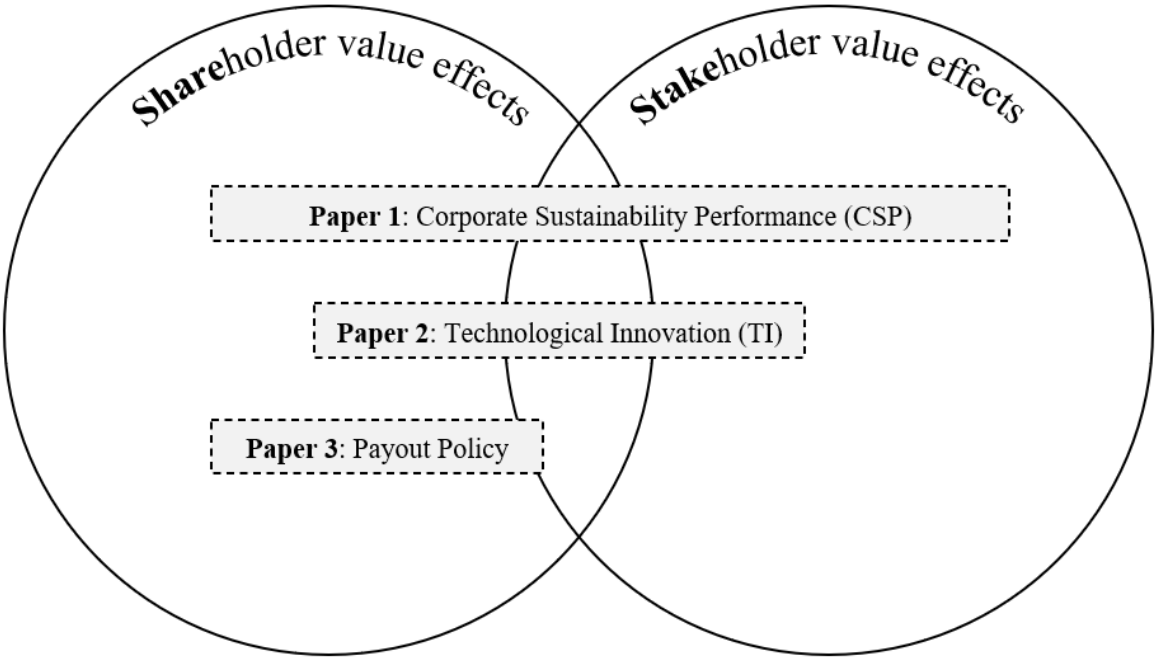
The central objective of this dissertation is to examine legitimacy-constituting effects of shareholder orientation as expressed by the use of VBM. This implies that all analyses aim to determine whether it remains reasonable to focus on shareholders first amidst growing sustainability efforts and an increased attention on the interests of all stakeholders. This question is addressed by investigating research gaps in two partially overlapping fields. The first research area concerns the organizational outcomes of VBM as depicted in Figure 3. Hence, the first concrete sub-objective is to uncover additional effects, respectively organizational outcomes, of VBM. Further, the identification of contingency factors should provide evidence upon the efficient implementation of VBM. The second research area addresses the largely qualitative debate on the compatibility of shareholder and stakeholder orientation. Accordingly, the second sub-objective is to empirically investigate the interrelation between these orientations. This interplay is analyzed in various ways, including the examination of the mutual association, key influencing factors and (joint) effects. While the three research projects explore numerous detailed themes, they all relate to these overarching questions.

Theme selection

The initial step of this dissertation involved selecting VBM as the overarching research theme and identifying respective research gaps. Underlying rationale of this step was to expand prior research on the organizational outcomes of VBM and to explore the interplay between shareholder and stakeholder orientation. On this basis, this dissertation seeks to determine whether primarily focusing on shareholders remains an adequate orientation in the present context. The research

subjects examined in the three projects are closely related to shareholder and/or stakeholder orientation. This categorization is illustrated in Figure 4 and further detailed in the subsequent project descriptions. The first target construct, CSP, not yet analyzed in association with VBM, is directly connected to both shareholder and stakeholder orientation. Investigating the impact on TI, the second identified VBM research gap, is also relevant for both groups due to its importance for companies' long-term development, although the linkage to financial performance suggests a particular significance for shareholders. However, examining PEOPCENT as an essential moderator of this association introduces another element of stakeholder orientation. In contrast, the third analyzed research gap, the influence of VBM on payout policy, is a crucial, but not yet explored element of shareholder orientation. Besides stock price gains, payouts represent the key aspect of materialized value creation for shareholders.

FIGURE 4: Allocation of research projects



Data collection

To analyze the mentioned interrelations, extensive data collection was necessary. This preliminary work represents a central component of the dissertation due to the scope and rarity of the assembled datasets. Firstly, the VBM dataset lays the foundation for all three projects. Initiated through a collective effort of the Chairs of Management Accounting and Control at the universities of Bayreuth, Bochum and Münster, this dataset was significantly reviewed, partially re-collected and expanded for the projects in this dissertation. The dataset includes an assessment of the five VBM elements and, consequently, VBM sophistication (section 2) based on a manual annual report analysis. The original dataset contained VBM data for the 200 largest non-financial firms of the STOXX Europe 600 for the period from 2005 to 2014. To avoid survivorship bias, the sample composition was uniquely captured by firm size at the end of 2005 and not adjusted in case of liquidation or delisting. Following a preliminary analysis, 51 companies had to be replaced in the sample and have been re-collected due to different size definitions for the projects in this dissertation. The dataset was then extended to 2020 to allow for a more insightful analysis of current topics, such as the growing ESG awareness. This update was coordinated by the author and involved six student assistants from the universities of Bayreuth and Bochum. The author was further involved in all process steps including data collection, coordination as well as the final aggregation and verification of the dataset.

While the availability of numerous financial and operational data from LSEG (formerly Refinitiv) Eikon enabled the analysis of most selected constructs, a dedicated dataset was required for analyzing effects on TI. This process, which is only briefly summarized in the introducing chapter of this dissertation, focused on patent data to measure the impact of VBM on innovation output. Patent information, including the number of patents and citations, is available from the PATSTAT

Online database of the European Patent Office (EPO). However, an elaborate process was necessary to derive aggregated measures for the corresponding firm years in the VBM dataset due to numerous required information at the patent level and missing unique identifiers to allocate patents to companies. This process involved two research assistants from the chair of controlling at the university of Bayreuth, who assisted in identifying and cleaning patent allocations. Based on this procedure, an aggregated dataset at the firm year level was consolidated. A detailed description of this process is provided in the second paper, presented in chapter 4.

Research projects

Based on the preliminary work, the three projects have been conducted and constitute the main part of this dissertation. The first paper, co-authored by Niklas Kister, Thorsten Knauer and Friedrich Sommer, examines the interplay between VBM and CSP, an indicator of stakeholder orientation. In addition to exploring their mutual association, the paper also investigates the joint impact on operational and capital market performance. As hypothesized, there is a significant positive influence of VBM sophistication on CSP and significant positive joint effects of substantive, i. e., deeply implemented VBM and CSP on financial performance. The argumentation for a positive influence of VBM on CSP is primarily based on improved trend identification and initiative implementation through VBM, ultimately leading to enhanced CSP. The positive joint performance effects are expected to arise from the individual positive effects of VBM and CSP, which are amplified by their mutual existence. Related to operational performance, companies with substantive VBM should systematically prioritize value-enhancing sustainability programs – which is particularly promising in case of high CSPs. Regarding capital market performance, explicit shareholder orientation through VBM should help mitigating skepticism about the financial impact of CSR

initiatives. Additionally, better CSP can contribute to avoiding reputational risks of an extensive shareholder focus, ultimately reflecting in higher valuations.

By focusing on CSP, this project investigates another not yet explored outcome of VBM. Additionally, it extends prior research on financial performance effects by proposing another crucial moderating factor for a successful use of VBM. Further, it directly addresses the debate on the compatibility of shareholder and stakeholder orientation and provides explicit evidence for a potential co-existence in line with enlightened stakeholder theory.

The second paper, co-authored by Ivo Schedlinsky and Friedrich Sommer, analyzes another not yet explored VBM outcome with a close link to performance: TI. Focusing on patent outputs, or more precisely the citation impact as a quantity- and quality-reflecting metric, the direct effect of VBM as well as its joint effect with PEOPCENT and the share of long-term institutional investors (LTINV) as moderators are investigated. While the results do not indicate a statistically significant effect for the base relationship, the hypothesized moderating effects become evident. Accordingly, PEOPCENT can stimulate creativity and foster innovative efforts at the operational level but also bears the risk of untargeted efforts. VBM seems to address this issue by facilitating the prioritization of value-enhancing initiatives as well as their structured implementation and commercialization. At the management level, LTINV can back TI initiatives, even if they restrict interim results. Reducing information asymmetries and ensuring goal alignment through VBM appears to facilitate such support, ultimately leading to improved TI output.

The investigation of VBM's impact on TI addresses a relevant research gap of prior VBM literature, with implications for long-term performance. Additionally, important conclusions can be derived for both shareholders and stakeholders. The positive long-term effects of TI can

influence market values for shareholders, but also ensure stability to various stakeholders such as employees, suppliers and customers.

The third paper, co-authored by Niklas Kister, Thorsten Knauer and Friedrich Sommer, examines the effect of VBM on payout policy in the form of dividends and repurchases as important instruments of shareholder value distribution. By focusing on deeply implemented VBM systems, the results indicate that VBM leads to a higher likelihood for both dividends and repurchases. However, while higher VBM levels are also associated with higher repurchase ratios, the corresponding dividend ratios are lower if promising investment opportunities exist. These results indicate that a shareholder value-oriented view leads to a more strategic use of payouts to align continuous shareholder value creation with its distribution. Further, the study underpins the relevance of deeply implemented VBM systems in order to achieve measurable shareholder-focused effects.

The analysis of VBM and payout policies addresses another gap in the VBM effects literature and illustrates mechanisms of VBM impacting internal decision-making. The findings have direct implications for shareholders. For further groups, the study improves the understanding of resource allocation practices of VBM users, which indirectly affect all stakeholders.

Key contributions

Through the described analyses and their corresponding results, all presented papers contribute to the initially defined research objectives. In summary, three key contributions of the dissertation can be derived: *First*, three VBM research gaps are addressed. Accordingly, the state of prior research on VBM's organizational outcomes, as illustrated in Figure 3, is expanded by analyses of the effects of VBM on CSP, TI and payout policy. Furthermore, the research on the impact of VBM on financial performance is enriched by considering joint (positive) effects of VBM and CSP. *Second*, this dissertation provides a quantitative examination of the previously predominantly

qualitative debate on the compatibility of shareholder and stakeholder orientation. As depicted in Figure 4, all three papers are closely connected to the effects of shareholder and/or stakeholder orientation on shareholders and/or stakeholders. Given the increasing importance of CSR and stakeholder orientation in recent decades as well as the rising criticism of shareholder orientation, the findings in favor of the compatibility of both approaches hold significant contemporary and practical relevance. *Third*, the contribution of the generated data pool itself must be highlighted. The extensive consolidation of the two datasets on VBM sophistication and patent outputs provides an exceptional data foundation. These rare data are the basis for the investigation of the discussed research gaps in this dissertation. Moreover, these datasets can serve as a starting point for future research projects and the evaluation of further unexplored relationships.

5 Conclusion and outlook

This dissertation is based on three papers that investigate performance-related effects and organizational outcomes of VBM. Concurrently, they examine the impacts of a pronounced shareholder orientation on shareholders and/or stakeholders and identify relevant contingency factors. Further, they all provide answers to the overarching question of the dissertation, whether a pronounced shareholder orientation remains legitimate amidst growing criticism.

The results of the three research papers support the continued legitimacy of shareholder orientation as expressed by the use of VBM. This conclusion is based on two main arguments. *First*, several positive organizational outcomes are identified across this dissertation. Shareholder orientation in the form of VBM can lead, in particular under the right circumstances, to improved CSP, financial performance, patent outputs as well as a shareholder value-oriented payout policy. *Second*, the findings of two papers suggest that shareholder orientation is compatible with elements of stakeholder orientation. Even complementary effects are suggested. Accordingly, the first paper

indicates a positive joint effect of VBM and CSP on operational and capital market performance, while the second paper identifies improved patent outputs when VBM is combined with PEOPCENT.

The findings of this dissertation offer numerous avenues for further research. Beyond the specific aspects discussed in the papers, three overarching directions can be identified: *First*, addressing shareholder orientation's legitimacy, the question arises whether the findings are applicable to geographies beyond Europe. For example, a recent trend reversal can be observed in the U.S., where the necessity of ESG efforts is increasingly questioned and some states even consciously hinder the implementation of ESG measures (e. g., Winston 2023). *Second*, VBM is not fully explored and still has research gaps regarding both, the determinants and the effects of VBM. However, it is the evolvement of VBM which was particularly notable during the compilation and analysis of the dataset based on annual reports. Apparently, the interpretation of certain VBM elements of the framework proposed by Firk et al. (2019b) has changed. For instance, *value orientation* rather appears to be used rather as a public relations instrument in line with external expectations. Therefore, further case studies or survey-based research on the practical application of VBM promise valuable insights. Such research could also explore whether and how VBM users incorporate the valuation of ESG measures in their decision-making processes. *Third*, unexplored intersections of the constructs in this dissertation present fruitful research areas. Specifically, the analysis of TI determinants should be mentioned. For example, the interplay between payout policy and TI offers a controversial topic due to their direct connections to the use of profits and long-term orientations of companies. Finally, an empirical investigation of the influences on the environmental impact of TI would be of current relevance. Analyses could focus on the use of VBM or the involvement of activist institutional investors – and could be based on the patent dataset of this dissertation.

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(2)

Author contribution statements

Study no.	**1**				
Title	**Value-based management sophistication, corporate sustainability, and financial performance**				
Authors*	Niklas Kister, Thorsten Knauer, Friedrich Sommer, Michael Wiegerling				
Author contribution		NK	TK	FS	MW
	Research question/methodology	✓	✓	✓	✓
	Acquisition of data	✓			✓
	Analysis/interpretation of data	✓		✓	✓
	Writing the manuscript	✓	✓	✓	✓
Publication status	Management Accounting Research (PMR RECH: A) *2nd round, revise and resubmit*				
Conferences/ presentations (presenter)	2022	ERMAC – Empirical Research in Management Accounting and Control Annual Conference (MW)			
	2023	ACMAR – Annual Conference for Management Accounting Research (MW)			
	2023	CAAA – Canadian Academic Accounting Association Annual Conference (MW)			
	2023	EAA – European Accounting Association Annual Congress (MW)			
	2023	Brownbag seminar University of Bayreuth (MW)			
Research approach	Archival study				
Abstract	Shareholder and stakeholder orientations are often portrayed as opposites, often rooted in abstract debates and analyses. We challenge this assumption by moving to the implementation level of management concepts and instruments. We hypothesize a positive association between value-based management (VBM) sophistication as an instrument of shareholder orientation and corporate sustainability performance (CSP) as a prominent result of stakeholder orientation. We further predict that deeply ingrained VBM systems and CSP positively interact in their association with financial performance, i. e., accounting and capital market performance. Drawing on a hand-collected VBM dataset with more than 2,500 European firm years from 2005 to 2020, we find support for our predictions. We split the sample into different subperiods and conclude that VBM sophistication can foster trend identification and help implement voluntary initiatives that are beneficial from the accounting performance perspective. Regarding capital market performance,				

	the results imply that both VBM sophistication and high CSP levels entail certain risks that mutually mitigate each other, especially in volatile periods, and their combination is accompanied by higher capital market performance. On the abstract level, we conclude that shareholder and stakeholder orientations can coexist and even be complementary.
Keywords	value-based management, corporate sustainability performance, shareholder value, stakeholder theory, financial performance
JEL	M41; M14; G30

* The authors' names are listed in alphabetical order by surname.

Study no.	**2**			
Title	**Management control systems and technological innovation: Empirical evidence on effects and context factors of value-based management and patent outputs**			
Authors*	Ivo Schedlinsky, Friedrich Sommer, Michael Wiegerling			
Author contribution		IS	FS	MW
	Research question/methodology	✓	✓	✓
	Acquisition of data			✓
	Analysis/interpretation of data	✓	✓	✓
	Writing the manuscript	✓	✓	✓
Publication status	*Working Paper*			
Conferences/ presentations (presenter)	2023	Doctoral colloquium Ruhr-Universität Bochum (MW)		
	2024	Brownbag seminar University of Bayreuth (MW)		
	2024	Doctoral colloquium TU Dortmund (MW)		
Research approach	Archival study			
Abstract	This study analyzes the influence of value-based management (VBM) on technological innovation (TI). TI, the creation of technological products, processes or systems, enables firms to develop competitive advantages and, thus, determines the long-term success of organizations. While VBM is often considered as an instrument for efficiency-driven mature companies with a naturally lower focus on TI, it should, by its focus on value generation, foster TI in the long-term from a conceptual perspective. To answer the question whether VBM actually promotes TI, we collect patent data from the European Patent Office to measure TI and match this data with a VBM dataset from Kister et al. (2024) comprising more than 2,500 European firm years between 2006 and 2020. Our results reveal that VBM can indeed positively influence TI depending on context factors: While we do not find a generally positive effect of VBM on TI, we demonstrate that VBM positively influences TI output depending on the orientation towards employees' needs, i. e., people centricity, and on the shares held by long-term-oriented institutional investors. These results indicate that innovation stimuli triggered by VBM work differently across organizational levels. At the operational level, a strong orientation towards employees' needs might reduce inter-organizational pressure			

	generated through VBM's efficiency-driven controls. Conversely, at the management level, we reason that influential institutional investors with long-term investment horizons have the "long breath" to support managers with long-term TI projects when implemented VBM systems reduce asymmetric information and ensure goal alignment.
Keywords	value-based management, technological innovation, patents, people centricity, institutional shareholders
JEL	M41; O32; M14

* The authors' names are listed in alphabetical order by surname.

Study no.	**3**				
Title	**Aligning shareholder value creation with payouts: The impact of value-based management sophistication levels on payout policies**				
Authors*	Niklas Kister, Thorsten Knauer, Friedrich Sommer, Michael Wiegerling				
Author contribution		NK	TK	FS	MW
	Research question/methodology	✓	✓	✓	✓
	Acquisition of data	✓			✓
	Analysis/interpretation of data	✓	✓	✓	✓
	Writing the manuscript	✓			✓
Publication status	*Working Paper*				
Conferences/ presentations (presenter)	2022	VHB – *Verband der Hochschullehrerinnen und Hochschullehrer für Betriebswirtschaft* Annual Conference (NK)			
	2022	ACMAR – Annual Conference for Management Accounting Research (NK)			
	2023	EAA – European Accounting Association Annual Congress (NK)			
Research approach	Archival study				
Abstract	While value-based management (VBM) prioritizes shareholder value creation, payouts are central means of distributing created value to shareholders. To better understand how shareholder-oriented firms employ payout policies to fulfill shareholder interests, this paper examines the association between the implementation of VBM and payout types. We differentiate between levels of VBM sophistication, to measure the extent of VBM implementation within organizations, and payout types, specifically dividends and share repurchases. Using a sample of 1,365 European firm years, our findings indicate that firms with high levels of VBM sophistication (1) are more likely to pay dividends and repurchase shares, (2) have higher repurchase ratios, and (3) reduce dividend ratios if alternative investment opportunities exist. These results indicate that firms with high VBM levels appreciate the opportunity to actively distribute created value to shareholders. Simultaneously, the analyses suggest a strategic use of payout types. Particularly the identified higher share repurchase ratios and reduced dividend ratios in the presence of				

	alternative investment opportunities suggest a preference of VBM users for the more flexible share repurchases. Further, the analyses demonstrate the importance of differentiating between sophistication levels of VBM.
Keywords	value-based management, shareholder value, payout policy, dividends, share repurchases
JEL	M41; G35

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Value-based management sophistication, corporate sustainability, and financial performance

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Value-based management sophistication, corporate sustainability, and financial performance

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Abstract

Shareholder and stakeholder orientations are often portrayed as opposites, often rooted in abstract debates and analyses. We challenge this assumption by moving to the implementation level of management concepts and instruments. We hypothesize a positive association between value-based management (VBM) sophistication as an instrument of shareholder orientation and corporate sustainability performance (CSP) as a prominent result of stakeholder orientation. We further predict that deeply ingrained VBM systems and CSP positively interact in their association with financial performance, i. e., accounting and capital market performance. Drawing on a hand-collected VBM dataset with more than 2,500 European firm years from 2005 to 2020, we find support for our predictions. We split the sample into different subperiods and conclude that VBM sophistication can foster trend identification and help implement voluntary initiatives that are beneficial from the accounting performance perspective. Regarding capital market performance, the results imply that both VBM sophistication and high CSP levels entail certain risks that mutually mitigate each other, especially in volatile periods, and their combination is accompanied by higher capital market performance. On the abstract level, we conclude that shareholder and stakeholder orientations can coexist and even be complementary.

Keywords: value-based management; corporate sustainability performance; shareholder value; stakeholder theory; financial performance

JEL: M41; M14; G30

"Profits are in no way inconsistent with purpose – in fact, profits and purpose are inextricably linked. […] Companies that fulfill their purpose and responsibilities to stakeholders reap rewards over the long-term. Companies that ignore them stumble and fail."

Larry Fink, Co-Founder, Chairman, and CEO of Blackrock, Inc. (Fink 2019).

1 Introduction

Contrary to Friedman's (1970) provocative argument that the social responsibility of businesses is to increase profits, the stakeholder theory of Freeman (1984) argues that addressing the needs of all stakeholders yields the most desirable results. These fundamental beliefs fueled a controversial academic and public debate over the primacy of shareholder- versus stakeholder-oriented management approaches (Goranova and Ryan 2022; Inkpen and Sundaram 2022).

Typically, a firm's stakeholders consist of various groups. We follow Freeman (2010, p. 25) and define stakeholders as "any group or individual who can affect or is affected by the achievement of the firm's objectives." Beyond customers, employees, suppliers, creditors, public interest groups and governmental bodies, they also encompass shareholders. Thus, shareholders are *investing* stakeholders. The frequent practice of contrasting them to the remaining stakeholders stems from their privileged position that enables them to, for example, make formal demands or directly meet with executives (DesJardine et al. 2022). The discussion on whether to prioritize the interests of shareholders (i. e., shareholder orientation) or stakeholders (i. e., stakeholder orientation) stems from recently opposed trends in public and corporate popularity. In particular, whereas environmental and social awareness represent recent macro trends, openly communicated shareholder orientation has lost its popularity. This development also relates to the global financial crisis, in which profit orientation, often viewed as a synonym for shareholder value orientation, was perceived as one main cause (Carberry and Zajac 2021). This further declining popularity has even resulted in an official letter by 200 of the most powerful U.S. firms that refrained from the idea of shareholder

value (Business Roundtable 2019).[1] However, recent voices from academia and practice suggest that both approaches can be compatible or even complementary. On the academic side, the enlightened stakeholder theory of Jensen (2010) explicitly suggests that the interests of all stakeholders need to be addressed to maximize long-term shareholder value. On the practical side, the initial quote by BlackRock's Larry Fink from his annual letter to CEOs is a prominent example.

Despite the lively qualitative and sometimes abstract debate, prior empirical studies have remained silent on whether concrete management concepts or instruments that are intended to put forward either shareholder orientation or the interests of other stakeholders interact with each other, i. e., whether the instruments torpedo each other, are independent of each other or even reinforce each other. We exemplify value-based management (VBM) sophistication as a management concept that targets shareholder value creation and corporate sustainability performance (CSP), the measurable outcome of corporate social responsibility (CSR) initiatives, as a stakeholder-directed concept.

Thus, we examine whether the degree of VBM sophistication influences a firm's CSP level and whether the combination of these two concepts results in superior financial performance, i. e., accounting performance and capital market performance. Both VBM sophistication and CSP are multifaceted and thus complex at the conceptual and measurement levels. VBM implementation is not a binary decision. Rather, different degrees of sophistication prevail in practice (Burkert and Lueg 2013; Firk et al. 2019b; Malmi and Ikäheimo 2003; Nowotny et al. 2022; Wobst et al. 2023). We consider five elements of VBM sophistication: a company's commitment to shareholder value orientation, adoption of a value-based metric that implicitly incorporates the costs of capital, value-

[1] Some scholars do not view the statement as repudiating the shareholder value maximation maxim. It is seen as a consequence of shareholders' long-term benefit from incorporating stakeholder interests (Inkpen and Sundaram 2022).

based target setting, linkage of compensation to the value-based metric, and integration into lower levels of the organization (Firk et al. 2019b). CSP consists of aggregate performance measures in the environmental, social, and governance[2] (ESG) domains.

Prior literature has intensively discussed the trade-off between shareholder and stakeholder interests (e. g., DesJardine et al. 2022; Goranova and Ryan 2022; Inkpen and Sundaram 2022). In contrast to the formerly prevailing idea that shareholders solely interact with management for profit-maximizing purposes (Sundaram and Inkpen 2004), recent studies have indicated that shareholder groups regularly pursue stakeholder-oriented agendas and seek long-term social returns, thus tempering the negative effects of short-term financial objectives (DesJardine et al. 2022). For example, Neubaum and Zahra (2006) and Chen et al. (2020) show that long-term institutional shareholders positively affect CSP. Focusing on the environmental impact, Azar et al. (2021) find that ownership by the institutional owners BlackRock, Vanguard and State Street leads to reduced carbon emissions.

Turning to the level of the management concepts, prior research on VBM sophistication and CSP has analyzed both concepts separately. VBM research provides rich insights into the determinants and consequences of VBM systems. In particular, VBM systems affect working capital (Mavropulo et al. 2021) and capital budgeting (Balachandran 2006) decisions, thus influencing both short- and long-term decisions. Among other consequences, VBM adopters benefit from lower information asymmetries and costs of capital (Schultze et al. 2018), as well as better operating performance (e. g., Firk et al. 2016) and increased stock market performance (e. g., Rapp et al. 2011). CSP are ascribed similar consequences, including lower information asymmetries (e. g.,

[2] We acknowledge that VBM systems can be considered part of the corporate governance system. Thus, we run additional tests to rule out that joint characteristics drive the reported empirical effects.

Diebecker and Sommer 2017), lower costs of capital (e. g., El Ghoul et al. 2011), and higher operating performance (e. g., Barnett and Salomon 2012). However, the results for capital market performance are mixed (see Malik 2015 for a brief review).

We argue that higher VBM sophistication leads to higher CSP because managers can identify trends such as CSR issues and justify corresponding decisions through quantitative analysis considering the cost of capital. At the same time, they adopt a long-term perspective that can be relevant for CSR initiatives. Furthermore, we expect that only value-generating CSR initiatives are chosen under highly sophisticated VBM systems (substantive VBM implementation). Thus, we expect a positive interaction effect of CSP and substantive VBM on accounting performance. Finally, in capital markets, excessive shareholder value orientation and extraordinary CSP in isolation could be considered problematic. We argue that these risks are mutually diminished by the combination of substantive VBM implementation and high CSP levels and propose a positive interaction on capital market performance.

In our empirical study, we use a hand-collected dataset comprising VBM sophistication assessments based on annual reports of more than 2,500 firm years during a 16-year period from 2005 to 2020. We match these data with CSP ratings from Refinitiv Eikon. Return on assets (ROA) is our proxy for accounting performance, and we measure capital market performance using Tobin's Q. The empirical results support our predictions. We find a significantly positive effect of VBM sophistication on CSP and significantly positive interaction effects between substantive VBM implementation and CSP on accounting and capital market performance. The results are robust to variations in the measurement of the variables and the econometric approach. Analyzing different time slices in our sample period reveals additional interesting insights. The positive effects of VBM sophistication on CSP and the increased accounting performance through their combination are

driven by the period *after* the financial crisis, through which CSP became a relevant trend, and *before* the introduction of European Non-Financial Reporting Directive 2014/95, which mandates sustainability reporting and thus could cause pressure to engage in CSP via increased transparency. Interestingly, this effect translates into higher values for Tobin's Q only through accounting performance but does not offer an additional capital market premium. The interaction effect between substantive VBM implementation and CSP on Tobin's Q is primarily salient in the financial crisis.

Our study contributes to theory and practice in at least three ways. First, we conclude that sophisticated VBM systems help detect performance-relevant trends and facilitate initiative implementation, particularly higher levels of voluntary CSP engagement. Thus, we substantiate an important and yet unidentified consequence of VBM sophistication, which can also apply to other relevant trends in the future. Through the analysis of accounting performance, we can further show that the corresponding decisions are indeed beneficial. Second, we bring together the streams of the literature on the consequences of VBM sophistication and CSP on capital market performance. VBM and CSP jointly lead to improved capital market performance, particularly during crises. We argue that the value creation focus of VBM and the risk-mitigation function of CSP mutually diminish detrimental performance effects, unleashing the performance potential of both. In line with this reasoning, the positive effect of substantive VBM implementation on the relation between CSP and capital market performance is particularly pronounced in volatile times. Third, again on the abstract level, we show that shareholder and stakeholder orientation can coexist and even be complementary. By considering concrete management concepts to put forward one or the other orientation, we contribute to the recently proliferating research stream on "stakeholder capitalism" that elucidates the impact of shareholders on stakeholder-relevant firm outcomes (DesJardine et al. 2022).

The remainder of the paper is structured as follows. Section 2 presents the related literature and the development of our hypotheses. Section 3 describes our empirical approach, and Section 4 presents the results. Section 5 concludes.

2 Related literature and hypothesis development

2.1 Value-based management (VBM)

VBM is an "integrated framework for measuring and managing businesses, with the explicit objective of creating superior long-term value for shareholders" (Ittner and Larcker 2001, p. 352). Thus, the central idea of VBM is to encourage managers to maximize shareholder value (Rappaport 1998). The concept is based on the calculation of performance measures considering the cost of capital as investors' return expectations (Dekker et al. 2012; Firk et al. 2016; Ryan and Trahan 1999). To reach the goal of value creation by overcompensating the cost of capital, these value-based measures need to be considered for strategic and operational decisions. VBM can serve both the decision facilitating role and the decision influencing role of management accounting. Regarding the decision facilitating role, VBM systems can provide a quantitative basis for incorporating trends, such as an increased CSR focus, into the decision-making process. Regarding the decision influencing role, agency problems can be alleviated. These can arise if the interests of shareholders and managers diverge in a setting with separated ownership and control and information asymmetry (Fama and Jensen 1983; Jensen and Meckling 1976). VBM should motivate managers to maximize shareholder value (Elgharbawy and Abdel-Kader 2013; Wallace 1997) and foster long-term orientation and continuity (Firk et al. 2019b; Fiss and Zajac 2006; Ittner and Larcker 2001).

However, the adoption and sophistication of VBM systems vary considerably among firms (e. g., Lueg and Schäffer 2010; Claes 2006; Malmi and Ikäheimo 2003). Thus, the dichotomous

segmentation into VBM adopters and nonadopters frequently proposed by prior research may not be fully reminiscent of corporate practice. Mainly building on the findings of Malmi and Ikäheimo (2003), Firk et al. (2019b) propose a framework to evaluate VBM sophistication using five elements. In addition to the firm's commitment to the overall objective of value creation (*value orientation*), the framework reflects whether a firm uses value-based performance measures (*value-based measure adoption*), sets targets based on value-based measures (*target setting*), links compensation to value-based measures (*compensation linking*) and integrates value-based measures into lower levels of the organization (*operational integration*). A firm that implements more elements has higher VBM sophistication.

Two streams of VBM research have emerged. The first stream investigates the determinants of VBM adoption and disclosure (e. g., Brück et al. 2022; Dekker et al. 2012; Fiss and Zajac 2004; Lovata and Costigan 2002; Nowotny et al. 2022). The second stream scrutinizes the consequences, particularly the promised benefits, of VBM adoption (e. g., Firk et al. 2016; Knauer et al. 2018; Mavropulo et al. 2021; Rapp et al. 2011; Ryan and Trahan 2007; Schultze et al. 2018).

This study belongs to the second stream, which can be divided into two substreams: studies that directly investigate (overall) performance and studies that investigate other consequences of VBM adoption. Summarizing the rather ambiguous findings in the first substream, we differentiate among studies investigating the effects of VBM on accounting performance, self-rated performance, and capital market performance. While the first (e. g., Balachandran 2006; Firk et al. 2016; Ryan and Trahan 2007; Wallace 1997) and second (e. g., Ittner et al. 2003; Riceman et al. 2002) stream of studies have mainly confirmed the hypothesized positive effects, those investigating capital market performance present mixed results. More recent research that has analyzed stock returns after the introduction of value-based measures (Rapp et al. 2011) or the effect of VBM after

strategic decisions (e. g., M&A) have also observed positive performance effects (e. g., Firk et al. 2021; Firk et al. 2019a; Knauer et al. 2018). However, earlier research has only partially reported the positive effects of VBM adoption on stock returns (e. g., Athanassakos 2007; Hogan and Lewis 2005; Kleiman 1999; Prakash et al. 2003; Wallace 1997) but has partially failed to substantiate such effects (e. g., Biddle et al. 1997; Ittner et al. 2003; Wallace 1997). Studies on other consequences have addressed, e. g., the effect of VBM adoption and disclosure on information asymmetries and the cost of capital (Schultze et al. 2018), the effect on working capital management (Mavropulo et al. 2021), payout policy (Kister et al. 2024), and earnings management (Hörner and Sommer 2023).

To our knowledge, previous studies have not considered the effect of VBM implementation on CSP and VBM sophistication as a moderator in the relation between CSP and (accounting and capital market) performance.

2.2 Corporate sustainability performance (CSP)

In the sustainability domain, different terminology has evolved and is often used interchangeably, despite slightly divergent meanings (Gillan et al. 2021). While terms such as CSR focus on *initiatives* and *programs*, the term CSP refers to the measurable *outcome* of corporate actions that impact ESG aspects.[3] To clearly disentangle CSP from VBM, we continue with the abovementioned definition and refer to CSP as a construct that focuses on ESG aspects and does not explicitly include an economic pillar (in addition to environmental and social considerations) as, e. g., in the *Triple Bottom Line* (Elkington 1994).

In line with increased public environmental and social awareness, the corporate world

[3] We refer to Dahlsrud (2008) for a detailed discourse of diverging definitions in the sustainability domain.

significantly intensified sustainability efforts and disclosure (Miller and Serafeim 2015), thus addressing the expectations of key stakeholders, such as customers and employees. For example, CSP has gained importance in investment decisions (Amel-Zadeh and Serafeim 2018). While CSP was initially discussed as a concept that builds on voluntariness, the Non-Financial Reporting Directive 2014/95 by the European Union has mandated that, as of 2017, large listed EU firms must disclose annual non-financial reports (European Parliament 2014), thus indirectly incentivizing sustainability-related initiatives.

Assessing CSP levels is complex, given both the vagueness of the sustainability concept and companies' incentives to inflate their CSP through "ceremonial actions" (Hawn and Ioannou 2016), including the widespread and controversially discussed "greenwashing" phenomenon (Kim and Lyon 2015). ESG ratings by external providers are a frequently used method for not only analysts but also research (Chatterji et al. 2016). These ratings apply consistent criteria and rely not only on information disclosed by the focal company but also external sources such as news and nongovernmental organizations (Diebecker et al. 2019). However, several studies have concluded that CSP ratings vary substantially across providers (e. g., Berg et al. 2022; Chatterji et al. 2016; Diebecker et al. 2019).

Analogous to the VBM literature, the constantly growing body of empirical CSP research can be divided into a stream on the determinants of CSP and a stream on the consequences of CSP, the latter again with substreams on (overall) financial performance and other effects. The first stream identifies market-specific but also overarching CSP determinants. Importantly, empirical evidence indicates that company size (e. g., Artiach et al. 2010; Chih et al. 2010), financial performance (e. g., Campbell 2007; Lourenço and Branco 2013), and external expectations of CSP (e. g., Allen et al. 2009; Dhaliwal et al. 2012) are positively associated with CSP, while competitive

pressure and a worsened economic situation have negative effects (Campbell 2007).

The debate and research on the relation between CSP and financial performance in the second stream of the literature has a long history (e. g., Cochran and Wood 1984; Fogler and Nutt 1975; Monsen 1972). In recent decades, this discourse has gained dynamics (Malik 2015). While some scholars have identified a negative or no clear association between CSP and financial performance (e. g., Clacher and Hagendorff 2012; Friedman 1970; Waddock and Graves 1997), subsequent evidence has predominantly indicated a positive (e. g., Bouslah et al. 2022; Ferrell et al. 2016; Hang et al. 2019; Ioannou and Serafeim 2015; Wong et al. 2021) or at least a nonnegative relation (e. g., Friede et al. 2015; Hawn et al. 2018). Despite this shift toward positive results, it is important to differentiate between studies using accounting-based and market-based performance measures. While the first substream of studies has almost consistently observed a positive impact of CSP on financial performance (e. g., Barnett and Salomon 2012; Tang et al. 2012; Wu and Shen 2013), the latter are occasionally confronted with mixed results (e. g., Brammer and Millington 2008; Clacher and Hagendorff 2012; Surroca et al. 2010). Beyond direct financial performance effects, the literature on CSP has identified additional economic benefits. For example, CSP and its disclosure lower information asymmetries (Cui et al. 2013; Diebecker and Sommer 2017; Lopatta et al. 2016) and (perceived) firm risk (El Ghoul et al. 2011; Goss and Roberts 2011; Sassen et al. 2016), improve access to finance (Cheng et al. 2014), lower the cost of equity (Dhaliwal et al. 2011) and debt (Raimo et al. 2021), and increase customer reputation (Bhattacharya et al. 2009; Lev et al. 2010) and attractiveness to employees (Greening and Turban 2000; Porter and Kramer 2006), analysts and investors (Dhaliwal et al. 2011; Ioannou and Serafeim 2015).

Through this study, we contribute to both streams of CSP research by analyzing VBM sophistication as a determinant of CSP and the joint consequences of VBM sophistication and CSP on accounting and capital market performance.

2.3 Hypothesis development

2.3.1 Association between VBM sophistication and CSP

We argue that higher VBM sophistication facilitates *trend identification* and actual *initiative implementation*, ultimately resulting in higher CSP (H1). Companies using value-based measures scrutinize whether certain initiatives, such as sustainability initiatives that increase CSP, promise returns that exceed the costs of capital and, hence, are beneficial from the shareholder perspective. As outlined above, public discussion and empirical research have suggested that high-CSP companies enjoy economic benefits, in particular higher accounting performance (ultimately leading to higher cash flows) and lower costs of capital. Both increase shareholder value.

Regularly reviewing *value-based measures* inevitably leads to a quantification of initiatives encompassing reactions to trends such as increased CSR awareness. Hence, VBM fosters trend identification and provides a quantitative basis for prioritization and subsequent decision making. Beyond strategic prioritization and decision making, applying value-based measures and principles across organizational layers is likely to facilitate the implementation of value-generating sustainability initiatives, as VBM can be particularly impactful in justifying costly sustainability efforts.

Following managerial opportunism theory, shareholders might expect management to primarily pursue private goals (Preston and O´Bannon 1997). As managers are usually incentivized by short-term targets, they only make substantial investments in CSR initiatives when investment opportunities are low or when doing so helps justify poor results. In contrast, they might withhold

resources if short-term opportunities exist even though long-term prospects are worsened. When applying *value-based target setting*, long-term investments are encouraged, and such sustainability-connected agency problems should be mitigated, leading to the pursuit of (high-quality) sustainability initiatives. *Value-based compensation* magnifies this effect. Finally, *operational VBM integration* enables efficient decisions and monitoring of sustainability initiatives, leading to a permeation of value-creating sustainability initiatives throughout the firm. Thus, we formulate our H1 as follows:

H1. *Higher VBM sophistication is associated with higher CSP levels.*

2.3.2 Joint performance effects of VBM sophistication and CSP

In the following, we propose an interaction effect of highly sophisticated VBM systems and CSP on accounting performance (H2). *Value-based performance measures* enable managers to identify value-enhancing programs (decision-facilitating role). If such measures are in place and firms decide to engage in sustainability initiatives, value generation is promised. Regarding the decision-influencing role, *value-based compensation* and *operational integration* are viewed as powerful tools for pushing the organization toward value generation (Young and O'Byrne 2001), with *value-based target setting* as a common compensation prerequisite. Thus, the likelihood of non-value-generating sustainability measures under highly sophisticated VBM systems should be minimized, and the initiatives taken should be profitable, thus enhancing accounting performance. Prior empirical research has pointed to improved accounting performance through both VBM implementation and CSP in isolation, lending further credibility to our prediction of an interaction.

If VBM sophistication is sufficiently high to serve both the decision-facilitating and decision-influencing roles, we call such an implementation substantive. Following Young and O'Byrne

(2001), we consider a VBM implementation to be substantive if it contains at least four elements. Therefore, we develop our second hypothesis, which is on an interaction effect between substantive VBM implementation and CSP on accounting performance:

H2. *Substantive VBM implementation and higher CSP are jointly associated with higher accounting performance.*

Prior research has revealed mixed empirical results regarding the capital market performance effects of VBM implementation and CSP in isolation, allowing the conclusion that both concepts *can* impact capital market performance positively under certain, yet not fully understood, conditions. In the following, we develop theory to propose a positive interaction effect of VBM sophistication and CSP on capital market performance (H3), which builds on the idea that both approaches entail certain risks that can be mutually diminished.

First, capital markets might perceive sustainability initiatives as non-value-adding and, hence, punish firms with high CSP. In this vein, entrenchment theory suggests that managers might misuse CSR budgets to pursue short-term private goals rather than focusing on long-term value creation (Preston and O´Bannon 1997). Thus, sustainability spending could bear the risk of tying up resources that could otherwise serve value-adding activities. High VBM sophistication can alleviate this concern. When *value-based metrics* are employed, capital market participants may assume that sustainability initiatives must promise higher returns than the cost of capital. Furthermore, regarding prioritizing expenses or investments, sustainability is less likely to crowd out more important projects. *Value-based target setting* assures the capital markets that management is evaluated from a long-term perspective, while *value-based compensation* enforces value creation by aligning managerial incentives. *Operational VBM integration* suggests that also lower

organizational levels evaluate sustainability initiatives against the value-oriented benchmark. Importantly, the individual VBM elements are interdependent, and only a substantial combination qualifies as a credible signal to the capital markets.

Second, high VBM sophistication might signal a strong emphasis on shareholder value creation and potentially be perceived as denying the importance of stakeholder orientation. CSP can send a countersignal and, thus, reduce the reputational risk arising from high VBM sophistication. The enlightened stakeholder theory of Jensen (2010) describes the idea of pursuing long-term shareholder value creation but, thereby, considering all relevant stakeholder interests. Although the joint effect of VBM sophistication and CSP has not yet been investigated, related research has pointed to the idea of a complementary relationship. For example, several studies have concluded that well-governed firms tend to have higher CSP levels, which jointly leads to positive performance effects (Cai et al. 2012; Jo and Harjoto 2012; Ntim and Soobaroyen 2013). Ntim and Soobaroyen (2013) posit that the combination of CSP and good corporate governance has a stronger positive effect on financial performance than does CSP alone. Although corporate governance intersects with both the governance pillar of CSP and VBM, arguably, VBM principles, including the voluntary disclosure of critical measures to reduce asymmetric information, notably contribute to improved corporate governance.

Based on our theoretical reasoning and related empirical evidence, we state H3 as follows:

H3. *Substantive VBM implementation and higher CSP are jointly associated with higher capital market performance.*

3 Research design

3.1 Sample

Our sample consists of the 200 largest non-financial STOXX Europe 600 firms in terms of market capitalization and covers the period between 2005 and 2020. The European setting is particularly interesting for this study due to the widespread VBM diffusion and the variation in VBM diffusion (Bezemer et al. 2015; Burkert and Lueg 2013; Cooper and Crowther 2008; Fiss and Zajac 2004).[4] To avoid survivorship bias, we select the largest constituents at the end of our starting year of 2005 and follow through until 2020.

As no public databases capture VBM-specific information, we follow prior VBM research and hand-collected the required data from annual reports (Firk et al. 2019b; Fiss and Zajac 2006; Knauer et al. 2018; Lovata and Costigan 2002). We downloaded the reports from company websites and public databases. If reports were not available, we contacted the investor relation departments. Through this approach, we collected 99%[5] of the aspired annual reports in the observation period. Based on these reports, we evaluated the degree of VBM sophistication according to Firk et al. (2019b), as described below. All further required data, including the CSP measure, were retrieved from the Refinitiv Eikon database.

Starting with an initial sample of 3,200 firm-year observations (200 firms over 16 years), we eliminated 410 firms because of liquidation or delisting. We excluded 121 firm-years of double-listed companies to ensure an unambiguous allocation of company-specific data.[6] Excluding

[4] The STOXX Europe 600 covers a large share of the free-float market capitalization in Europe and has also been used in prior VBM studies (e. g., Firk et al. 2019b).

[5] This includes 3,200 total firm years in the observation period, 2,754 annual reports analyzed, 410 non-existing due to company liquidation or delisting, and 36 not found.

[6] Including the respective companies leads to inferentially identical results of our hypotheses tests.

observations with missing annual reports relevant for hand-collecting the VBM sophistication variables (36 observations), missing CSP data (43 observations), and missing data for control variables (74 observations) results in our final sample of 2,516 firm-year observations. Table 1 provides a summary of the sample selection.

[Insert TABLE 1 here.]

3.2 Measurement

3.2.1 VBM variables

As already outlined, we hand-collected our VBM variables from annual reports. To capture the various degrees of VBM sophistication, we built on Firk et al. (2019b) and assessed a company's commitment to shareholder value orientation, the adoption of a value-based metric, value-based target setting, linking compensation to a value-based metric, and the operational integration of VBM in lower levels of the organization, each coded in a binary variable. The coding procedure was based on an ex ante coding scheme to ensure consistent evaluations and to avoid subjectivity and a common rater bias. The use of five distinct elements provides additional granularity compared to a binary assessment that merely captures the use of value-based measures. Appendix A contains a detailed description of the methodology.

To test the interrelation between VBM and CSP in H1, we sum the binary-coded variables in *VBM_SUM*, ranging from zero to five, as our measure of VBM sophistication (Firk et al. 2019b; Firk et al. 2021). In our development of H2 and H3, we argue that the positive performance effects materialize for only deeply ingrained VBM systems. As a proxy for this substantive VBM implementation, we create the binary variable *VBM_SUBST* that takes the value of one if at least four out of five VBM elements are documented within one firm year and zero otherwise. This

conservative allocation ensures that the VBM system is holistically applied. In the robustness section, to challenge the coding rule for substantive VBM, we lower the threshold to three elements.

In line with prior research, the distinctive feature of a value-based metric is the comparison against the costs of capital (Dekker et al. 2012; Ryan and Trahan 1999). Hence, we treat profit- and cash-based residual income metrics and corresponding return ratios as value-based (Firk et al. 2016; Knauer et al. 2018; Rapp et al. 2011; Ryan and Trahan 2007).[7]

3.2.2 CSP

We measure *CSP* as the Refinitiv ESG Score. The ESG ratings of Refinitiv Eikon have been frequently used in prior empirical CSR research due to their transparency and comprehensiveness (e. g., Cheng et al. 2014; Eccles et al. 2014; Ioannou and Serafeim 2012). Clearly defined criteria aim to ensure a balanced assessment and minimize variations related to firm-specific disclosure. The ratings are based on publicly available information compiled by analysts, such as annual or sustainability reports, stock filings and news articles, to assess sustainability performance per firm year (Refinitiv 2022). More than 500 data points are captured and aggregated into an overarching ESG score reflecting CSP and into subscores for the environmental (*CSP_EN*), social (*CSP_SO*) and governance (*CSP_CG*) domains. These scores range from zero to 100, with higher values implying higher performance. In contrast to prior specifications by Refinitiv (or the predecessor database ASSET4), the economic domain is no longer explicitly considered (Diebecker et al. 2019), which reflected the traditional triple bottom line (economy, environment, social). Rather, the governance dimension is integrated as part of the ESG approach that contains some elements related

[7] Search terms included "EVA," "CVA," "ROCE," ROIC," "value added," "economic value," "return on," "WACC," "shareholder value," and "value creation," including spelled-out abbreviations and modified search terms, such as "cost of capital," "capital cost," and "capital charge." The identified text passages were used to analyze the use of value-based metrics.

to economic performance and other criteria. The potential association between the governance dimension and economic performance implies a possible association between the governance dimension and VBM. For the main analyses, we use the "complete" ESG score, as it offers important insights. Particularly in a European sample encompassing countries with specific employee participation rights and influential labor unions, not considering this specific pillar would not be in line with stakeholder theory. However, to alleviate concerns regarding conceptual and empirical overlaps, we exclude the governance dimension in the robustness tests.

3.2.3 Accounting and capital market performance

In line with prior literature (e. g., Barnett and Salomon 2012), we proxy accounting performance using *ROA* from the Refinitiv Eikon database.

Following prior literature (e. g., Garcia-Castro et al. 2010; Hawn and Ioannou 2016; Jo and Harjoto 2012), capital market performance is measured using Tobin's Q (*TOBQ*). For the main analysis, we build on the widely established definition of Chung and Pruitt (1994). Since this approach is considered conservative with respect to data requirements and computational effort while providing high-quality estimations, it facilitates replicability and comparability (Schreck 2011). Generally, Tobin's Q is defined as the ratio of the market value of assets to their replacement value. Specifically, we proxy the market value of assets by the market value of common stock plus the book value of long-term debt and short-term liabilities minus current assets. The replacement value of assets is proxied by the book value of assets. We acknowledge that numerous slightly different definitions have been discussed and applied in previous research (Schreck 2011). To account for the distortionary effects arising from varying calculation logics, we apply two further definitions in the robustness section.

3.2.4 Control variables

We control for factors that could confound our hypotheses tests and select control variables based on previous research, attesting an impact on CSP and/or capital market performance.

First, prior research has argued that larger firms are likely to act in socially more responsible ways since they are regularly and closely monitored by the public (Chih et al. 2010). Hence, we include the log of total assets (*LSIZE*). Second, Artiach et al. (2010) provide evidence that profitability has a positive effect on CSP. As operating performance also affects capital market performance, we include *ROA*, our measure for accounting performance, in our tests of H1 and H3, in which *ROA* is not the dependent variable. Third, Artiach et al. (2010) demonstrate a positive effect of growth potential on CSP, which we reflect through firms' annual sales growth (*GROWTH*). Fourth, even though several studies have not found significant negative effects of leverage (*LEV*) on CSP (e. g., Lourenço and Branco 2013), arguably, servicing debt can limit (also CSR-related) investments and, consequently, affects performance. Fifth, cashflow volatility (*CFVOL*) accounts for operational risk (as opposed to capital market-related risk by analyzing stock price volatility). Sixth, *BETA* is derived from a single index model and captures systematic firm risk (Sassen et al. 2016). Seventh and eighth, we add two research and development (R&D)-related variables, as R&D investments indicate long-term orientation and, thus, can be associated with increased CSP and long-term financial performance. Thus, *RDRATIO* measures R&D expenses over total sales. To address the issue of missing R&D data, we follow the previous literature by manually setting missing values of *RDRATIO* to zero and – to capture the potential systematic effects of missing R&D data – introduce the dummy variable *RD_MISSING* if the R&D value was manually adjusted (Rapp et al. 2011). Ninth, institutional investors' presence plays a role in both the VBM and CSP literature. Lovata and Costigan (2002) report that institutional investors in particular rely on value-based

metrics. Furthermore, Hörner and Sommer (2023) argue that institutional investors are more capable of handling complex VBM systems and rely specifically on value-based compensation as an important component, in addition to value-based metrics. In addition, Firk et al. (2016) report that financially oriented investors amplify the positive VBM effects on financial performance. We introduce *NOSHIC* as the percentage of strategic shareholdings of institutions, such as investment banks, insurance, or security companies, of at least 5%. Appendix B summarizes the variable definitions.

3.3 Statistical approach

Endogeneity is considered a major issue in empirical VBM research (Firk et al. 2019b; Knauer et al. 2018) *and* studies that have investigated the effects of CSP (Wu and Shen 2013). Hence, we run Wooldridge (1995) tests to assess the appropriate regression type for each of our hypotheses. The tests reveal that our main analysis should not be affected by endogeneity. Hence, we use ordinary least squares (OLS) estimators to test H1, H2, and H3. However, parts of our additional analyses are prone to endogeneity, which we aim to counter using an instrumental variable (IV) approach. Despite controversial discussions (Larcker and Rusticus 2010), we refer to prior VBM research and use the annual average VBM sophistication within the industry as an instrument, and the focal firm is excluded. The explanation for the choice of this instrument is the external pressure to implement a VBM system (Rapp et al. 2011). Even though previous research has solely focused on the adoption of value-based measures (Knauer et al. 2018; Rapp et al. 2011),

we consider this approach valuable for our study, as the basic argumentation remains the same.[8]

To obtain valid regression results, our models reflect additional statistical specifications. First, we mean-center continuous variables to reduce multicollinearity concerns. Second, we winsorize *ROA*, *TOBQ*, *GROWTH*, *LEV*, and *RDRATIO* at the first and 99th percentiles to mitigate the distortionary effects of outliers. Third, as the Breusch and Pagan (1979) tests indicate heteroscedasticity, we use robust standard errors (White 1980) clustered at the firm level. Fourth, we use a mixed effects model with industry, country and year fixed effects to account for industry-, country- and time-invariant heterogeneity among firms. We use the following models to formally test our hypotheses H1 and H2/H3, with *Performance* being either *ROA* (H2) or *TOBQ* (H3), while *ROA* is not used as a control variable in H2 but displayed in the aggregated model for illustration purposes:

$$\begin{aligned} CSP_i = {} & \gamma_0 + \gamma_1 VBM\_SUM_i + \gamma_2 LSIZE_i + \gamma_3 ROA_i + \gamma_4 GROWTH_i + \gamma_5 LEV_i \\ & + \gamma_6 CFVOL_i + \gamma_7 BETA_i + \gamma_8 RDRATIO_i + \gamma_9 RD\_MISSING_i + \gamma_{10} NOSHIC_i \\ & + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + Country\ Fixed\ Effects \\ & + \varepsilon_i \end{aligned} \quad (1)$$

$$\begin{aligned} Performance_i = {} & \gamma_0 + \gamma_1 (VBM\_SUBST_i \times CSP_i) + \gamma_2 VBM\_SUBST_i + \gamma_3 CSP_i + \gamma_4 LSIZE_i \\ & + \gamma_5 ROA_i + \gamma_6 GROWTH_i + \gamma_7 LEV_i + \gamma_8 CFVOL_i + \gamma_9 BETA_i + \gamma_{10} RDRATIO_i \\ & + \gamma_{11} RD\_MISSING_i + \gamma_{12} NOSHIC_i + Year\ Fixed\ Effects \\ & + Industry\ Fixed\ Effects + Country\ Fixed\ Effects + \varepsilon_i \end{aligned} \quad (2)$$

[8] An appropriate instrument needs to fulfill two key criteria. First, it must not covary with the error term; hence, it must be truly exogenous. Second, it must covary with the endogenous independent variable, following Wooldridge (2016). Regarding the focal instrument, it might be argued that VBM industry averages systematically vary with agency costs (Knauer et al. 2018). However, we still consider this instrument as the most appropriate in the VBM context but acknowledge its potential limitations.

4 Results

4.1 Descriptive results and correlations

Table 2 presents the analysis of the elements of VBM sophistication for our sample, by year and in total. Almost 70% of the companies in the sample indicate value orientation (*VBM_VO*). Their proportion almost continuously increases until 2014 but declines substantially until 2020 to lower than the initial value. A total of 23.4% of the companies employ value-based performance measures (*VBM_KPI*), with no clear trend observable and numbers oscillating around the mean value. The same holds true for value-based target setting (*VBM_TARGET*) and compensation (*VBM_COMP*) but at lower levels (18.9% and 16.5%). Only 11.8% of the companies integrate VBM into the lower levels of their hierarchies (*VBM_SEGMENT*), and values decline sharply toward the end of the sample period.

[Insert TABLE 2 here.]

Table 3 provides the descriptive statistics for the variables in the hypotheses tests plus the values for the three ESG pillar scores. Companies' mean *ROA* in our sample equals 5.716% and has a wide range of between -10.247% and 33.253%. Thus, ROA varies considerably, which is also reflected by the high standard deviation of 6.358%. The statistics for *TOBQ* show a mean of 1.210. Hence, capital market valuation is on average 21% higher than are book values. The standard deviation of 1.005 is again considerable. The mean for *VBM_SUM* is 1.404, which indicates that firms have implemented more than one VBM element on average. The average of 0.149 for *VBM_SUBST* implies that 14.9% of our observations show substantive VBM implementation with four or more VBM elements. The mean *CSP* value is 68.615 and below the median of 72.065, indicating a relatively high number of very low ratings.

[Insert TABLE 3 here.]

We further differentiate our sample by presenting year, industry, and country clusters in Table 4. In Panel A, we investigate chronological trends and observe opposing developments for VBM sophistication and CSP. The pinnacle of *VBM_SUM* can be observed at the end of the financial crisis, with the highest average VBM sophistication (*VBM_SUM*) of 1.503 and a share of substantive VBM (*VBM_SUBST*) of 17% in 2010. Thereafter, both metrics decline but again stabilize as of 2016 at a slightly lower level than that at the beginning of our observation period. *CSP* improves continuously over the sample period.

Companies in the health care, basic materials, utility, industrial and consumer goods industries show a VBM sophistication above the average (Panel B). At the bottom end, particularly oil & gas and technology companies have a low VBM sophistication. Regarding CSP, technology firms exhibit the highest overall levels, and consumer services firms exhibit the lowest.

From a nationality perspective, VBM is particularly widespread in Germany (Panel C). Focusing on the larger European nations, French, Spanish, and Italian companies show VBM sophistication levels clearly below the mean. Regarding CSP, the varying number of observations might distort direct comparisons. However, Swiss and Spanish firms receive the highest ratings associated with a reasonable number of observations.

[Insert TABLE 4 here.]

Table 5 displays the correlations between the variables of the main analysis. We report the Spearman rank correlation coefficients above and the Pearson correlation coefficients below the diagonal. The correlation matrix shows an overall positive relationship between *VBM_SUM* and *CSP*, with positive significant correlations at the 1% level. Remarkably, each of the variables *VBM_SUM*, *VBM_ SUBST* and *CSP* is negatively correlated with *TOBQ* for all corresponding

coefficients, at least at the 10% level. The correlations with *ROA* are less straightforward. While *VBM_SUBST* and *CSP* also correlate negatively with *ROA* at the 1% level, there is no significant correlation with *VBM_SUM*. As expected, we observe a strong, positive correlation between *ROA* and *TOBQ*, which is significant at the 1% level.

[Insert TABLE 5 here.]

4.2 Results of the hypotheses tests

Table 6 presents the multivariate regression results. As outlined above, we use OLS estimates for the tests of our hypotheses, as Wooldridge (1995) tests do not indicate endogeneity. For transparency, we report the *p*-values of these tests that originate from the IV estimations below the OLS regressions. The adjusted coefficients of determination (R^2) range between 30.3% and 63.4%. Maximum variance inflation factor (VIF) values of 3.81 (Model 1) and 3.82 (Models 2 and 3) are below common thresholds and do not indicate notable multicollinearity issues.

H1 predicts a positive effect of VBM sophistication on CSP. We formally test this hypothesis in Model 1, which seeks to explain *CSP* as the dependent variable. The coefficient on *VBM_SUM* is indeed positive and significant at the 1% level ($p = 0.005$).[9] Thus, H1 is supported, and the level of VBM sophistication is positively associated with CSP.

When deriving H2, we hypothesize that firms with high VBM sophistication engage only in value-generating CSR activities. We consider VBM sophistication substantive when four or more VBM elements are implemented. This engagement in only value-generating CSR activities should lead to higher accounting profitability. Thus, statistically, we expect an interaction effect between *VBM_SUBST* and *CSP* on *ROA*. Model 2 presents the hypothesis test. The coefficient on the

[9] We report two-tailed test statistics throughout this paper.

interaction effect is positive and significant ($p = 0.025$). Thus, we find support for H2. Interestingly, we do not observe main effects for *VBM_SUBST* and *CSP*. Although we emphasize that main effects need to be interpreted with caution in the presence of an interaction effect, this result implies that the combination of both dominates the two concepts in isolation.

H3 posits that the interaction of substantive VBM implementation and CSP also leads to positive capital market performance. Analogous to H2, we test this hypothesis in Model 3. The coefficient is again significantly positive ($p = 0.006$), supporting H3.

[Insert TABLE 6 here.]

4.3 Additional analyses

4.3.1 Periodical effects

Our theory implies that firms can *voluntarily choose* to engage in CSR activities (H1) and implement initiatives beneficial to accounting performance (H2) based on *identified trends*. Moreover, capital markets recognize the corresponding benefits of these voluntary measures (H3). Thus, we exemplify trend identification by investigating CSR activities. Our sample period provides us with the opportunity to challenge this assumption by defining subperiods with two important events to discuss. First, the strict focus on shareholder value creation was considered causal for the financial crisis, contributing to a subsequent shift toward stakeholder orientation. Thus, the "trend" toward stakeholder orientation should gain impetus after the end of the crisis. We follow previous research and consider the years from 2008 to 2010 as our "crisis sample" (Berglund 2020; Nicol 2018; Öztürk et al. 2020). Second, the Non-Financial Reporting Directive mandates sustainability reporting, which potentially creates pull effects regarding corporate sustainability initiatives. Hence, sustainability initiatives under this directive are no longer truly voluntary. The directive

entered into force in 2017, which is why we define our "regulated postcrisis sample" as 2017–2020. This leaves us with 2011–2016, the time in-between as the most interesting period. We call this the "unregulated postcrisis sample" and expect that our predicted effects are particularly pronounced during this period, as the CSP level should be driven by internally defined priorities and processes. We further analyze the period before the crisis as from 2005 to 2007 ("precrisis sample").

Table 7 presents the corresponding results. Panel A reflects our analysis of the periodic effects for H1. Again, Wooldridge (1995) tests indicate that our tests are not prone to endogeneity, which is why we again present OLS regressions. In line with the arguments just mentioned, *VBM_SUM* has a positive effect on *CSP* in the unregulated postcrisis sample but not under the directive or before and during the financial crisis. This highlights that VBM sophistication can foster initiative implementation following identified trends.

Panel B presents the corresponding results for H2 with *ROA* as our dependent variable. Wooldridge (1995) tests reveal that the regression for the crisis sample, but not the remaining regressions, is subject to endogeneity ($p = 0.002$). For reasons of brevity, we present the IV regression for the crisis sample and the remaining regressions as OLS. Again, the results show the expected positive effect of the interaction of *VBM_SUBST* and *CSP* on *ROA* in the unregulated postcrisis period, while we do not observe effects in the precrisis and regulated postcrisis periods. The results for the crisis sample are somewhat surprising. We also observe a significantly positive coefficient on the interaction but a significantly negative main effect of a greater magnitude for *VBM_SUBST*. While firms with highly sophisticated VBM systems show lower accounting returns, the combination with CSP offsets at least parts of the effect, which could be interpreted with caution as a complementary effect. Panel C contains the results of the regressions for H3 using *TOBQ* as the dependent variable, again reporting OLS or IV regressions based on Wooldridge (1995) tests. We do

not observe the expected significant interaction between *VBM_SUBST* and *CSP* for the unregulated postcrisis sample. However, we observe that *ROA* is positively associated with our dependent variable *TOBQ*. Hence, the capital market is likely to reward the additional accounting returns in the unregulated postcrisis period, but no premium associated with VBM sophistication, CSP, or their combination. Interestingly, the effect of our formal test of H3 seems driven by the crisis period.

By synthesizing the analyses of the periodic effects on H2 and H3, we can conclude that the combination of deeply ingrained VBM systems and high CSP is rewarded with higher accounting performance in the unregulated postcrisis period *and* the crisis period. The capital market seems to "only" reward the additional accounting returns in the unregulated postcrisis period but offers a premium for the combination of highly sophisticated VBM systems and high CSP during crises. Although unexpected, this finding is in line with our argument that both concepts entail certain critical issues that can be mutually diminished.

[Insert TABLE 7 here.]

4.3.2 Variable specifications

In the following, we test the robustness of our main results by using different proxies for our VBM and CSP measures, as well as Tobin's Q.

Regarding the VBM proxies, we acknowledge that, in particular, the definition of substantive VBM can be discussed. We argue that, to test H2 and H3, at least four VBM elements are required for substantive VBM implementation. When we lower the hurdle for substantive VBM implementation to three or more VBM elements (*VBM_SUBST_ALT*), 518 companies in the sample are considered substantive VBM adopters. Rerunning the tests (untabulated) for our performance

hypotheses leads to inferentially identical results yet slightly divergent *p*-values for the interactions (H2: $p = 0.08$; H3: $p = 0.017$) using this altered proxy definition.

We use the Refinitiv ESG Score as our primary CSP proxy. As VBM systems might be considered part of the corporate governance system, they could also be captured by the corporate governance pillar of our CSP proxy. To alleviate the concern that potential performance effects (H2 and H3) are driven by the fact that "benefits are counted twice," we eliminate the corporate governance pillar as an additional analysis. Hence, we calculate the variable *CSP_EX* based on the equally weighted Refinitiv scores for the environmental and social pillars without incorporating the corporate governance score. Changing this proxy again leads to inferentially identical results but slightly divergent *p*-values for the interactions (H2: $p = 0.059$; H3: $p = 0.001$; untabulated).

Prior literature has suggested numerous definitions of our proxy for capital market performance in H3, i. e., Tobin's Q (Schreck 2011). Thus, we move away from the definition of Chung and Pruitt (1994) in our robustness checks and instead apply the definitions by Dhaliwal et al. (2011) and Refinitiv Eikon, respectively. For both definitions, the coefficients on the interaction term between *VBM_SUBST* and *CSP* remain significant at the 5% level (untabulated).

4.3.3 Econometric model

As already outlined, endogeneity is an intensively discussed issue in both the VBM and CSP literature. Although the test results indicate the absence of endogeneity in our main analysis, the argument remains that CSR initiatives often require lead time to yield the aspired effects (Graafland and Smid 2019), and VBM can trigger only CSR efforts. Similarly, accounting performance and capital market performance effects might also be delayed. Although stock prices incorporate

anticipated future developments, the use of VBM and CSP can only be assessed retrospectively.[10] We account for these arguments by testing the effect of lagged *VBM_SUM* on (nonlagged) *CSP* (H1) and the effect of the lagged interaction between *VBM_SUBST* and *CSP* on nonlagged *ROA* (H2) and *TOBQ* (H3). Again, the adjusted models with lagged independent variables support the main results in terms of coefficient signs and significance levels (untabulated).

5 Conclusion

Shareholder and stakeholder orientations are frequently considered contrasting ideas and are analyzed separately. Enlightened stakeholder theory argues that both are compatible and can even be complementary (Jensen 2010). As quantifying management orientations is difficult, prior research that provides the empirical evidence to substantiate this argumentation scarce. By compiling a comprehensive dataset including hand-collected VBM assessments of more than 2,500 firm years and CSP ratings of the 200 largest non-financial firms of the STOXX Europe 600 from 2005 to 2020, we provide an approach to fill this gap. Considering the level of VBM sophistication as a proxy for shareholder orientation, while the CSP level represents stakeholder orientation, we investigate, *first*, the association between the two orientations and, *second*, their joint effect on accounting and capital market performance. The results of the association between the two orientations support the argumentation that both can coexist and be complementary. In particular, more sophisticated VBM systems are associated with increased CSP. This is especially the case in the period after the financial crisis and before the Non-Financial Reporting Directive. In this period, CSP was a relevant trend, and no "legal pull effect" existed regarding CSR initiatives. Thus, we conclude that VBM sophistication helps identify and implement relevant trends, which could be

[10] As our firm-year-based dataset only allows full year lags, which appear fairly large when measuring capital market responses, we decided against lagged independent, respectively dependent lead variables in the main analysis.

transferable in the future to other trends. Regarding accounting and capital market performance, we provide evidence that shareholder and stakeholder orientation can be complimentary by presenting positive joint accounting and capital market performance effects of substantive VBM and CSP. The positive accounting effects can be viewed as a signal that voluntary CSR decisions are indeed value generating. The positive capital market effect is particularly salient during the financial crisis. We argue that the stock market rewards substantive VBM that enables firms to recognize and promote the risk mitigation function of CSP during volatile periods, while shareholder value focus reduces the risk of disproportionate CSR spending. Our results of the defined periodical effects and alternative variable and econometric specifications support our reasoning.

Through our study, we contribute to the VBM and CSP literature. On the VBM side, our results provide evidence that, in contrast to the often-discussed public notion, VBM can be associated with high CSP. We further respond to the call of Firk et al. (2019b) to investigate the performance effects of VBM sophistication. Through our findings, we suggest that VBM sophistication moderates the positive performance effects of CSP, which applies to both accounting and capital market performance, although the mechanisms vary. On the CSP side, we expand the research streams investigating CSP antecedents (e. g., Artiach et al. 2010; Campbell 2007; Chen et al. 2020) and financial performance effects (e. g., Dhaliwal et al. 2011; Ferrell et al. 2016; Hawn et al. 2018). Regarding the first stream, our results suggest that VBM can trigger CSP improvements, as it helps with recognizing the associated benefits. Addressing the second stream, our results indicate that publicly disclosed shareholder orientation can improve the performance effects of CSP. Primarily, we argue that VBM disclosure reduces investors' fear of disproportionate CSR spending that could be used more efficiently to create shareholder value.

We acknowledge several limitations of our research design, especially concerning the data sources and the generalization of the results based on our sample composition. Regarding the first, our VBM data gathering approach depends on annual reports. Although these reports contain audited content, addressing strategic communication goals might lead to over- or underreporting of applied VBM elements (Firk et al. 2019b). We measure CSP based on Refinitiv ESG scores. Even though this external assessment is well-reputed for its objectivity and transparency, considerable variations exist between sustainability datasets (e. g., Berg et al. 2022). Furthermore, the specific sample composition restricts the generalizability of our conclusions. First, only listed firms have been evaluated, questioning the applicability to private firms. Second, the focus on European firms complicates inferences for further markets. Third, the unique characteristics of the financial crisis of 2008 potentially restrict the transferability of the results to more recent downturns.

Our study design and findings might spark future research. On the one hand, related empirical studies could challenge our results by addressing the abovementioned limitations. Primarily, extending our European research to further markets such as the U.S., where shareholders and extensive ESG orientation have been recently contested (Reuters 2022), could provide polyvalent insights. On the other hand, VBM research could build on two of our key findings. First, the differences in the results before and after the Non-Financial Reporting Directive demand more insights into VBM effects in regulated versus unregulated settings. Second, the importance of substantive VBM to realize (capital market) performance effects could inspire researchers to further disassemble (performance) effects based on the level of VBM implementation.

Appendix

Appendix A. Definition of VBM elements

VBM sophistication element Firk et al. (2019b), p. 421	**Evaluation criteria** (fulfilled = 1; not fulfilled = 0)
Commitment to shareholder value orientation	The annual report explicitly mentions the goal of increasing value for shareholders. The goal of increasing value without explicitly mentioning shareholders is not sufficient (e. g., the goal of increasing value for all stakeholders without further mentioning shareholders).
Value-based measures as key performance indicator	At least one profit- or cash flow-based residual profit figure or a corresponding return ratio is mentioned in the annual report. The ratio is only classified as a value-based measure if either the cost of capital is explicitly included in the calculation (e. g., economic value added; EVA) or explicitly compared with the cost of capital in the annual report (e. g., earnings before interest and taxes after cost of capital (EBITaC) or return on capital employed (ROCE) with a direct comparison to the weighted average cost of capital (WACC).
Objectives for value-based measures	For one of the value-based measures, a target is explicitly stated in the annual report (e. g., ROCE target: cost of capital of 8%; EVA higher compared to that in the previous year). It is not sufficient to assume an objective solely by linking a value-based measure to executive compensation (reason: linking can be done without defining an explicit objective; selectivity between levels must be guaranteed).
Linking value-based measures with the executive board's compensation	At least one value-based measure is explicitly mentioned in the annual report as the basis for assessing the executive board's compensation. Complete dependence on performance-oriented compensation is not a prerequisite. The link between compensation and total shareholder return (TSR) is only sufficient if there is a clear reference to value added (e. g., delta TSR).
Use of value-based measures for segments	The use of at least one value-based measure to manage or control the segments or business units is explicitly mentioned in the annual report or can be seen in the segment reporting (e. g., the value contribution is used to assess the business units).

Appendix B. Variable overview, descriptions and data sources

Variable	Description	Sources
Variables in the main analyses		
ROA	Net income (WC01551) divided by the previous year's total assets (WC02999) multiplied by 100	Refinitiv Eikon
TOBQ	Tobin's Q definition following Chung and Pruitt (1994): market value of common stocks (WC08001) plus the book value of long-term debt (WC03251) and short-term liabilities (WC03101) minus current assets (WC02201), all divided by the book value of assets (WC02999)	Refinitiv Eikon
VBM_SUM	VBM sophistication on a scale from zero to five, representing the number of existing VBM elements (see Appendix A)	Hand-collected
VBM_SUBST	Substantive VBM quantified by dichotomous variable that equals 1 if the firm has VBM sophistication (*VBM_SUM*) of at least 4, 0 otherwise	Hand-collected
CSP	Corporate sustainability performance retrieved as Refinitiv ESG Score (TRESGS)	Refinitiv Eikon
LSIZE	Natural logarithm of the firm's total assets (WC02999)	Refinitiv Eikon
GROWTH	Annual sales (WC01001) of the current year divided by annual sales of the previous year, multiplied by 100	Refinitiv Eikon
LEV	Total debt (WC03255) divided by common equity (WC03501)	Refinitiv Eikon
CFVOL	Standard deviation of cash flows (WC04201) divided by total sales (WC01001) over three years	Refinitiv Eikon
BETA	Systematic risk measured as the beta of a single index model by regressing stock returns on market returns using the total STOXX Europe 600 as a benchmark	Own calculation based on Refinitiv Eikon data
RDRATIO	R&D expenses (WC01201) divided by total sales (WC01001) multiplied by 100	Refinitiv Eikon
RD_MISSING	Dichotomous variable that equals 1 if R&D data are missing and 0 otherwise	Own calculation
NOSHIC	Percentage of total shares issued held by investment banks and institutions, at least 5% (*NOSHIC*)	Refinitiv Eikon
Further variables (descriptive statistics and robustness tests)		
CSP_EN	Corporate sustainability performance rating exclusively referring to the environmental (ENSCORE) pillar	Refinitiv Eikon
CSP_SO	Corporate sustainability performance rating exclusively referring to the social (SOSCORE) pillar	Refinitiv Eikon
CSP_CG	Corporate sustainability performance rating exclusively referring to the corporate governance (CVSCORE) pillar	Refinitiv Eikon
CSP_EX	Adjusted corporate sustainability performance rating based on equally weighted scores of the environmental (*CSP_EN*) and social (*CSP_SO*) pillar but not incorporating the corporate governance (*CSP_CG*) pillar	Own calculation based on Refinitiv Eikon data
VBM_SUBST_ALT	Substantive VBM quantified by a dichotomous variable that equals 1 if the firm has VBM sophistication (*VBM_SUM*) of at least 3 and 0 otherwise	Hand-collected

Refinitiv Eikon Datastream codes in parantheses.

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Tables

TABLE 1: Sample selection

Selection sequence	Firm years
Firm years of the 200 largest non-financial STOXX Europe 600 firms between 2005 and 2020	3,200
- liquidation or delisting within observation period	410
- double listing (no clear allocation to company-specific data)	121
- missing annual reports	36
- missing CSP data	43
- missing control data	74
Final sample	2,516

TABLE 2: Share of companies adopting the five different elements of VBM sophistication by year (in %)

Year	n	*VBM_VO*	*VBM_KPI*	*VBM_TARGET*	*VBM_COMP*	*VBM_SEGMENT*
2005	165	68.5	23.6	18.8	13.3	12.1
2006	161	70.2	26.1	22.4	17.4	11.2
2007	160	70.6	23.7	21.9	18.1	11.9
2008	158	70.3	23.4	21.5	19.6	12.7
2009	160	71.9	21.9	20.0	15.6	12.5
2010	159	73.0	23.9	22.0	17.0	14.5
2011	161	72.7	21.7	19.9	17.4	12.4
2012	158	72.2	20.9	20.3	17.7	13.9
2013	161	71.4	21.1	19.3	19.3	14.9
2014	161	74.5	19.3	17.4	17.4	14.3
2015	157	68.8	27.4	18.5	17.8	12.7
2016	155	67.7	21.9	16.1	14.2	9.7
2017	153	68.0	26.1	15.7	13.7	10.5
2018	150	65.3	24.0	16.0	15.3	8.7
2019	150	66.0	24.7	15.3	14.0	8.7
2020	147	64.6	24.5	17.0	15.0	8.2
Total	2,516	69.8	23.4	18.9	16.5	11.8

TABLE 3: Descriptive statistics

Variable	n	Mean	Min.	Q25	Median	Q75	Max.	Std. dev.
ROA	2,516	5.716	-10.247	2.406	4.647	7.984	33.253	6.358
TOBQ	2,516	1.210	0.207	0.644	0.929	1.408	6.840	1.005
VBM_SUM	2,516	1.404	0.000	0.000	1.000	2.000	5.000	1.483
VBM_SUBST	2,516	0.149	0.000	0.000	0.000	0.000	1.000	0.356
CSP	2,516	68.615	9.080	59.305	72.065	81.245	95.150	16.459
CSP_EN	2,516	68.869	0.000	57.615	74.640	84.945	99.230	21.819
CSP_SO	2,516	71.409	3.560	59.320	76.150	86.805	98.470	19.347
CSP_CG	2,516	63.278	2.470	48.720	66.885	80.130	98.590	20.787
SIZE[a]	2,516	41,939,597	249,679	11,103,248	24,237,195	48,705,153	483.628.000	51,923,633
LSIZE	2,516	16.990	12.428	16.226	17.005	17.705	19.997	1.102
GROWTH	2,516	3.462	-40.473	-3.371	3.139	9.970	66.989	14.772
LEV	2,516	1.060	-2.759	0.394	0.691	1.366	8.009	1.262
CFVOL	2,516	0.024	0.000	0.008	0.015	0.028	0.621	0.033
BETA	2,516	0.926	-0.567	0.687	0.901	1.145	2.509	0.356
RDRATIO	2,516	2.492	0.000	0.000	0.290	2.787	24.718	4.742
RD_MISSING	2,516	0.339	0.000	0.000	0.000	1.000	1.000	0.473
NOSHIC	2,516	3.306	0.000	0.000	0.000	6.000	41.000	5.648

This table shows the arithmetic mean (Mean), minimum (Min.), first quartile (Q25), median (Median), third quartile (Q75), maximum (Max.), and standard deviation (Std. dev.) for all firm-year observations (n) across the entire period. Detailed variable descriptions are provided in the Appendix.
[a] Nonlogarithmized values of *LSIZE* in thousand euros to facilitate interpretation.

TABLE 4: Sample composition by year, industry, and country

Panel A: Year	n	*ROA*	*TOBQ*	*VBM_SUM*	*VBM_SUBST*	*CSP*
2005	165	7.944	1.387	1.364	0.164	50.474
2006	161	8.172	1.490	1.472	0.180	52.151
2007	160	8.315	1.464	1.462	0.169	60.114
2008	158	5.835	0.990	1.475	0.171	65.250
2009	160	4.494	1.072	1.419	0.156	67.328
2010	159	7.025	1.119	1.503	0.170	69.178
2011	161	6.027	1.018	1.441	0.161	70.192
2012	158	5.280	1.065	1.449	0.158	70.477
2013	161	4.866	1.224	1.460	0.161	70.310
2014	161	5.110	1.219	1.429	0.143	70.613
2015	157	4.518	1.243	1.452	0.153	72.775
2016	155	4.420	1.208	1.297	0.123	73.594
2017	153	5.765	1.248	1.340	0.118	74.554
2018	150	5.357	1.121	1.293	0.120	77.059
2019	150	4.881	1.247	1.287	0.113	77.506
2020	147	3.014	1.233	1.293	0.116	79.342
Total	2,516	5.716	1.210	1.404	0.149	68.615
Panel B: Industry	**n**	***ROA***	***TOBQ***	***VBM_SUM***	***VBM_SUBST***	***CSP***
Basic Materials	231	5.885	0.991	1.680	0.186	73.194
Consumer Goods	453	6.642	1.422	1.501	0.179	69.220
Consumer Service	457	6.621	1.512	1.206	0.138	60.668
Health Care	195	9.878	1.939	1.703	0.159	73.208
Industrials	472	4.015	0.874	1.604	0.210	65.496
Oil & Gas	167	5.079	0.834	0.886	0.018	76.809
Technology	89	6.297	1.507	0.753	0.000	77.600
Telecommunication	224	4.423	1.076	1.036	0.049	70.299
Utilities	228	3.358	0.767	1.654	0.193	70.073
Total	2,516	5.716	1.210	1.404	0.149	68.615
Panel C: Country	**n**	***ROA***	***TOBQ***	***VBM_SUM***	***VBM_SUBST***	***CSP***
AT – Austria	31	3.332	0.789	1.839	0.129	68.233
BE – Belgium	64	5.525	1.122	0.719	0.000	57.744
CH – Switzerland	129	9.072	1.645	1.597	0.132	76.485
DE – Germany	327	4.346	0.935	3.373	0.657	71.069
DK – Denmark	40	13.408	2.733	1.600	0.150	60.954
ES – Spain	154	4.458	1.074	0.779	0.000	74.239
FI – Finland	80	5.538	0.946	1.012	0.000	73.191
FR – France	496	4.764	1.156	0.611	0.042	65.194
GB – Great Britain	568	6.538	1.313	1.347	0.093	68.812
GI – Gibraltar	9	6.801	3.228	0.667	0.000	36.469
GR – Greece	32	12.284	2.032	0.844	0.000	64.075
IE – Ireland	16	7.184	1.240	0.375	0.000	32.579
IT – Italy	137	3.042	0.907	0.825	0.036	69.116
JE – Jersey	24	4.265	0.892	2.000	0.000	65.468
LU – Luxemburg	32	7.239	1.270	1.125	0.188	39.175
NL – Netherlands	159	4.832	1.052	1.377	0.119	72.704
NO – Norway	64	4.973	0.942	1.328	0.109	73.011
PT – Portugal	26	2.854	0.733	1.192	0.000	71.214
SE – Sweden	128	8.666	1.669	1.688	0.172	72.608
Total	2,516	5.716	1.210	1.404	0.149	68.615

This table presents the sample composition clustered by years, industries according to the Industry Classification Benchmarks (ICB) at Refinitiv Eikon, countries according to stock listing, and the arithmetic means of the variables. Detailed variable descriptions are provided in the Appendix.

TABLE 5: Correlations

	ROA	*TOBQ*	*VBM_ SUM*	*VBM_ SUBST*	*CSP*	*LSIZE*	*GROWTH*	*LEV*	*CFVOL*	*BETA*	*RDRATIO*	*RD_ MISSING*	*NOSHIC*
ROA		0.68***	0.00	-0.09***	-0.10***	-0.25***	0.33***	-0.37***	-0.03	-0.20***	0.07***	-0.05**	0.05***
TOBQ	0.72***		-0.04*	-0.17***	-0.14***	-0.36***	0.17***	-0.26***	0.04**	-0.36***	-0.01	0.07***	0.10***
VBM_ SUM	-0.03	-0.07***		0.66***	0.08***	0.06***	0.01	0.05**	-0.01	-0.07***	0.11***	-0.13***	0.06***
VBM_ SUBST	-0.07***	-0.11***	0.86***		0.03*	0.10***	-0.02	0.05**	-0.04*	0.09***	0.12***	-0.12***	0.02
CSP	-0.13***	-0.15***	0.07***	0.03		0.46***	-0.13***	0.04**	0.02	0.14***	0.23***	-0.18***	-0.05***
LSIZE	-0.29***	-0.38***	0.10***	0.11***	0.48***		-0.00	0.26***	-0.01	0.20***	0.21***	-0.29***	-0.10***
GROWTH	0.25***	0.12***	-0.01	-0.02	-0.12***	0.02		-0.12***	-0.04*	-0.04**	0.03	-0.05***	-0.01
LEV	-0.22***	-0.17***	-0.01	-0.01	0.01	0.16***	-0.03		0.03	-0.02	-0.20***	0.14***	0.04**
CFVOL	0.04**	0.09***	-0.02	-0.03	-0.02	-0.13***	-0.02	0.02		0.05**	0.06***	-0.04**	0.02
BETA	-0.18***	-0.23***	-0.00	0.07***	0.15***	0.17***	-0.05**	-0.07***	0.05**		0.17***	-0.15***	-0.08***
RDRATIO	0.09***	0.12***	0.05**	0.01	0.14***	0.06***	0.01	-0.13***	0.10***	0.01		-0.82***	-0.01
RD_ MISSING	0.00	0.09***	-0.14***	-0.12***	-0.18***	-0.30***	-0.05**	0.14***	0.00	-0.16***	-0.38***		0.07***
NOSHIC	0.04*	0.02	0.03	0.00	-0.09***	-0.13***	0.02	0.06***	0.01	-0.08***	0.05**	0.07***	

This table reports the Pearson (above diagonal) and Spearman (below) correlation coefficients between our variables. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. Detailed variable descriptions are provided in the Appendix.

TABLE 6: Hypotheses tests

Model	1	2	3
Hypothesis	1	2	3
Estimation	OLS	OLS	OLS
Dependent variable	*CSP*	*ROA*	*TOBQ*
Period	Full	Full	Full
Years	2005-2020	2005-2020	2005-2020
Constant	50.977***	6.254***	0.536***
	(2.749)	(0.676)	(0.130)
VBM_SUM	0.876***		
	(0.314)		
VBM_SUBST × *CSP*		0.338**	0.041***
		(0.151)	(0.015)
VBM_SUBST		-0.008	-0.032
		(0.469)	(0.060)
CSP		-0.036	-0.026
		(0.416)	(0.033)
LSIZE	4.600***	-1.877***	-0.179***
	(0.908)	(0.394)	(0.053)
ROA	-0.004		0.057***
	(0.073)		(0.008)
GROWTH	0.004	0.067***	-0.001
	(0.013)	(0.010)	(0.001)
LEV	-0.016	-0.444**	0.013
	(0.262)	(0.177)	(0.014)
CFVOL	8.244	3.198	0.329
	(6.523)	(8.655)	(0.820)
BETA	0.956**	-0.462**	-0.025
	(0.385)	(0.215)	(0.024)
RDRATIO	-0.028	-0.441***	0.008
	(0.194)	(0.142)	(0.011)
RD_MISSING	-1.136	-0.612	-0.041
	(1.356)	(0.596)	(0.050)
NOSHIC	0.006	-0.024	-0.007*
	(0.065)	(0.031)	(0.004)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Observations/firm years	2,516	2,516	2,516
Adj. R-squared	56.3%	30.3%	63.4%
Max. VIF	3.81	3.82	3.82
(Corresponding) Wooldridge test[a]	0.51	0.18	0.34

This table reports the hypotheses tests based on multivariate regressions. Robust standard errors, clustered at the firm level, are provided in parentheses below the standardized coefficients. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. Detailed variable descriptions are provided in the Appendix.

[a] We choose between presenting OLS or IV regressions based on the *p*-values for IV regressions in the Wooldridge (1995) tests of endogeneity. If an OLS regression is chosen (for *p*-values > 0.1), the *p*-value stems from this (corresponding) test.

TABLE 7: Periodical effects

Panel A:
H1. *Higher VBM sophistication is associated with higher CSP levels*.

Model	4	5	6	7
Hypothesis	1	1	1	1
Estimation	OLS	OLS	OLS	OLS
Dependent variable	*CSP*	*CSP*	*CSP*	*CSP*
Period	Precrisis	Crisis	Unreg. postcrisis[a]	Reg. postcrisis[a]
Years	2005-2007	2008-2010	2011-2016	2017-2020
Constant	47.970***	71.560***	72.516***	73.341***
	(7.243)	(2.071)	(1.743)	(3.459)
VBM_SUM	1.091	0.267	0.730***	0.270
	(0.727)	(0.308)	(0.227)	(0.331)
LSIZE	9.372***	8.426***	5.255***	3.716***
	(1.227)	(1.105)	(1.077)	(1.109)
ROA	0.028	0.214**	-0.023	-0.016
	(0.120)	(0.098)	(0.079)	(0.039)
GROWTH	-0.020	0.005	0.007	0.021
	(0.036)	(0.017)	(0.022)	(0.016)
LEV	-0.035	0.202	0.047	-0.501
	(0.471)	(0.535)	(0.242)	(0.310)
CFVOL	23.444*	11.483	-14.861	1.779
	(13.358)	(9.362)	(17.286)	(6.918)
BETA	0.125	1.141*	0.173	0.215
	(0.996)	(0.659)	(0.363)	(0.365)
RDRATIO	-0.893***	0.431	0.228*	0.274
	(0.275)	(0.264)	(0.131)	(0.226)
RD_MISSING	-4.388*	1.358	-0.563	1.311
	(2.655)	(1.738)	(0.951)	(2.907)
NOSHIC	0.041	-0.075	0.095	-0.146**
	(0.120)	(0.086)	(0.064)	(0.074)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations/firm years	486	477	953	600
Adj. R-squared	44.1%	47.9%	49.2%	48.4%
Max. VIF[b]	3.61	4.46	3.88	4.03
(Corresponding) Wooldridge test[c]	0.31	0.62	0.62	0.71

TABLE 7: Periodical effects (continued)

Panel B:
H2. *Substantive VBM implementation and higher CSP are jointly associated with higher accounting performance*.

Model	8	9	10	11
Hypothesis	2	2	2	2
Estimation	OLS	IV	OLS	OLS
Dependent variable	*ROA*	*ROA*	*ROA*	*ROA*
Period	Precrisis	Crisis	Unreg. postcrisis[a]	Reg. postcrisis[a]
Years	2005-2007	2008-2010	2011-2016	2017-2020
Constant	10.162***	5.195***	3.818***	5.639***
	(1.729)	(1.227)	(0.951)	(0.948)
VBM_SUBST × *CSP*	0.061	3.816**	0.788**	-0.677
	(0.194)	(1.547)	(0.318)	(0.536)
VBM_SUBST	-1.272	-8.336***	-1.157	2.388*
	(1.002)	(2.453)	(0.805)	(1.275)
CSP	-0.274	0.377	-0.025	-0.127
	(0.356)	(0.752)	(0.624)	(0.704)
LSIZE	-2.531***	-2.064***	-1.349***	-1.244***
	(0.770)	(0.612)	(0.513)	(0.450)
GROWTH	0.030	0.072***	0.066***	0.062***
	(0.020)	(0.019)	(0.021)	(0.015)
LEV	-0.111	-0.677**	-0.792***	-0.375
	(0.286)	(0.306)	(0.263)	(0.375)
CFVOL	-21.814**	11.924	10.000	-10.290*
	(9.677)	(15.277)	(8.039)	(5.774)
BETA	0.438	-1.458***	-0.746***	-0.674**
	(0.378)	(0.477)	(0.270)	(0.320)
RDRATIO	0.018	-0.093	-0.147	-0.094
	(0.212)	(0.180)	(0.114)	(0.123)
RD_MISSING	-1.213	-2.750*	-0.340	-0.893
	(1.735)	(1.434)	(0.690)	(0.944)
NOSHIC	-0.055	-0.038	0.025	0.038
	(0.036)	(0.060)	(0.037)	(0.055)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations/firm years	486	477	953	600
Adj. R-squared	32.6%	18.3%	34.5%	30.9%
Max. VIF[b]	3.72		3.93	4.85
(Corresponding) Wooldridge test[c]	0.40	0.00	0.13	0.23

TABLE 7: Periodical effects (continued)

Panel C:
H3. *Substantive VBM implementation and higher CSP are jointly associated with higher capital market perfor-*

Model	12	13	14	15
Hypothesis	3	3	3	3
Estimation	OLS	IV	OLS	OLS
Dependent variable	*TOBQ*	*TOBQ*	*TOBQ*	*TOBQ*
Period	Precrisis	Crisis	Unreg. postcrisis[a]	Reg. postcrisis[a]
Years	2005-2007	2008-2010	2011-2016	2017-2020
Constant	0.613***	0.438**	0.441***	0.919***
	(0.225)	(0.187)	(0.095)	(0.120)
VBM_SUBST × *CSP*	0.029	0.340*	-0.007	-0.044
	(0.021)	(0.182)	(0.019)	(0.032)
VBM_SUBST	-0.112	0.078	0.031	0.001
	(0.101)	(0.253)	(0.048)	(0.097)
CSP	0.023	-0.104	-0.015	-0.082
	(0.036)	(0.081)	(0.050)	(0.095)
LSIZE	-0.535***	-0.210***	-0.289***	-0.336***
	(0.091)	(0.060)	(0.083)	(0.087)
ROA	0.048***	0.088***	0.030***	0.013**
	(0.012)	(0.013)	(0.006)	(0.007)
GROWTH	-0.000	-0.001	0.003***	-0.000
	(0.001)	(0.002)	(0.001)	(0.001)
LEV	-0.032	0.023	0.003	-0.005
	(0.029)	(0.022)	(0.010)	(0.014)
CFVOL	-0.586	-0.636	-0.513	-0.692
	(0.537)	(1.486)	(0.856)	(0.443)
BETA	0.004	-0.070	-0.009	-0.108***
	(0.036)	(0.055)	(0.022)	(0.022)
RDRATIO	0.006	0.024	0.015*	0.026
	(0.014)	(0.015)	(0.008)	(0.023)
RD_MISSING	0.105	-0.031	0.025	0.062
	(0.134)	(0.118)	(0.056)	(0.148)
NOSHIC	-0.003	-0.012**	0.001	0.002
	(0.005)	(0.006)	(0.003)	(0.005)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations/firm years	486	477	953	600
Adj. R-squared	74.9%	56.4%	66.7%	52.6%
Max. VIF[b]	3.72		3.93	4.86
(Corresponding) Wooldridge test[c]	0.42	0.01	0.62	0.43

This table reports the hypothesis tests based on multivariate regressions. Robust standard errors, clustered at the firm level, are provided in parentheses below the standardized coefficients. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. Detailed variable descriptions are provided in the Appendix.

[a] Unregulated (Regulated) postcrisis period, i. e., years until (after) the initiation of the Non-Financial Reporting Directive 2014/95 in 2016.

[b] VIF values are only reported for OLS models due to ambiguous computation and interpretation of the respective values of the IV models.

[c] We choose between presenting OLS or IV regressions based on the *p*-values for IV regressions in the Wooldridge (1995) tests of endogeneity. If an OLS regression is chosen (for *p*-values > 0.1), the *p*-value stems from this (corresponding) test.

(4)

Management control systems and technological innovation: Empirical evidence on effects and context factors of value-based management and patent outputs

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Management control systems and technological innovation: Empirical evidence on effects and context factors of value-based management and patent outputs

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Abstract

This study analyzes the influence of value-based management (VBM) on technological innovation (TI). TI, the creation of technological products, processes or systems, enables firms to develop competitive advantages and, thus, determines the long-term success of organizations. While VBM is often considered as an instrument for efficiency-driven mature companies with a naturally lower focus on TI, it should, by its focus on value generation, foster TI in the long-term from a conceptual perspective. To answer the question whether VBM actually promotes TI, we collect patent data from the European Patent Office to measure TI and match this data with a VBM dataset from Kister et al. (2024) comprising more than 2,500 European firm years between 2006 and 2020. Our results reveal that VBM can indeed positively influence TI depending on context factors: While we do not find a generally positive effect of VBM on TI, we demonstrate that VBM positively influences TI output depending on the orientation towards employees' needs, i. e., people centricity, and on the shares held by long-term-oriented institutional investors. These results indicate that innovation stimuli triggered by VBM work differently across organizational levels. At the operational level, a strong orientation towards employees' needs might reduce inter-organizational pressure generated through VBM's efficiency-driven controls. Conversely, at the management level, we reason that influential institutional investors with long-term investment horizons have the "long breath" to support managers with long-term TI projects when implemented VBM systems reduce asymmetric information and ensure goal alignment.

Keywords: value-based management; technological innovation; patents; people centricity; institutional shareholders
JEL: M41; O32; M14

1 Introduction

Management control systems (MCS) and technological innovation (TI) have received significant attention in previous scholarly discourse due to their potential impact on short- and long-term performance (e. g., Guo et al. 2019; Biswas and Akroyd 2022; Barros and Da Ferreira 2023; Akroyd and Maguire 2011; Barros and Da Ferreira 2019, 2022; Davila et al. 2009; Davila 2000; Feeney and Pierce 2018; Henri and Wouters 2020; Pan Fagerlin and Lövstål 2020). While adequately designed MCS – "the formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities" (Simons 1995) – can secure the implementation of defined strategic targets and operational excellence (Merchant and van der Stede 2023), TI is required to sustain long-term competitiveness within rapidly evolving global economies. Despite this high practical relevance, empirical research on the impact of MCS on TI and relevant contextual factors remains incomplete (Guo et al. 2019). Theoretically, well-designed MCS can incentivize and allocate resources effectively and efficiently, fostering a conducive environment for creativity among employees, and thus, enhance TI. Conversely, overly restrictive MCS may impede TI by directing the focus solely towards measurable, often short-term-oriented objectives, stifling creativity and risk-taking. Hence, empirically analyzing these conflicting line of thoughts offers highly relevant insights how organizations can effectively capture innovative potential to sustain long-term competitiveness.

Value-based management (VBM), with its emphasis on long-term shareholder value creation, represents a MCS that is intended to balance short-term efficiency with important long-term goals. Prior research has documented various positive performance effects of the adequate use of VBM (Knauer et al. 2018; Lueg and Schäffer 2010; Firk et al. 2016; Ittner and Larcker 2001; Athanassakos 2007; Rapp et al. 2011; Kister et al. 2024). At the same time, VBM has been blamed for

leading managers and investors to focus solely on short-term results (Rieg 2015). Given these contradictory views, it is surprising that the association of VBM and TI is unexplored yet. In this study, we target this specific research gap and explore whether the use of VBM indeed translates into impactful innovation outputs. On the one hand, the quantification of projects with value-based metrics should lead to a prioritization of value-generating innovation efforts compared to, e. g., alternative payouts via dividends or stock repurchases. On the other hand, cost cutting, which is often associated with the use of VBM, might be linked to lower spending on or investing in innovative efforts (Lovata and Costigan 2002) – particularly in saturated firms in later life-cycle stages, where VBM is widespread (Brück et al. 2023).

Given these diverging potential consequences of VBM, we also analyze critical context factors of this relationship to identify boundary conditions that support the positive influence on TI. First, we hypothesize that the firm's orientation towards employees' needs, its *people centricity* (PEOPCENT), complements the shareholder value creation aspect of VBM in order to foster TI. We argue, that the deeply ingrained VBM principles provide a clear path towards value creation and, thus, support the generation of tangible innovation outputs. At the same time, however, VBM creates organizational pressure on employees. PEOPCENT reduces this organizational pressure by providing the necessary personal support to be creative. Hence, we argue that PEOPCENT moderates the influence of VBM. Second, we posit that the implicit long-term orientation through VBM is facilitated through the presence of long-term-oriented institutional investors (LTINV). Assuming that managers act in shareholders' best interests, LTINV should support long-term-oriented TI ambitions, even if they worsen interim results.

In our empirical study, we rely on patent data from the European Patent Office (EPO) to analyze the main construct TI. To obtain adequate data for our study context, we employed a

sophisticated process involving numerous steps and three independent data collectors to systematically query patent data through name matching, followed by a diligent review and data aggregation. We complement this data by a dataset comprising individual assessments of VBM elements from Kister et al. (2024) based on annual reports of initially more than 2,500 firm years during a 15-year period from 2006 to 2020 and with relevant firm-specific data from London Stock Exchange Group (LSEG) Eikon.

The empirical results present a multifaceted association between VBM and TI, measured through patent outputs. While we do not find an overarching positive effect of VBM sophistication on TI, the analyzed determinants PEOPCENT and LTINV moderate the expected impact. Accordingly, high levels of VBM sophistication accompanied with an extensive PEOPCENT or high shares of LTINV lead to improved TI. These results are robust to a variety of variable and econometric specifications. Analyzing the composition of the two focal context factors PEOPCENT and LTINV deepens the understanding of this relationship. Most remarkably, decomposing the different investor types indicates that it is indeed the long-term orientation that drives the positive impact of VBM on TI.

This study contributes to theory and practice on multiple levels by analyzing context factors, which help to exploit a positive influence of VBM on TI. At the operational level, the positive interaction effect of VBM and PEOPCENT on TI indicates a particularly important role of "soft" context factors like an orientation towards employees' needs. We argue that such factors can reduce the organizational pressure of VBM from the employees' perspective while maintaining the clear guidance towards value creation, thus providing a working environment in which output-oriented creativity can materialize.

At the management level, the positive interaction effect of VBM and LTINV on TI rather emphasizes the importance of reducing information asymmetries and signaling. This is explained by goal-alignment between management and LTINV through VBM, which should reduce short-term pressure on managers and allow more long-term-oriented innovation strategies, even if they potentially affect interim results. Importantly, we show that VBM does not necessarily lead to higher TI outputs. However, systematically focusing on long-term shareholder value creation can still be an effective lever to increase TI – as long as context factors with the potential to mitigate VBM-associated risks exist.

The paper is structured as follows. Section 2 summarizes related literature on VBM and TI to develop the hypotheses in Section 3. Section 4 describes our empirical approach. Section 5 presents our results, robustness checks, and additional analyses. Section 6 concludes.

2 Background

2.1 Quantification of VBM

By introducing the framework of the levers of control, Simons (1995) explicitly acknowledged the need for MCS to address strategic uncertainties. VBM can be classified as an MCS that integrates such uncertainties: At the conceptual level, the guiding principle of VBM explicitly emphasizes strategic *long-term* orientation (Ittner and Larcker 2001), which might positively impact time-lagged innovation outputs.[1] Further, a comprehensive VBM implementation entails various, individually determinable control elements, which might enhance the effectiveness of the MCS through its combination with other factors.

[1] At the same time, "blaming shareholder value and value-based management as causes for short-termism" (Rieg 2015, p. 194) has been widespread from its beginning on.

Fundamentally, VBM represents a MCS that aligns organizational activities and decision-making towards the stellar objective of maximizing shareholder value in the long-term (Ittner and Larcker 2001; Firk et al. 2016; Nowotny et al. 2022; Schultze et al. 2018). By drawing on value-based metrics, which quantify value creation through the comparison of firm performance with the cost of capital (Brück et al. 2023; Dekker et al. 2012), the long-term value generation of innovation initiatives can be quantified – in particular, as value-based metrics can also incorporate nonfinancial information as value drivers (Ittner and Larcker 2001). Furthermore, using value-based metrics can reduce asymmetric information by establishing transparent and standardized measurement criteria (Schultze et al. 2018). This, in turn, can be the basis for better-informed decisions regarding resource allocation and investment in innovation projects. Additionally, it has the potential to reduce uncertainty and facilitate more accurate valuations of innovation initiatives.

However, previous VBM research suggests to capture the implementation level of VBM not only based on the use of value-based metrics, but to reflect VBM systems more holistically (Malmi and Ikäheimo 2003; Burkert and Lueg 2013; Firk et al. 2019). In this study, we draw on a framework proposed by Firk et al. (2019), which encompasses five elements that account for the so-called *VBM sophistication* within organizations. These elements are the explicit commitment to the target of value creation (*value orientation*), the use of a value-based performance metric (*value-based metric adoption*), target-setting based on value-based metrics (*target setting*), linking compensation to value-based metrics (*compensation-linking*), and the integration of value-based metrics into lower levels of the organization (*operational integration).*

Regarding the innovation context, this broad assessment of VBM sophistication has the potential to reflect an organization's (by definition long-term) value orientation more accurately. Particularly linking executive compensation to long-term value creation has the potential to incentivize

managers to prioritize innovation efforts that enhance sustainable growth and competitive advantage in the long-term. This alignment of incentives could encourage managers to support TI and cultivate a culture of innovation within organizations that is beneficial to shareholders.

2.2 Quantification of TI

TI is a proven success factor for financial long-term performance (e. g., Hsu et al. 2023; Kogan et al. 2017), and hence, shareholder value (Hall et al. 2005; Hirshleifer et al. 2013). TI describes the creation and implementation of new or improved technological products, processes or systems (Porter and Kramer 2006). This can include various technological advancements such as creating novel devices, but also enhancing existing products or combining different technologies to new systems (Lin 2023). However, quantifying the TI level of organizations is challenging. Towards this end, previous research differentiated between innovation input, output, or their respective ratios, often referred to as innovation efficiency (Hirshleifer et al. 2013). While innovation input is typically quantified by research and development (R&D) expenditures, various measurement options for innovation output exist, such as rating-based assessments, the proportion of new products compared to financial metrics, or patent-based approaches. In this study, we focus on patents for measuring innovation output due to several advantages. First, and most important, patents allow an objective quantification of innovation output due to associated officially defined and often tedious patenting processes. Second, they enable a differentiation between quantity (number of patents) and quality (forward citations). Particularly the consideration of forward citations, i. e., the references to a patent by later patents, allows a correction of potentially skewed absolute patent numbers due to varying patenting strategies or regulatory hurdles. Drawing on the metric *citation impact* combines quantity and quality through weighting the absolute patent numbers based on a

relative comparison of forward citations within their respective year/technology class clusters (Hall and Ziedonis 2001; Boh et al. 2020). Third, supplementary information at the individual patent level enable study-specific classifications and multi-faceted analyses.

However, capturing TI output through patent information faces several difficulties. First, patenting activities are volatile and affected by context factors. For example, not all innovations are protected by patents due to associated efforts and costs as well as additional protecting means, such as intentionally complex specifications, lead time or industrial secrecy (Dechezleprêtre et al. 2021). Furthermore, relevance and use of patents vary significantly between industries, countries and periods (Neuhäusler and Frietsch 2017). Illustrating the first factor, patenting innovative drugs is at the core of business models of pharmaceutical companies, suggesting different strategies as compared to companies in other industries.

Second, the duration of innovation development and patent grant processes complicate the temporal allocation of patents. While development cycles vary greatly, also the granting procedure can take from three up to five years from patent application to official publication (European Patent Office 2024). Prior empirical research suggests focusing on the (lagged) year of patent application (Atanassov 2013; Atanassov and Liu 2020; Mao and Weathers 2019; Jia et al. 2022). In doing so, the impact of varying granting process durations can be mitigated.

Third, patent-related empirical research is typically confronted with inadequate data quality. While early research frequently relied on the common publicly available datasets, such as the NBER dataset (Hall et al. 2001), exploiting yet available public databases presents various challenges. Analyzing a European sample, the database PATSTAT Online of the EPO offers patent-related information at the finest granularity and allows individual customizations via Structured Query Language (SQL). However, there is no standardized unique identifier-based allocation of

patents to companies. Being reliant on applicants' name declarations poses a major challenge due to varying company names, but also subsidiaries and country-specific entities. This calls for a comprehensive approach that is based on the required name matching but alleviates potential discrepancies due to manual allocations through clearly pre-defined coding rules and the independent assessment of various coders.

Nevertheless, the output-based measurement through patents, particularly considering the citation impact, allows for a multifaceted analysis, considering both the quantity and quality of TI.

3 Hypotheses development

We argue that higher VBM sophistication leads to higher TI outputs as it *facilitates prioritization*, *reduces uncertainty* and thereby *increases legitimacy* of promising innovation projects through its explicit value-based quantification approach. At the same time, the underlying *long-term-orientation* and *reduced short-term pressure* by stakeholders should even enhance advantageous effects (H1).

MCS, and in particularly the shareholder-value-focused VBM, are often perceived as management practices used by large, complex and mature companies in later lifecycle stages. Additionally, they are often equated with cost reduction concepts due to their performance-based control mechanisms. As innovations are predominantly driven by younger growth-oriented companies and often require substantial investments, traditional accounting practices are not intuitively associated with TI. Nevertheless, MCS research clearly suggests that the promotion of innovation through learning and adaptation plays a crucial role (Simons 1995; Merchant and Otley 2006). Also empirical research demonstrated that particularly more open approaches to management control can foster innovation via multiple pathways (Chenhall and Moers 2015). Accordingly, several studies

indicate that MCS can reduce uncertainty, for instance in project settings (e. g., Davila et al. 2009; Ylinen and Gullkvist 2014; Cardinal 2001). MCS can further support the generation, dissemination and exchange of knowledge, enhancing collaboration and creativity but also the conversion of ideas into commercially successful products (Henri 2006; Jørgensen and Messner 2010; Guo et al. 2019; Jansen et al. 2006). Additionally, they can support legitimization of processes with internal and external stakeholders (Davila et al. 2009).

Specifically referring to VBM, the explicit quantification with regards to shareholder value contribution should promote early-stage assessments of innovation projects. Thus, VBM should reduce uncertainty and motivate stakeholders to actively foster promising initiatives. Moreover, being able to justify investment and resource allocation decisions based on pre-defined evaluations will further ease the legitimization of initiatives. Beyond the before-mentioned arguments, VBM metrics are helpful in prioritizing cost and investment allocation and utilization (e. g., Hogan and Lewis 2005), and hence are particularly powerful for prioritizing TI efforts. Adhering to a clearly defined prioritization logic and systematically allocating resources to expectedly value creating projects should result in improved TI outputs. Lastly, measuring shareholder value contributions against the required cost of capital implies a certain long-term orientation. This orientation will be even stronger if VBM is comprehensively implemented within the organization, including operational integration at the segment level or value-based compensation. Long-term planning and target setting is expected to yield significant benefits, particularly in complex innovation projects with potentially even higher returns. This should further facilitate the management of complex projects. Hence, we formulate our H1 as follows:

H1. *Higher VBM sophistication is associated with a higher TI output.*

Previous research describes the relationship between MCS and TI output as highly context-specific (Guo et al. 2019). Accordingly, we investigate two contextual factors hypothesized to exert a moderating influence on the relation between VBM and TI, with one factor (PEOPCENT) focussing on the operational level of an organization, and the other (LTINV) on the management level. First, we propose an interaction effect of VBM sophistication and PEOPCENT on TI (H2). We define PEOPCENT as the level of employee orientation of an organization. This encompasses initiatives to directly support the own workforce (e. g., through increasing workplace safety and establishing development opportunities), but also indirect initiatives (e. g., increasing the standard of living through community projects, and thereby enhancing the perceived well-being of the own workforce).

We argue that the shareholder value orientation of VBM leads to two different effects on the operational level of an organization. Most importantly, VBM provides a clear path towards value creation through its value-based quantification approach, which supports employees on the operational level in generating tangible innovation outputs. This clear path, however, also comes at the cost of high organizational pressure being put on employees, which might reduce the generation of tangible innovation outputs, questioning the overall effect of the shareholder value creation aspect on TI on the operational level.

Prior research demonstrates that perceived organizational support, which can be fostered by people-centric investments into employees' career development, trainings and working conditions, promotes job satisfaction and overall performance (Cullen et al. 2014; Eisenberger et al. 2001; Rhoades and Eisenberger 2002). Additionally, fostering an inclusive environment and diversity within organizations can also be beneficial for TI. For instance, previous research concludes that diverse teams are more creative (Burt 2004; Fleming et al. 2007; Rodan and Galunic 2004) and

diverse communities even demonstrate higher patenting rates (Lee et al. 2004; Lee et al. 2002; Samila and Sorenson 2017).

Despite the before-mentioned positive effects, strong PEOPCENT alone, particularly associated with increased autonomy at the operational level, can also inhibit performance (Vogelsang 2024). Focusing on TI outputs, two main causes need to be considered: Firstly, strong PEOPCENT could lead to inefficiencies as employees do not experience the need for innovative outputs. In predominantly trust-based organizational cultures, reduced productivity might not become as apparent or only with a delay. Secondly, consciously granted autonomy can result in a lack of or untargeted prioritization of activities and projects. This might lead to a suboptimal resource allocation for innovation output.

Notably, the above-mentioned negative influence of PEOPCENT on TI should not materialize under VBM, as VBM metrics, firstly, can help to identify and monitor inefficiencies and secondly, pre-defined evaluations of innovation projects will foster an output-oriented prioritization. At the same time, the also discussed positive influence of PEOPCENT on TI should reduce organizational pressure on employees. Hence, we argue that high PEOPCENT reduces the organizational pressure on employees, thereby supporting the positive influence of VBM on TI. We formally posit H2 as follows:

H2. *Higher VBM sophistication and a higher degree of PEOPCENT are jointly associated with a higher TI output.*

Next, we propose that VBM and the presence of LTINV are jointly associated with higher TI output (H3). Summarized, we argue that long-term value-based decision-making works particularly

well if influential investors have “the long breath” to back long-term-oriented management decisions.

Institutional investors have an exceptional position when it comes to influencing management decisions. They typically closely monitor activities, regularly exchange with executives and can leverage unified stockholdings to credibly voice their interests (DesJardine et al. 2022). In the past, institutional owners often had a reputation of solely being interested in short-term shareholder value maximization – which, in turn, could undermine innovative projects with long-term returns (Zhang et al. 2023; Bushee 1998). However, previous literature documents a change of objectives and practices across institutional investors. Accordingly, modern institutional investors increasingly prioritize goals beyond mere shareholder value maximization, including a broader focus on long-term-oriented issues (Dyck et al. 2019; DesJardine et al. 2023; Velte 2023; Basse Mama and Mandaroux 2022; Alda 2019; Chen et al. 2020; Garel and Petit-Romec 2021; Kim et al. 2019; Oikonomou et al. 2020). This increased emphasis on long-term matters inherently leads to extended planning horizons. Additionally, institutional investors are highly heterogeneous, also with regards to investment horizons (Erhemjamts and Huang 2019; Oikonomou et al. 2020; Boubaker et al. 2017) – apparently determining their affinity towards TI investments.

By disclosing value-based metrics under VBM, firms voluntarily reduce asymmetric information and provide critical information to investors. This can be interpreted as a signaling mechanism which credibly reduces especially *institutional* investors’ information risk regarding managers’ commitment to pursue the goal of long-term shareholder value creation (Schultze et al. 2018). Hence, while VBM should contribute to goal congruence between managers and investors in general, this should particularly be the case for institutional investors, who possess a profound understanding of value-based metrics, deeply integrated with longer investment horizons. Relying on the

adequate use of VBM, positively evaluated innovation projects should always be supported by rationale institutional investors with long-enough investment horizons. Assuming rational decision-making of LTINV, this would even apply when the innovation focus is associated with negative short-term results. With significantly reduced pressure on managers to deliver short-term (e. g., quarterly) results to safeguarding their positions, a stringent execution of competitively advantageous innovation strategies should be facilitated. Consistently following-through value-creating innovation strategies should, in turn, lead to improved measurable innovation outputs.

This notion is also supported by prior research on the influence of institutional investors: Several studies observe a variety of potential positive effects of institutional investors on innovation, such as a lower likelihood of cutting R&D investments to meet short-term targets (Bushee 1998) or more support for CEOs in the face of profit downturns (Aghion et al. 2013). Accordingly, overarching positive effects of institutional investors on innovation are documented in various geographies (Duppati et al. 2022; Zhang et al. 2023; Rong et al. 2017; Chi et al. 2019), particularly if longer investment horizons are considered (Kordsachia et al. 2022; Barrot 2012).

Hence, we argue that while VBM reduces information asymmetries and thereby increases goal congruence in general, this is especially pronounced for institutional investors. Such investors often have a long-term investment horizon, gives assurance to managers that following VBM principles is supported by the investors even if these are associated with negative short-term results. Accordingly, we formulate our final hypothesis H3:

H3. *Higher VBM sophistication and higher shares of long-term-oriented institutional ownership are jointly associated with a higher TI output.*

4 Research design

4.1 Sample

As VBM is particularly widespread across larger and more complex firms (Brück et al. 2023), we focus our sample on the 200 largest non-financial STOXX Europe 600 firms in terms of market capitalization. The European setting is particularly suited for this study given the widespread levels of and variation in VBM adoption (Bezemer et al. 2015; Burkert and Lueg 2013; Firk et al. 2019; Nowotny et al. 2022). Analyzing a 15-years-period from 2006 to 2020 allows us to reflect long-term developments of TI. We address survivorship bias by defining our sample from an ex-ante perspective, based on firm size at the beginning of our study period.[2]

The sample is based on two comprehensive datasets: one providing various metrics on patent output at the firm-year level, and the other detailing the level of VBM sophistication. To derive our patent dataset, we drew on publicly available data from PATSTAT online by the EPO. PATSTAT is the largest international patent database, providing access to granular data at the patent level. This includes information regarding applicant (e. g., name and identification number), patent categories (e. g., according to the International Patent Classification (IPC) and the Cooperative Patent Classification system (CPC)), application process (e. g., filing, grant and publication date) as well as forward citations, also allowing a qualitative assessment of individual patents. Forward citations offer the important feature that they capture the future citations of a patent in the year of the patent grant. For a patent granted, for example, in 2010, this approach would sum up all citations of this patent from 2010 onwards until the data retrieval from EPO PATSTAT (i. e., in our case the end

[2] As our independent VBM variables are lagged by one year (see method of analysis), the sample selection is based on market capitalization at the end of 2005.

of 2023). Despite the granularity of the patent data, there is no unique identifier for a patent-to-company allocation. Hence, name matching is required. However, missing standardization of company names in the patent application process complicate the allocation procedure, particularly regarding subsidiaries and local entities. We address these challenges through a comprehensive data collection process based on pre-defined rules. Initially, we define that subsidiaries should be considered as they can bundle R&D resources to improve innovation outcomes (Srinivasan et al. 2021). However, we only include subsidiaries with more than 50% ownership by the parent company, as VBM practices are more likely to be applied in subsidiaries with majority ownership. Based on these rules, we compiled the dataset in five steps: firstly, defining the sample, secondly, conducting an expression search to cover all potential company matches, thirdly, querying patent data based on the defined search terms, fourth, manually assigning and cleaning of search terms to patents,[3] and fifth, consolidating and reviewing the search queries. Due to the extensive manual effort and to ensure high data quality, three analysts, including one of the authors, were involved across these steps.

For measuring VBM sophistication, we rely on data previously collected by Kister et al. (2024). To derive at the VBM dataset, these authors collected annual reports and individually assessed the existence of the five VBM elements, proposed by Firk et al. (2019), to obtain the level of VBM sophistication on a scale ranging from zero to five.[4] This approach allowed allowed these authors to quantify VBM sophistication for more than 99% of the analyzed firm years in line with

[3] We systemized the fourth step by addressing the issues of 'missing matches' with our expression allocation and 'false matches' with our cleaning approach. Example for 'missing matches': To obtain all patent entries for 'Volkswagen' search terms such as 'VW' (including different word complements), but also majority subsidiaries such as 'Audi', 'Skoda', 'Škoda', 'Bentley' and many further, need to be considered. Example for 'false matches': Querying 'MAN' results in numerous non-associated patent downloads (e. g., 'MAN Jeong Foods Company').

[4] In the European context, this information needs to be extracted from annual reports, while in the United States the relevant data can partially be found in proxy statements (Carter et al. 2022).

proven evaluation criteria in recent VBM research (Firk et al. 2019; Kister et al. 2024).[5] In this context, the authors considered absolute profit-based (e. g., EVA®) or cashflow-based (e. g., CVA) residual income measures as value-based, their corresponding return ratios or return ratios as long as they are compared with the cost of capital. To complete our dataset, we supplement the VBM and patent data with financial and operational firm data from the LSEG Eikon database, allowing a thorough analysis of the described context factors and considering a set of relevant control variables.

Table 1 provides an overview of the selection sequence leading to the final sample based on the above-described consolidated dataset. From our initially 3,000 firm-year observations, we eliminated 408 observations due to liquidation or delisting. To clearly allocate company-specific data, we further excluded 111 observations of double-listed companies. The final sample size of 2,299 firm-years results from the deduction of missing observations due to missing annual reports (20), missing patent (51) and control (111) data.

[Insert TABLE 1 here.]

4.2 Variables

Main variables

For a comprehensive output measurement, we draw on the citation impact and, hence, patent quality (e. g., Gu 2005; Boh et al. 2020; Dechezleprêtre et al. 2021; Hirshleifer et al. 2013; Hall and Ziedonis 2001) as dependent variable of the main analysis instead of the patent count (i. e., patent quantity), which we spare for the robustness test section. The key advantage of the citation

[5] According to Kister et al. (2024), only 20 annual reports of the 3,000 focal firm years in the observation period could not be retrieved through company websites, public databases or requests to the respective investor relation teams.

impact is its aggregation of both, quantitative but also qualitative aspects of TI into one single metric. Patent quality appears highly relevant for our study context as prior literature demonstrated that MCS can be particularly powerful in a later stage of the innovation process (Baer 2012; Oldham and Cummings 1996), the conversion of creative ideas into commercially successful products, services or processes (Guo et al. 2019; Bisbe and Malagueño 2015). We follow Hall and Ziedonis (2001) and Boh (2020) by calculating the logarithmized citation impact *LCITBOOK* based on received forward citations for all patents filed by a company in the year of interest, relative to the average forward citations per patent technology subcategory for that year, and finally weighted with the respective book value. Analogous to Jia et al. (2022), we focus on patent filings instead of grants to measure the actual impetus of VBM on innovation output, unaffected of specifics of the granting process.[6]

Our main independent variable is the degree of VBM sophistication. Following Firk et al. (2019), we calculate the ordinal variable *VBM_SUM* based on the sum of the five binary scored VBM elements in the dataset by Kister et al. (2024).

Moderating variables

For the proposed interactions, we need to operationalize PEOPCENT (H2) and LTINV (H3). The level of *PEOPCENT* is based on ratings of selected criteria concerning the social orientation in LSEG Eikon. These ratings are part of broader sustainability evaluations, which are conducted by LSEG analysts based on a variety of public information, such as annual and sustainability reports, stock filings and news articles (LSEG 2023). Scoring ranges on a scale from zero to 100, which implies a stronger people orientation for higher values. We calculate the level of

[6] The time period between patent filing/application and patent grant/approval depends on numerous factors, can vary significantly, and may take up to five years (European Patent Office 2024).

PEOPCENT as the equally weighted average of the three subdimension scores for Workforce (job satisfaction, workplace health and safety, diversity and equal opportunities, and development opportunities)[7], Human Rights (respecting human rights conventions)[8] and Community (being a good corporate citizen, public health, and business ethics)[9]. We intentionally spare out the fourth subdimension of the social pillar evaluation, i. e., product responsibility[10], in our aggregate score to focus only on the people-oriented performance. Nonetheless, we consider all mentioned subdimensions individually in an additional analysis.

To operationalize the moderating effect of *LTINV*, we consolidate the share of all private institutional shareholders as applicable in the LSEG database. Specifically, our moderating variable *LTINV* includes institutional ownership (of investment banks or further institutions, such as insurance or security companies), pension funds and externally invested companies. Even though further shareholder groups, such as governments or employees, should have a pronounced long-term interest in the company, we only refer to institutional investors with an expectedly active role and expertise to influence prioritization of innovative ambitions and projects. Again, we reflect conceivable alternative compositions through an additional analysis of the before-mentioned shareholder groups.

[7] "The workforce score measures a company's effectiveness in terms of providing job satisfaction, a healthy and safe workplace, maintaining diversity and equal opportunities and development opportunities for its workforce" (LSEG 2023, p. 29).

[8] "The human rights score measures a company's effectiveness in terms of respecting fundamental human rights conventions" (LSEG 2023, p. 29).

[9] "The community score measures the company's commitment to being a good citizen, protecting public health and respecting business ethics" (LSEG 2023, p. 29).

[10] "The product responsibility score reflects a company's capacity to produce quality goods and services, integrating the customer's health and safety, integrity and data privacy" (LSEG 2023, p. 29).

Control variables

We account for confounding factors in the test of our hypotheses by selecting control variables with a potential influence on TI. Firstly, company size can positively affect innovative efforts due to more financial and personnel resources, while it can also signal saturation and a less pronounced focus on TI (e. g., He and Tian 2013; Jia et al. 2022; Srinivasan et al. 2021). Accordingly, we consider the log of total assets (*LSIZE*). Secondly, higher growth rates can be associated with innovation. We account for this through *GROWTH*, the firms' (current) annual sales growth. Thirdly, we control for leverage (*LEV*) as higher debt rates can affect investments into R&D (e. g., Jia et al. 2022; He and Tian 2013). On the one hand, higher leverage might imply less funds to allocate towards patent output, on the other hand, it might also increase monitoring by internal and external parties and potentially improve prioritization. Fourth, Return on Assets (*ROA*) is included as a proxy for operating performance (e. g., Jia et al. 2022; Li et al. 2023; Keum 2021; Cai et al. 2021) as more efficient firms may have greater resources for TI. Fifth, Tobin's Q (*TOBQ*) serves as a proxy for the capital market's assessment of future growth opportunities and is potentially associated innovation (He and Tian 2013). In line with Chung and Pruitt (1994), we define *TOBQ* as the ratio of the market value of assets to their replacement value. Sixth, price volatility (*PVOLA*) is considered as a proxy for firm risk. Greater price volatility may signal higher uncertainty, which can be detrimental for a TI-focused long-term strategy. Conversely, it might also signal the willingness of companies to sacrifice short-term for long-term results. Seventh, the dividend ratio (*DIVEAR*) is included due to its ambivalent association with TI. It signals long-term orientation but at the same time ties up resources. The dividend ratio is calculated as the ratio of total dividends paid to net income. Eighth, the weighted ratio of R&D expenses to revenues over the prior five years (*RDWEIGHTED*) reflects the previous innovation input with an expected positive effect on

patent output. To address the issue of missing R&D data, we follow previous literature (Rapp et al. 2011) by manually setting missing values of *RDWEIGHTED* to zero. To capture potential systematic effects of missing R&D data, we introduce, ninth, *RD_MISSING* as a binary indicator whether the R&D value was manually adjusted. Finally, as one measure to encounter endogeneity, we employ a control function approach (Wooldridge 2015; applied in, e. g., Qin and Yang 2022) and incorporate the fitted residual (*VBM_SUM_PRED*) from a first stage regression in our models.[11]

4.3 Method of analysis

To address the complexities of the patent process, numerous factors must be considered when empirically analyzing patent data. Firstly, our study employs a robust log-linear model to account for the naturally high number of zero values and the right-skewed distribution of the dependent patent variables.[12] Specifically, we increase the patent variable, i. e., the citation impact in the main analysis, by one before logarithmizing it. Secondly, we aspire to analyze the actual impetus of VBM on TI. As mentioned in the variable descriptions, the citation impact and other patent metrics are consequently based on patent applications rather than inconsistently delayed grants. Thirdly, we incorporate a one-year lag for the independent variable VBM sophistication and the control variables to capture potentially systematically delayed effects of VBM on TI. Fourth, recognizing

[11] In the first stage regression of the control function approach the independent variable of the main analysis, VBM sophistication, is regressed on commonly used control variables, including the typical instrument (in 2SLS regressions) in prior VBM research (Rapp et al. 2011; Knauer et al. 2018), i. e., the average VBM prevalence in the industry-year-cluster excluding the focal company. The resulting predicted residuals are then included as an additional control variable in the main analysis. The economic reasoning behind the chosen instrument builds on the "external pressure to implement a VBM system" in a certain industry (Rapp et al. 2011, p. 188). We acknowledge, though, that industry level averages are regarded ambivalently (e. g., Larcker and Rusticus 2010). This stems from the economic motivation, which is usually considered limited in scope, and that they do not stem from "outside the system" (Larcker and Rusticus 2010, p. 196).

[12] Particularly in certain industries, patenting activities are rather uncommon (e. g., consumer services or utilities) which leads to firm years with corresponding zero values. Furthermore, the number of firm years is decreasing with increasing patent numbers, leading to a right-skewed distribution.

substantial variations in patenting behaviors across firms, industries, countries, and periods, we use the citation impact with its comparison within technology classes on the one hand, and apply a fixed effects model, indicated by Hausman (1978) test results, on the other hand. Using firm and year fixed effects is a particularly restrictive approach to address the numerous influences in the innovation context. Fifth, the fixed effects configuration is chosen to proactively tackle endogeneity concerns with regard to potential time-constant omitted variables and reverse causality. Additionally, we use the aforementioned control function approach, incorporating residuals from the first-stage regression as a control variable, following Wooldridge (2015).[13]

Beyond these TI-specific considerations, we further mean-center all continuous variables to reduce multicollinearity, winsorize all ratios at the first and 99th percentiles to mitigate the effect of outliers, and employ robust standard errors (White 1980), clustered at the firm level, to address heteroscedasticity, as indicated by a Breusch and Pagan (1979) test. Altogether, these specifications result in the following model to formally test H1:

$$\begin{aligned} LCITBOOK_i \quad &= \gamma_0 + \gamma_1 VBM\_SUM_i + \gamma_2 PEOPCENT_i + \gamma_3 LTINV_i + \gamma_4 LSIZE_i + \gamma_5 GROWTH_i \\ &+ \gamma_6 LEV_i + \gamma_7 ROA_i + \gamma_8 TOBQ_i + \gamma_9 PVOLA_i + \gamma_{10} DIVEAR_i + \gamma_{11} RDWEIGHTED_i \\ &+ \gamma_{12} RDMISSING_i + \gamma_{13} VBM\_SUM\_PRED_i + Firm\ Fixed\ Effects \\ &+ Year\ Fixed\ Effects + \varepsilon_i \end{aligned} \quad (1)$$

Interaction effects of *VBM_SUM* and *PEOPCENT* as well as *VBM_SUM* and *LTINV* are added to investigate the interaction hypotheses H2 and H3, respectively:

[13] As insignificant Wooldridge (1995) test results do not indicate endogeneity issues in our main models, we refrain from interpreting the corresponding instrumental variable models (untabulated).

$$LCITBOOK_i = \gamma_0 + \gamma_1 VBM\_SUM_i + \gamma_2 VBM\_SUM_i \times PEOPCENT_i + \gamma_3 PEOPCENT_i + \gamma_4 LTINV_i + \gamma_5 LSIZE_i + \gamma_6 GROWTH_i + \gamma_7 LEV_i + \gamma_8 ROA_i + \gamma_9 TOBQ_i + \gamma_{10} PVOLA_i + \gamma_{11} DIVEAR_i + \gamma_{12} RDWEIGHTED_i + \gamma_{13} RDMISSING_i + \gamma_{14} VBM\_SUM\_PRED_i + Firm\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_i \quad (2)$$

$$LCITBOOK_i = \gamma_0 + \gamma_1 VBM\_SUM_i + \gamma_2 VBM\_SUM_i \times LTINV_i + \gamma_3 PEOPCENT_i + \gamma_4 LTINV_i + \gamma_5 LSIZE_i + \gamma_6 GROWTH_i + \gamma_7 LEV_i + \gamma_8 ROA_i + \gamma_9 TOBQ_i + \gamma_{10} PVOLA_i + \gamma_{11} DIVEAR_i + \gamma_{12} RDWEIGHTED_i + \gamma_{13} RDMISSING_i + \gamma_{14} VBM\_SUM\_PRED_i + Firm\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_i \quad (3)$$

5 Results

5.1 Descriptive statistics and correlations

Table 2 contains a descriptive overview of the VBM element adoption by year and overall. In total, value orientation (*VBM_VO*) is identified in 70.7% of the firm years in our sample with a peak period after the financial crisis (maximum of 75.2%) and a subsequent decline to 65.6% in 2020.[14] No clear trend can be recognized for the use of value-based metrics (*VBM_KPI*), which fluctuates around its average adoption rate of 23.1%. For the three remaining elements *VBM_TARGET*, *VBM_COMP* and *VBM_SEGMENT* declining adoption rates can be observed in the second half of our observation period with overall values of 18.8%, 16.8% and 11.9%, respectively.

[14] Table 2 reports the actual VBM element adoption rates for the observation period from 2006 to 2020. Consequently, sub-sample sizes and totals slightly vary from the main analysis, which draws on lagged VBM variables.

[Insert TABLE 2 here.]

Table 3 presents the descriptive statistics for the variables in the main and all further analyses. Our dependent variable *LCITBOOK* with a mean of -5.601 can be interpreted more intuitively through the non-logarithmized variable *CITBOOK*. As expected, numerous firm years without patenting activities lead to a very small median (0.003) as compared to its mean (0.036), which is even higher than the Q75-quartile (0.034). Our independent variable *VBM_SUM* has a mean of 1.417, indicating an average adoption of more than one VBM element across our sample. The moderating variable in H2, *PEOPCENT*, has a mean of 72.350, which is below its median of 76.470 and indicates a relatively high number of low PEOPCENT ratings. In contrast, *LTINV* as the moderating variable in H3, indicates the expected higher mean of 10.361 as opposed to the median of 5.000, which results from a limited number of companies in our sample with high values of *LTINV*.

[Insert TABLE 3 here.]

Table 4 provides additional cross-sectional statistics of our main variables subdivided by year, industry and country. Panel A discloses several chronological trends. The quality (*CITBOOK*) and quantity (*PATBOOK*) show relatively stable values until 2016 but decrease afterwards. While one could argue that the final years of the sample period may still be affected be the granting process,[15] R&D expenses (*RDWEIGHTED*) show a similar pattern. However, the shrinking sample size, due to the frozen sample to address survivorship bias, needs to be considered. Most VBM elements were identified shortly after the financial crisis. After peaking at a *VBM_SUM* of 1.506 in 2011, a decline followed. Over the last five sample years, *VBM_SUM* has stabilized slightly

[15] Decreasing patent output metrics from 2018 onwards are mainly attributable to the granting process duration of three to five years and the data consolidation based on the PATSTAT Online database of 2023.

below pre-crisis levels. Regarding the moderating variables, the increasing *PEOPCENT* levels are remarkable, experiencing a rise of more than a quarter from 64.675 (2006) to 81.922 (2020) within the observation period. Focusing on the second moderating variable *LTINV*, shares of mostly below ten percent can be observed after the financial crisis as compared to shares of more than twelve percent in the first three years of our observation period. Panel B provides an overview of industry differences and particularly demonstrates variations in patenting behaviors. For example, the citation impact *CITBOOK* in Technology (0.182) and Health Care (0.099) is higher as compared to Consumer Services (0.002) and Utilities (0.001). Regarding VBM, most industries average between one and two VBM elements. Only Oil & Gas (0.885) and Technology (0.756) fall below this range. This order is reversed for *PEOPCENT*, where Oil & Gas (81.025), Technology (79.993) and Basic Materials (80.090) have the highest ratings, while Consumer Services (66.039) lags behind. For *LTINV*, Industrials (15.367) and Telecommunications (14.070) have the highest average shares, Oil & Gas (5.433) the lowest. Panel C uncovers differences across nationalities. However, in interpreting these differences, we need to be cautious given the partly small sub-sample sizes. Patent outputs are mainly driven by a few Central, Western and Northern European countries such as Germany, France, Switzerland, the Netherlands and Sweden, while particularly Southern European countries show significantly lower (or even no) outputs. VBM appears to be particularly popular in Germany with an average *VBM_SUM* of 3.407, while most other larger European countries, such as France (0.643), Spain (0.780) and Italy (0.822), average below one VBM element. *PEOPCENT* ratings are particularly high in Spain (86.685) and Switzerland (83.357), while France (67.352) is the only larger European country below the sample mean (73.585). LTINV seem to have higher average shares in several smaller European countries, for which again smaller sample sizes complicate explicit conclusions.

[Insert TABLE 4 here.]

Table 5 presents the correlation matrix. Spearman rank correlation coefficients are shown above the diagonal, while Pearson correlation coefficients are below. Both coefficients indicate significantly positive relationships between our independent variable *VBM_SUM* and dependent variable *LCITBOOK* (significant at the 5% and 1% level, respectively). Regarding our moderating variables, significantly positive correlation coefficients at the 1% level can be observed between *PEOPCENT* and *LCITBOOK* as well as *PEOPCENT* and *VBM_SUM*. The correlation coefficients between *LTINV* and *LCITBOOK* are contrasting though. While Spearman coefficients indicate a positive but insignificant relationship, Pearson coefficients, most appropriate for metric variables, suggest a negative correlation that is significant at the 10% level. The coefficients between *LTINV* and *VBM_SUM* are both significantly negative at the 1% level.

[Insert TABLE 5 here.]

5.2 Tests of the hypotheses

Table 6 reports the results of the multivariate regression analysis featuring the control function approach to account for endogeneity. The adjusted coefficients of determination (R^2) of the three log-linear models in our main analysis range between 23.1% and 23.6%. As maximum variance inflation factor (VIF) values between 2.66 and 2.77 are clearly below critical thresholds, multicollinearity does not appear to be an issue.

In our baseline hypothesis H1, we hypothesize a positive association between VBM sophistication and TI, measured through patent outputs in terms of patent quality, i. e., our dependent variable *LCITBOOK*. Despite of a positive coefficient of *VBM_SUM* in Model 1, relevant

significance levels are not met. Hence, the empirical results do not support H1 ($p = 0.551$).[16]

In H2, we propose PEOPCENT as a relevant context factor, which moderates the effect of VBM sophistication on TI. In line with this prediction, the associated coefficient of *VBM_SUM* × *PEOPCENT* in Model 2 is positive and significant ($p = 0.043$). Thus, we infer support for H2.

In H3, we predict that the share of LTINV will also moderate the baseline effect of VBM sophistication on TI. Again, the positive and significant ($p = 0.009$) coefficient of *VBM_SUM* × *LTINV* in Model 3 supports our final hypothesis.[17]

[Insert TABLE 6 here.]

5.3 Additional analyses

To test the robustness of our main analysis and analyze underlying drivers of the results, we sequentially address potential distortions originating from configurations of our independent, dependent and moderating variables, before challenging various econometric specifications, also regarding endogeneity concerns.

Regarding the chosen independent variable, we conduct a factor analysis of the five individual VBM elements to validate the use of *VBM_SUM* (Table 7, Part 1). An eigenvalue of 2.6339 reflects that the five VBM elements load onto a single factor with an average variance extracted of 0.539 (and thus beyond the threshold of 0.5) and a composite scale reliability of 0.8067 (and thus beyond the threshold of 0.7) (Fornell and Larcker 1981). However, *VBM_VO*, i. e., the commitment to value orientation, does not clearly load on this factor (factor loading < 0.5). This alludes to the

[16] All *p*-values in this paper are reported as two-tailed for reasons of conservativeness.
[17] The significant results for both interaction terms remain robust if they are jointly included in a single model (untabulated).

debate that proclaiming value orientation (also discussed in terms of symbolic VBM adoption) differs from the other VBM elements. To test the robustness of our result, we repeat the main analysis but exchange the independent variable with a newly created VBM measure weighting the five elements according to their factor loadings.[18] The results presented in Table 7 support the main analysis. The results are consistent to the main analysis, as H1 still cannot be supported and the relevant interaction terms for H2 ($p = 0.014$) and H3 ($p = 0.016$) remain positive and significant.

[Insert TABLE 7 here.]

In our main analysis, our dependent variable reflects the citation impact of the patents as patent outputs. We consider this measure superior because it also reflects the quality of the patents, and not just their quantity. However, patent quantity is also a frequently used measure of patent output, we test the operationalization of TI based on number of patents relative to book values instead of the citation impact in this robustness check. The results in Table 8 support the main results. In addition to using absolute patent numbers, we also challenge the citation impact calculation logic by omitting the relative comparison with book value (untabulated). Again, this approach supports the results of the main analysis.

[Insert TABLE 8 here.]

To deepen our understanding regarding the underlying mechanisms of our interactions, we examine the individual elements of our composite measures *PEOPCENT* and *LTINV*. Towards this end, we integrate the four subdimensions of *PEOPCENT*, i. e., the individual components of the

[18] Based on its low factor loading (0.2816) compared to the further VBM elements, excluding *VBM_VO* could be considered. However, for reasons of conservativeness, we retain it in the analysis. Excluding this item leads to inferentially identical results (untabulated).

LSEG social performance ratings, as well as their interactions with VBM_SUM (instead of integrating *PEOPCENT* itself) in our models to test the hypotheses (Table 9). The results are largely intuitive and in line with our theoretical reasoning. The joint positive effect of *VBM_SUM* and *PEOPCENT* seems driven by community (*VBM_SUM* × *SO_COMM*; $p = 0.020$) and the workforce orientation (*VBM_SUM* × *SO_WORK*; $p = 0.086$). Interestingly, the coefficient on *VBM_SUM* × *SO_HUM* is insignificant ($p = 0.211$). This result might hint towards fundamental human rights being a prerequisite, but not a differentiating feature regarding people orientation. We intentionally did not incorporate the fourth pillar, i. e., *SO_PROD*, in our *PEOPCENT* measure, as it does not seem related to people orientation. The empirical result backs this decision in that the coefficient on *VBM_SUM* × *SO_PROD* is insignificant ($p = 0.233$).

[Insert TABLE 9 here.]

Our rationale in composing *LTINV* was to consolidate the share of all long-term-oriented private institutional shareholders because we expect them to take an active role and provide relevant expertise. Thus, we included the number of shares held by banks and institutions (*NOSHIC*), other companies (*NOSHCO*), and pension funds (*NOSHPF*), each with at least 5%. Further potential blockholders include the government or governmental institutions (*NOSHGV*), employees (*NOSHEM*), and other holdings without further identification (*NOSHOF*). Our approach is analogous to the subdimension analysis for *PEOPCENT*. In Table 10, we substitute *LTINV* by the three mentioned components and integrate these as main effects and in the interactions with *VBM_SUM*. In line with our reasoning, we find the three shareholder groups in LTINV to drive the positive interaction effect (*VBM_SUM* × *NOSHIC*, $p = 0.025$; *VBM_SUM* × *NOSHCO*, $p = 0.030$; *VBM_SUM* × *NOSHPF*, $p < 0.001$). Also in line with our reasoning, no positive and significant

moderating effect is found for public or non-institutional shareholder groups presumed to also have a long-term interest, such as governments (*VBM_SUM* × *NOSHGV*, $p = 0.961$) and employees (*VBM_SUM* × *NOSHEM*, $p = 0.227$).[19]

[Insert TABLE 10 here.]

Beyond variable considerations, we challenge several econometric specifications of the main analysis. Firstly, we evaluate our chosen fixed effects configuration. Particularly the use of firm fixed effects has the potential to impact our key findings. On the one hand, firm fixed effects are beneficial to improve identification and address omitted variable biases as well as reverse causality and, hence, endogeneity concerns.[20] On the other hand, little variations of firm fixed effects might confound coefficient estimates (Breuer and DeHaan 2024). Accordingly, we replace firm fixed effects with country and industry fixed effects in an additional robustness test. The presented results in Table 11 demonstrate that the fixed effects configuration does not affect the key findings, even though the coefficient of *VBM_SUM* is negative in H1. Secondly, we examine the impact of time lags. While the main analysis contains independent and control variables lagged by one year, both additional models *without time lags* and those with a *dependent lead variable* show no remarkable deviations to the main results (untabulated).[21] Thirdly, we address the issue of lower patent counts in the final years of the sample due to ongoing granting processes. However, reducing the

[19] The interaction effect of *VBM_SUM* and *NOSHOF* is also insignificant ($p = 0.758$). However, this measure is rather a collecting basin that does not allow meaningful conclusions.

[20] As stated in the methodology section, we refrained from interpreting additional instrumental variable regressions as Wooldridge (1995) tests did not indicate endogeneity for our main models (all p-values > 0.28).

[21] The effects of VBM on TI might be delayed even further. However, we limit our robustness checks to lags of one year. VBM elements are expected to be present before annual report disclosures, which implies an effectively longer lead time. Further, extended time lags result in a loss of observations due to limited VBM and patent datasets.

observation period by excluding the clearly affected final years, i. e., 2019 and 2020, does not impact results of the main analysis (untabulated).

[Insert TABLE 11 here.]

6 Conclusion

The starting point of this study was the tension that overly efficient structures and higher cost sensitivity might inhibit innovation, while enhanced monitoring and commercialization could contribute to improved innovation outcomes (Henri 2006; Jørgensen and Messner 2010; Guo et al. 2019; Jansen et al. 2006). We investigate this relationship by firstly examining the association between VBM and TI (as measured by patent outputs). Secondly, we explore the boundary conditions of this relationship regarding people orientation (PEOPCENT) and ownership structure (LTINV).

To analyze this association, we draw on two datasets. Building on a dataset by Kister et al. (2024), who manually determined VBM sophistication for more than 2,500 firm-years of the 200 largest non-financial companies in the STOXX Europe 600 from 2006 to 2020 from annual reports, we extracted the relevant patent data from EPO PATSTAT Online through a multi-stage process and aggregated it to the firm-year level.

Contrary to our expectations, no statistically significant relationship is identified for VBM and TI overall. However, in line with the formulated hypotheses, a potential positive influence does emerge when considering the focal context factors. The significantly positive interaction of VBM and PEOPCENT, i. e., the focus on people-related topics, suggests that the creativity-enhancing effects of PEOPCENT positively influence the prioritization towards shareholder value creation through VBM in form of patent outputs. While VBM's impact appears to be particularly evident at the operational level in this analysis, the positive moderation by the second evaluated context factor

LTINV, i. e., private institutional investors with a particular long-term interest, also indicates positive effects at the management level. We suggest that lower asymmetric information through VBM is especially beneficial in front of institutional investors. As a result, management can genuinely support the most promising long-term innovation projects, leading to quantitatively and qualitatively better patent outputs.

Our analysis contributes to VBM, MCS and innovation research in at least three ways across different levels. Firstly, it fills a gap in VBM research by explicitly examining the impact of VBM on TI. Given the empirically supported positive association between TI and financial performance (e. g., Hsu et al. 2023; Hall et al. 2005; Hirshleifer et al. 2013), this analysis identifies an additional performance effect of VBM, at least under specific conditions. Secondly, the study contributes to general MCS research by deepening the understanding of "management accountants' involvement and roles in new product development environments" (Magnacca and Giannetti 2024, p. 651) and indicating varying effects of MCS at different organizational levels. At the operational level, decision-support functions appear to be particularly influential, while at the management level, reducing information asymmetries and signaling effects might be more relevant. Thirdly, the analysis of the joint effect of VBM and PEOPCENT contributes to the theoretical discussion on the importance of "soft" factors for the effective implementation of MCS in organizations.

Our research design is subject to several limitations. On the one hand, the limitations related to the used datasets need to be acknowledged. The VBM data by Kister et al. (2024) is based on an analysis of annual reports, which, despite defining and strictly adhering to objective criteria, is prone to over- and underreporting (Firk et al. 2019). The consolidation of the patent dataset involved several manually conducted steps. Despite a diligently designed process involving three independent coders, the necessary matching of patents to companies based on search terms can be

prone to errors. It is possible that not all patents associated with a company were identified in some cases. On the other hand, we need to acknowledge limitations based on the operationalization of TI through innovation output. TI can be measured in numerous ways (e. g., Dechezleprêtre et al. 2021). While we chose the configuration that seems to reflect TI output best in terms of quantity and quality (Gu 2005) and safeguarded the result through robustness checks, we could not integrate every possible alternative. In particular, the lack of comprehensive R&D data limits the analysis of innovation input and innovation efficiency, which should be considered when interpreting the results of this study.

Our study results can inspire future research. Firstly, adequate R&D data availability would allow an examination of VBM's impact on innovation input and innovation efficiency (Hirshleifer et al. 2013). Particularly the latter might be positively associated with VBM from a theoretical perspective. Secondly, analyzing the focal relationships in additional markets promises diverging insights as patenting behaviors vary drastically across geographies. Thirdly, the mechanisms behind the positive moderating effects could be examined in more depth. For example, an experimental research design could be used to study the effects between MCS, PEOPCENT and TI at the operational level. At the management level, further case studies and surveys could provide a better understanding of the perception of LTINV regarding the use of VBM.

Appendix

Appendix A. Variable overview, descriptions, and data sources

Variable	Description	Sources
Definition of VBM elements (following Firk et al. 2019b, p. 421)		
VBM_VO	Dichotomous variable that equals 1 if the annual report explicitly mentions the goal of increasing value for shareholders, 0 otherwise. The focus on shareholders in value creation is mandatory, such that, e. g., "increasing stakeholder value" without explicitly mentioning shareholders does not suffice.	Hand-collected
VBM_KPI	Dichotomous variable that equals 1 if the firm discloses at least one value-based metric, 0 otherwise. While the characteristics of value-based metrics are discussed in the paper, the main feature is explicitly incorporating the costs of capital, i. e., including them in the calculation (e. g., residual income) or comparing return ratios against them (e. g., return on capital employed (ROCE) with direct comparison against the costs of capital).	Hand-collected
VBM_TARGET	Dichotomous variable that equals 1 if a target is explicitly stated in the annual report for one of the value-based metrics, 0 otherwise. Both quantitative (e. g., ROCE – costs of capital = 8%) or qualitative (residual income higher than in the previous year) aspiration levels are considered, while assuming an objective only because of linking compensation to a value-based metric is insufficient, as linking does not require an explicit objective.	Hand-collected
VBM_COMP	Dichotomous variable that equals 1 if at least one value-based metric is explicitly mentioned in the annual report as the basis for executive board compensation, 0 otherwise. Total shareholder return (TSR) is only incorporated in the presence of a reference to value added (e. g., delta TSR).	Hand-collected
VBM_SEGMENT	Dichotomous variable that equals 1 if at least one value-based metric is explicitly mentioned in the annual report or can be seen in the segment reporting to control the business units or segments, 0 otherwise.	Hand-collected
Dependent Variable		
LCITBOOK	Natural logarithm of the cumulated citation impact per firm year (retrieved from PATSTAT Online) scaled by the book value of equity (LSEG Eikon: WC03501). The citation impact is calculated at the patent level and compares granted patents based on received forward citations to the respective patent technology class in the application year (Example: A patent that received 20% more forward citations as compared to the average forward citations in its technology class in the year of application has a citation impact of 1.2).	PATSTAT Online / LSEG Eikon
Independent and moderating variables		
VBM_SUM	VBM sophistication on a scale from zero to five, representing the number of existent VBM elements.	Hand-collected
PEOPCENT	People Centricity calculated as equally weighted social performance scores regarding workforce (TRESGSOWOS), community (TRESGSOCOS) and human rights (TRESGSOHRS).	LSEG Eikon
LTINV	Long-term-oriented institutional shareholders calculated as the cumulated share held by investment banks and institutions (NOSHIC), other companies (NOSHCO) and pension funds (NOSHPF). Detailed descriptions of NOSHIC, NOSHCO and NOSHPF are provided below.	LSEG Eikon

Appendix A. Variable overview, descriptions and data sources (continued)

Variable	Description	Sources
Control variables		
LSIZE	Natural logarithm of the firm's total assets (DWTA).	LSEG Eikon
GROWTH	Annual sales (WC01001) of current year divided by annual sales of the previous year, multiplied by 100.	LSEG Eikon
LEV	Total debt (WC03255) divided by common equity (WC03501).	LSEG Eikon
ROA	Net income (WC01551) divided by the previous year's total assets (DWTA), multiplied by 100.	LSEG Eikon
TOBQ	Tobin's Q definition following Chung and Pruitt (1994): market value of common stocks (WC08001) plus the book value of long-term debt (WC03251) and short-term liabilities (WC03101) minus current assets (WC02201), all divided by the book value of assets (DWTA).	LSEG Eikon
PVOLA	Price volatility calculated as the standard deviation of the stock's daily returns for each firm year.	LSEG Eikon
DIVEAR	Total dividend payout excluding special dividends divided by earnings, multiplied by 100. Total dividends: product of dividends per share excluding special dividends (DPS) and the number of shares in free float (NOSHFF). Earnings: tax and interest, before extraordinary items (WC01551).	LSEG Eikon
RDWEIGHTED	Weighted R&D ratio over five years from t-1 to t-5 (100%, 80%, …, 20%); R&D ratio defined as R&D expenses (WC01201) divided by total assets (DWTA), multiplied by 100.	LSEG Eikon
RDMISSING	Dichotomous variable that equals 1 if *RDWEIGHTED* is missing, 0 otherwise.	Own calculation
VBM_SUM_PRED	Predicted residuals for *VBM_SUM* from the first stage regression of the control function approach.	Own calculation based on Wooldridge (2015)
Further variables (descriptive statistics and robustness tests)		
VBM_SUM_ WEIGHTED	Adjusted VBM sophistication variable, weighting the five VBM elements according to their factor loadings.	Own calculation based on hand-collected data
LPATBOOK	Natural logarithm of the cumulated number of granted patent applications per firm year scaled by the book value of equity (WC03501).	PATSTAT Online / LSEG Eikon
PATENTS	Total number of filed patents per year attributable to mother company or subsidiary with a stake of at least 50%.	PATSTAT Online
SO_COMM	"The community score measures the company's commitment to being a good citizen, protecting public health and respecting business ethics" (LSEG 2023, p. 29) (*TRESGSOCOS*).	LSEG Eikon
SO_WORK	"The workforce score measures a company's effectiveness in terms of providing job satisfaction, a healthy and safe workplace, maintaining diversity and equal opportunities, and development opportunities for its workforce" (LSEG 2023, p. 29) (*TRESGSOWOS*).	LSEG Eikon
SO_HUM	"The human rights score measures a company's effectiveness in terms of respecting fundamental human rights conventions" (LSEG 2023, p. 29) (*TRESGSOHRS*).	LSEG Eikon
SO_PROD	"The product responsibility score reflects a company's capacity to produce quality goods and services, integrating the customer's health and safety, integrity and data privacy" (LSEG 2023, p. 29) (*TRESGSOPRS*).	LSEG Eikon
NOSHIC	The percentage of total shares issued held by investment banks and institutions with at least 5% (*NOSHIC*).	LSEG Eikon
NOSHGV	The percentage of total shares in issue held by a government or government institution with at least 5% (*NOSHGV*).	LSEG Eikon
NOSHCO	The percentage of total shares in issue held by one company in another with at least 5% (*NOSHCO*).	LSEG Eikon

Appendix A. Variable overview, descriptions and data sources (continued)

Variable	Description	Sources
NOSHPF	The percentage of total shares in issue held by pension funds or endowment funds with at least 5% (*NOSHPF*).	LSEG Eikon
NOSHEM	The percentage of total shares in issue held by company employees, or by those with a substantial position in a company that provides significant voting power at an annual general meeting (typically family members) with at least 5% (*NOSHEM*).	LSEG Eikon
NOSHOF	The percentage of total shares in issue held by other holdings without further identification with at least 5% (*NOSHOF*).	LSEG Eikon

LSEG Eikon codes in parantheses.

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Tables

TABLE 1: Sample selection

Selection sequence	Firm years
Firm years of the 200 largest non-financial STOXX Europe 600 firms between 2006 and 2020	3,000
- liquidation or delisting within observation period	408
- double listing (no clear allocation to company-specific data)	111
- missing annual reports	20
- missing patent data	51
- missing control data	111
Final sample	2,299

TABLE 2: Share of companies adopting the five different elements of VBM sophistication by year (in %)

Year	n	*VBM_VO*	*VBM_KPI*	*VBM_TARGET*	*VBM_COMP*	*VBM_SEGMENT*
2006	173	71.7	24.9	21.4	17.3	11.0
2007	169	71.0	23.1	21.3	18.3	11.8
2008	169	70.4	22.5	20.7	18.9	12.4
2009	167	73.1	22.2	19.8	15.6	12.0
2010	166	74.1	23.5	21.7	17.5	13.9
2011	165	74.5	21.8	20.0	17.6	12.1
2012	165	73.3	20.6	20.0	17.6	13.9
2013	164	72.6	21.3	19.5	19.5	15.2
2014	165	75.2	19.4	17.6	17.6	14.5
2015	163	69.3	27.0	18.4	17.8	12.9
2016	160	68.1	21.9	16.3	14.4	10.0
2017	158	68.4	25.9	15.8	13.9	10.8
2018	154	65.6	24.0	16.2	15.6	9.1
2019	153	66.0	24.8	15.7	14.4	9.2
2020	151	65.6	24.5	17.2	15.2	8.6
Total[a]	2,442	70.7	23.1	18.8	16.8	11.9

This table provides an overview of the adoption rates of the VBM elements by year between 2006 and 2020. a) Totals and sub-sample sizes are not identical as compared to further illustrated analyses, as they are based on lagged VBM variables. Additionally, this overview does not exclude firm years with missing data for control variables to provide a more comprehensive overview of the VBM element adoption.

TABLE 3: Descriptive statistics

Variable	*n*	Mean	Min.	Q25	Median	Q75	Max.	Std. dev.
Main analysis								
LCITBOOK[a]	2,299	-5.601	-9.992	-7.923	-5.643	-3.385	-0.876	2.520
CITBOOK[b]	2,299	0.036	0.000	0.000	0.003	0.034	0.415	0.073
VBM_SUM	2,299	1.417	0.000	0.000	1.000	2.000	5.000	1.497
PEOPCENT	2,299	72.350	9.640	59.583	76.470	87.213	98.880	18.043
LTINV	2,299	10.361	0.000	0.000	5.000	14.000	96.000	16.016
LSIZE	2,299	16.999	12.428	16.226	16.992	17.696	19.979	1.067
SIZE[b]	2,299	41,878,929	249,679	11,264,059	24,043,000	48,536,292	474.964.992	51,311,760
GROWTH[a]	2,299	4.252	-47.245	-2.267	3.839	10.468	58.654	14.448
LEV[a]	2,299	1.067	-1.197	0.393	0.690	1.364	8.085	1.184
ROA[a]	2,299	5.869	-9.878	2.562	4.728	8.124	32.469	6.137
TOBQ[a]	2,299	1.191	0.207	0.644	0.932	1.398	6.342	0.949
PVOLA[a]	2,299	0.262	0.060	0.193	0.238	0.308	1.145	0.101
DIVEAR[a]	2,299	62.567	-261.224	26.991	45.167	70.155	806.345	118.127
RDWEIGHTED[a]	2,299	1.690	0.000	0.000	0.164	2.238	20.716	3.133
RDMISSING	2,299	0.341	0.000	0.000	0.000	1.000	1.000	0.474
Further variables (e. g., robustness checks and further analyses)								
LPATBOOK[a]	2,299	-5.451	-9.782	-7.594	-5.512	-3.386	-1.016	2.390
PATBOOK[a]	2,299	0.034	0.000	0.000	0.004	0.034	0.353	0.067
LPATENTS	2,299	3.549	0.000	0.693	3.829	5.765	8.829	2.598
PATENTS	2,299	335.628	0.000	1.000	45.000	318.000	6,829.000	732.844
SO_COMM	2,299	69.718	1.250	52.970	75.930	91.480	99.820	25.436
SO_WORK	2,299	79.212	2.590	70.550	85.180	94.710	99.840	20.108
SO_HUM	2,299	70.023	1.390	56.670	78.260	91.210	99.250	25.557
SO_PROD	2,299	71.152	3.050	55.780	79.430	92.860	99.700	25.695
NOSHIC	2,299	3.346	0.000	0.000	0.000	5.000	43.000	6.116
NOSHGV	2,299	6.067	0.000	0.000	0.000	0.000	80.000	14.315
NOSHCO	2,299	6.903	0.000	0.000	0.000	6.000	96.000	15.403
NOSHPF	2,299	0.112	0.000	0.000	0.000	0.000	12.000	0.936
NOSHEM	2,299	7.640	0.000	0.000	0.000	6.000	98.000	16.378
NOSHOF	2,299	2.822	0.000	0.000	0.000	0.000	92.000	10.638

This table shows the arithmetic mean (mean), minimum (Min.), first quartile (Q25), median (Median), third quartile (Q75), maximum (Max.) and standard deviation (Std. dev.) for all firm-year observations (n) across the entire period. This overview refers to the full sample from 2006 to 2020. a) Winsorized at the 1% level. b) Non-logarithmized values of *LCITBOOK* (citation impact) and *LSIZE* (total assets, in thousand Euros) to facilitate interpretation. Except of the independent patent variables *LCITBOOK*, *CITBOOK*, *PATBOOK* and *PATENTS*, all variables are lagged by one year. Detailed variable descriptions are provided in the Appendix.

TABLE 4: Sample composition by year, industry, and country

A: Year	*n*	*PATENTS*	*CITBOOK*	*PATBOOK*	*VBM_SUM*	*PEOPCENT*	*LTINV*	*RDWEIGHTED*
2006	163	351.098	0.042	0.042	1.443	64.675	12.374	2.046
2007	159	361.270	0.044	0.042	1.452	65.750	12.114	1.991
2008	158	382.247	0.045	0.045	1.455	68.699	12.847	1.810
2009	154	372.747	0.049	0.047	1.435	70.146	11.935	1.779
2010	156	378.987	0.041	0.038	1.506	72.143	10.814	1.677
2011	156	379.872	0.038	0.037	1.474	72.850	10.141	1.649
2012	157	390.924	0.039	0.038	1.452	72.118	9.261	1.623
2013	154	392.305	0.044	0.041	1.487	72.391	8.357	1.653
2014	154	385.591	0.040	0.038	1.455	72.892	9.468	1.609
2015	156	377.147	0.037	0.036	1.458	76.082	10.654	1.591
2016	148	330.932	0.036	0.034	1.304	77.134	9.831	1.488
2017	149	329.201	0.027	0.026	1.342	78.814	10.255	1.447
2018	146	274.479	0.024	0.021	1.315	79.349	9.760	1.498
2019	145	192.510	0.016	0.015	1.303	81.284	9.393	1.499
2020	144	102.319	0.009	0.008	1.306	81.922	9.431	1.485
Total	2,299	335.628	0.036	0.034	1.415	73.585	10.467	1.661
B: Industry	*n*	*PATENTS*	*CITBOOK*	*PATBOOK*	*VBM_SUM*	*PEOPCENT*	*LTINV*	*RDWEIGHTED*
Oil & Gas	157	149.618	0.006	0.006	0.885	81.025	5.433	0.188
Basic Materials	204	330.088	0.031	0.031	1.618	80.090	9.951	1.395
Industrials	430	537.719	0.055	0.064	1.654	72.557	15.367	1.728
Consumer Goods	424	410.321	0.037	0.036	1.488	74.426	10.493	1.350
Health Care	182	827.192	0.099	0.072	1.717	79.988	8.995	6.309
Consumer Services	393	3.440	0.002	0.002	1.274	66.039	7.575	0.028
Telecommunications	213	74.704	0.007	0.007	1.000	71.071	14.070	0.349
Utilities	213	14.897	0.001	0.002	1.654	70.749	8.910	0.044
Technology	83	1,260.229	0.182	0.158	0.756	79.993	7.386	11.413
Total	2,299	335.628	0.036	0.034	1.415	73.585	10.467	1.661
C: Country	*n*	*PATENTS*	*CITBOOK*	*PATBOOK*	*VBM_SUM*	*PEOPCENT*	*LTINV*	*RDWEIGHTED*
AT – Austria	29	2.793	0.000	0.001	1.724	66.487	16.517	0.192
BE – Belgium	60	105.100	0.019	0.018	0.700	60.248	13.833	2.957
CH – Switzerland	124	579.145	0.048	0.043	1.602	83.357	3.694	3.766
DE – Germany	303	789.673	0.051	0.050	3.407	76.544	12.363	2.585
DK – Denmark	42	70.381	0.016	0.012	1.452	63.078	31.095	0.007
ES – Spain	145	9.421	0.004	0.004	0.780	86.685	19.986	0.082
FI – Finland	75	355.853	0.043	0.036	1.013	70.597	0.640	2.904
FR – France	450	429.171	0.036	0.045	0.643	67.352	9.379	1.232
GB – Great Britain	505	98.614	0.027	0.018	1.365	73.395	8.893	1.071
GI – Gibraltar	8	0.000	0.000	0.000	0.714	61.023	6.000	0.375
GR – Greece	30	0.000	0.000	0.000	0.833	73.618	19.433	0.000
IE – Ireland	15	0.000	0.000	0.000	0.400	43.578	11.467	0.000
IT – Italy	129	51.031	0.006	0.006	0.822	73.849	6.620	0.943
JE – Jersey	21	0.095	0.000	0.000	2.048	51.264	3.143	0.000
LU – Luxemburg	30	25.933	0.006	0.004	1.167	55.210	31.633	0.000
NL – Netherlands	129	806.899	0.104	0.096	1.318	79.969	13.085	4.346
NO – Norway	60	52.667	0.003	0.004	1.317	80.390	5.683	0.294
PT – Portugal	25	0.360	0.000	0.000	1.200	78.649	16.200	0.000
SE – Sweden	119	551.059	0.089	0.090	1.664	79.934	4.101	3.007
Total	2,299	335.628	0.036	0.034	1.415	73.585	10.467	1.661

TABLE 5: Correlations

	LCITBOOK[a]	*VBM_SUM*	*PEOPCENT*	*LTINV*	*LSIZE*	*GROWTH*[a]	*LEV*[a]	*ROA*[a]	*TOBQ*[a]	*PVOLA*[a]	*DIVEAR*[a]	*RDWEIGHTED*[a]	*RDMISSING*	*VBM_SUM_PRED*
LCITBOOK[a]		0.04**	0.07***	0.01	-0.04*	-0.02	-0.12***	0.08***	0.03	0.16***	-0.14***	0.71***	-0.47***	-0.03
VBM_SUM	0.09***		0.09***	-0.14***	0.06***	-0.01	0.04*	0.00	-0.02	-0.04*	0.01	0.11***	-0.12***	0.54***
PEOPCENT	0.06***	0.08***		-0.06***	0.36***	-0.06***	-0.05**	0.00	-0.06***	-0.03	0.03	0.22***	-0.14***	0.02
LTINV	-0.04*	-0.14***	-0.10***		-0.07***	0.01	0.15***	-0.07***	-0.03	0.12***	-0.10***	-0.09***	0.11***	0.04*
LSIZE	-0.04*	0.09***	0.35***	-0.10***		-0.00	0.24***	-0.25***	-0.37***	-0.10***	0.01	0.21***	-0.30***	0.04*
GROWTH[a]	-0.03	-0.02	-0.06***	0.04*	0.02		-0.13***	0.32***	0.19***	-0.05**	-0.10***	0.01	-0.03	-0.02
LEV[a]	-0.07***	-0.02	-0.03	0.19***	0.12***	-0.04*		-0.38***	-0.25***	0.01	0.09***	-0.17***	0.10***	0.07***
ROA[a]	0.07***	-0.03	-0.02	-0.06***	-0.28***	0.24***	-0.22***		0.70***	-0.30***	-0.03	0.06***	-0.02	-0.03
TOBQ[a]	0.06***	-0.06***	-0.07***	-0.06***	-0.38***	0.14***	-0.15***	0.75***		-0.42***	0.14***	-0.03	0.08***	0.00
PVOLA[a]	0.18***	0.01	-0.02	0.13***	-0.14***	-0.03	0.04*	-0.17***	-0.16***		-0.29***	0.06***	-0.01	-0.01
DIVEAR[a]	-0.08***	-0.00	-0.02	-0.02	-0.01	-0.05***	0.03	-0.07***	-0.02	-0.09***		-0.13***	0.11***	0.01
RDWEIGHTED[a]	0.58***	0.06***	0.15***	-0.11***	0.02	-0.01	-0.15***	0.08***	0.06***	0.11***	-0.04**		-0.76***	-0.00
RDMISSING	-0.47***	-0.12***	-0.15***	0.11***	-0.30***	-0.03	0.13***	0.05**	0.14***	-0.04*	0.05**	-0.38***		-0.02
VBM_SUM_PRED	-0.01	0.58***	0.02	-0.01	0.01	-0.01	-0.01	-0.00	0.00	0.01	0.01	-0.01	-0.02	

This table reports the Pearson (above diagonal) and Spearman (below) correlation coefficients between variables. All variables except of *LCITBOOK*, the dependent variables of the main analysis, are lagged by one year. a) Winsorized at the 1% level. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. Detailed variable descriptions are provided in the Appendix.

TABLE 6: Main results

Model	1	2	3
Hypothesis	1	2	3
Estimation	OLS	OLS	OLS
Dependent variable	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]
Constant	-6.097***	-6.130***	-5.433***
	-1.022	-1.009	(0.099)
VBM_SUM	0.453	0.472	0.693
	(0.759)	(0.750)	-1.095
VBM_SUM × PEOPCENT		0.058**	
		(0.029)	
VBM_SUM × LTINV			0.160***
			(0.061)
PEOPCENT	-0.033	-0.111*	-0.032
	(0.051)	(0.061)	(0.050)
LTINV	-0.016	-0.021	0.027
	(0.202)	(0.200)	(0.196)
LSIZE	-0.939***	-0.925***	-0.928***
	(0.208)	(0.204)	(0.206)
GROWTH[a]	-0.024	-0.025	-0.024
	(0.025)	(0.025)	(0.025)
LEV[a]	7.466***	7.488***	7.539***
	-2.858	-2.846	-2.814
ROA[a]	-0.027	-0.029	-0.022
	(0.071)	(0.070)	(0.071)
TOBQ[a]	-0.014	-0.022	-0.012
	(0.083)	(0.084)	(0.082)
PVOLA[a]	0.143**	0.144**	0.135**
	(0.060)	(0.060)	(0.060)
DIVEAR[a]	-0.026	-0.029	-0.003
	(0.102)	(0.103)	(0.103)
RDWEIGHTED[a]	0.068	0.071	0.083
	(0.092)	(0.093)	(0.090)
RDMISSING	-0.028	-0.026	-0.026
	(0.091)	(0.092)	(0.091)
VBM_SUM_PRED	-0.393	-0.414	-0.385
	(0.623)	(0.615)	(0.613)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations / firm years	2,299	2,299	2,299
Adj. R^2	23.1%	23.5%	23.6%
Max. VIF	2.76	2.77	2.66

This table reports the hypotheses tests based on multivariate regressions following the control function approach (Wooldridge 2015). Robust standard errors, clustered at the firm level, are provided in parentheses below the standardized coefficients. All variables except of the dependent variables are lagged by one year. Variables in the interaction terms and control variables are mean-centered. a) Winsorized at the 1% level. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. Detailed variable descriptions are provided in the Appendix.

TABLE 7 (PART 1): Robustness – Independent variable: Weighted VBM sophistication by factor loadings

Variable	VBM element	Scale reliability	Average variance extracted	Factor loading
VBM_SUM	*VBM_VO*	0.8067	0.539	0.2816
	VBM_KPI			0.8153
	VBM_TARGET			0.8810
	VBM_SEGMENT			0.7253
	VBM_COMP			0.7666

TABLE 7 (PART 2): Robustness – Independent variable: Weighted VBM sophistication by factor loadings

Model	1	2	3
Hypothesis	1	2	3
Estimation	OLS	OLS	OLS
Dependent variable	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]
Constant	-5.290***	-5.441***	-5.408***
	(0.187)	(0.088)	(0.087)
VBM_SUM_WEIGHTED[b]	-0.188	-0.219	-0.220
	(0.222)	(0.240)	(0.235)
VBM_SUM_WEIGHTED[b] × *PEOPCENT*		0.110**	
		(0.044)	
VBM_SUM_WEIGHTED[b] × *LTINV*			0.162**
			(0.066)
PEOPCENT	-0.028	-0.023	-0.028
	(0.054)	(0.052)	(0.054)
LTINV	-0.152	-0.161	-0.132
	(0.110)	(0.109)	(0.103)
LSIZE	-0.828***	-0.802***	-0.810***
	(0.156)	(0.150)	(0.155)
GROWTH[a]	-0.028	-0.029	-0.028
	(0.022)	(0.022)	(0.022)
LEV[a]	6.839***	6.701***	6.764***
	-1.730	-1.712	-1.717
ROA[a]	-0.056	-0.062	-0.052
	(0.063)	(0.063)	(0.063)
TOBQ[a]	-0.043	-0.048	-0.040
	(0.076)	(0.077)	(0.076)
PVOLA[a]	0.133*	0.135*	0.121*
	(0.071)	(0.070)	(0.070)
DIVEAR[a]	-0.055	-0.060	-0.035
	(0.105)	(0.105)	(0.105)
RDWEIGHTED[a]	0.070	0.068	0.087
	(0.095)	(0.095)	(0.095)
RDMISSING	-0.049	-0.049	-0.049
	(0.099)	(0.100)	(0.096)
VBM_SUM_PRED	0.085	0.081	0.118
	(0.119)	(0.118)	(0.118)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations / firm years	2,122	2,122	2,122
Adj. R^2	24.7%	25.4%	25.2%
Max. VIF	2.67	2.67	2.67

This table reports the robustness test results based on multivariate regressions following the control function approach (Wooldridge 2015). Robust standard errors, clustered at the firm level, are provided in parentheses below the standardized coefficients. All variables except of the dependent variables are lagged by one year. Variables in the interaction terms and control variables are mean-centered. a) Winsorized at the 1% level. b) Variable calculated based on the five VBM elements weighted with the respective factor loadings. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. Detailed variable descriptions are provided in the Appendix.

TABLE 8: Additional analysis – Dependent variable: Relative patent output

Model	1	2	3
Hypothesis	1	2	3
Estimation	OLS	OLS	OLS
Dependent variable	*LPATBOOK*[a]	*LPATBOOK*[a]	*LPATBOOK*[a]
Constant	-6.575***	-6.599***	-5.223***
	(0.868)	(0.860)	(0.086)
VBM_SUM	0.948	0.961	1.415
	(0.651)	(0.645)	(0.939)
VBM_SUM × PEOPCENT		0.043**	
		(0.024)	
VBM_SUM × LTINV			0.137***
			(0.049)
PEOPCENT	-0.025	-0.084	-0.025
	(0.045)	(0.057)	(0.044)
LTINV	0.102	0.098	0.139
	(0.173)	(0.172)	(0.166)
LSIZE	-1.026***	-1.016***	-1.017***
	(0.202)	(0.199)	(0.201)
GROWTH[a]	-0.024	-0.025	-0.024
	(0.023)	(0.023)	(0.023)
LEV[a]	8.708***	8.724***	8.770***
	-2.504	-2.499	-2.463
ROA[a]	-0.080	-0.082	-0.075
	(0.065)	(0.065)	(0.066)
TOBQ[a]	0.030	0.023	0.032
	(0.078)	(0.079)	(0.077)
PVOLA[a]	0.122**	0.123**	0.115**
	(0.055)	(0.055)	(0.055)
DIVEAR[a]	-0.027	-0.030	-0.008
	(0.090)	(0.091)	(0.090)
RDWEIGHTED[a]	0.095	0.098	0.108
	(0.087)	(0.086)	(0.087)
RDMISSING	-0.038	-0.037	-0.036
	(0.083)	(0.083)	(0.082)
VBM_SUM_PRED	-0.813	-0.829	-0.806
	(0.534)	(0.530)	(0.525)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations / firm years	2,299	2,299	2,299
Adj. R^2	26.5%	26.9%	27.0%
Max. VIF	2.76	2.77	2.66

This table reports the robustness test results based on multivariate regressions following the control function approach (Wooldridge 2015). Robust standard errors, clustered at the firm level, are provided in parentheses below the standardized coefficients. All variables except of the dependent variables are lagged by one year. Variables in the interaction terms and control variables are mean-centered. a) Winsorized at the 1% level. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. Detailed variable descriptions are provided in the Appendix.

TABLE 9: Additional analysis – Moderating variable (H2): Subdimensions People Centricity (*PEOPCENT*)

Model	1	2	3	4
Hypothesis	2	2	2	2
Estimation	OLS	OLS	OLS	OLS
Dependent variable	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]
Constant	-5.436***	-5.430***	-5.267***	-5.436***
	(0.102)	(0.107)	(0.132)	(0.118)
VBM_SUM	1.003	1.068	1.004	1.007
	-1.039	-1.072	-1.277	-1.117
VBM_SUM × SO_COMM	0.113**			
	(0.048)			
VBM_SUM × SO_WORK		0.076*		
		(0.044)		
VBM_SUM × SO_HUM			0.042	
			(0.033)	
VBM_SUM × SO_PROD				-0.048
				(0.040)
SO_COMM	0.014			
	(0.053)			
SO_WORK		-0.008		
		(0.039)		
SO_HUM			-0.008	
			(0.041)	
SO_PROD				-0.025
				(0.052)
LTINV	0.039	0.056	0.053	0.059
	(0.193)	(0.197)	(0.229)	(0.200)
LSIZE	-0.984***	-0.993***	-0.983***	-0.965***
	(0.193)	(0.197)	(0.223)	(0.210)
GROWTH[a]	-0.022	-0.022	-0.031	-0.032
	(0.024)	(0.025)	(0.025)	(0.023)
LEV[a]	8.433***	8.540***	8.430**	8.984***
	-2.764	-2.813	-3.299	-3.096
ROA[a]	-0.035	-0.036	-0.042	-0.039
	(0.070)	(0.071)	(0.078)	(0.065)
TOBQ[a]	-0.017	-0.015	-0.127	-0.040
	(0.086)	(0.084)	(0.091)	(0.072)
PVOLA[a]	0.140**	0.145**	0.098	0.106*
	(0.060)	(0.061)	(0.066)	(0.056)
DIVEAR[a]	-0.012	-0.022	-0.062	-0.013
	(0.104)	(0.104)	(0.113)	(0.108)
RDWEIGHTED[a]	0.084	0.097	0.106	0.125
	(0.092)	(0.093)	(0.113)	(0.095)
RDMISSING	-0.004	-0.008	-0.007	-0.003
	(0.091)	(0.092)	(0.098)	(0.094)
VBM_SUM_PRED	-0.589	-0.622	-0.592	-0.587
	(0.580)	(0.600)	(0.715)	(0.625)

TABLE 9 (continued)

Model	1	2	3	4
Hypothesis	2	2	2	2
Estimation	OLS	OLS	OLS	OLS
Dependent variable	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations / firm years	2,279	2,284	2,083	2,188
Adj. R^2	23.9%	23.5%	24.2%	24.5%
Max. VIF	2.67	2.67	2.86	2.65

This table reports the robustness test results based on multivariate regressions following the control function approach (Wooldridge 2015). Robust standard errors, clustered at the firm level, are provided in parentheses below the standardized coefficients. All variables except of the dependent variables are lagged by one year. Variables in the interaction terms and control variables are mean-centered. a) Winsorized at the 1% level. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. Detailed variable descriptions are provided in the Appendix.

TABLE 10: Additional analysis – Moderating variable (H1): Subdimensions long-term (institutional) investors (*LTINV*)

Model	1	2	3	4	5	6	7
Hypothesis	3	3	3	3	3	3	3
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Dependent variable	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]
Constant	-5.433***	-5.456***	-5.446***	-5.497***	-5.462***	-5.460***	-5.458***
	(0.099)	(0.095)	(0.097)	(0.101)	(0.095)	(0.094)	(0.095)
VBM_SUM	0.693	1.012	0.822	0.153	0.664	0.740	0.749
	-1.095	(0.622)	(0.561)	(0.609)	(0.582)	(0.548)	(0.575)
VBM_SUM × NOSHIC		0.068**					
		(0.030)					
VBM_SUM × NOSHGV			0.003				
			(0.059)				
VBM_SUM × NOSHCO				0.091**			
				(0.041)			
VBM_SUM × NOSHPF					0.049***		
					(0.012)		
VBM_SUM × NOSHEM						-0.067	
						(0.056)	
VBM_SUM × NOSHOF							0.012
							(0.040)
NOSHIC		0.057*					
		(0.032)					
NOSHGV			-0.132*				
			(0.079)				
NOSHCO				-0.126			
				(0.126)			
NOSHPF					-0.031		
					(0.039)		
NOSHEM						0.043	
						(0.067)	
NOSHOF							-0.024
							(0.040)
PEOPCENT	-0.032	-0.031	-0.035	-0.037	-0.023	-0.036	-0.031
	(0.050)	(0.051)	(0.051)	(0.051)	(0.050)	(0.052)	(0.052)
LSIZE	-0.928***	-0.983***	-0.963***	-0.872***	-0.963***	-0.949***	-0.952***
	(0.206)	(0.176)	(0.165)	(0.160)	(0.167)	(0.166)	(0.168)
GROWTH[a]	-0.024	-0.019	-0.024	-0.026	-0.024	-0.023	-0.023
	(0.025)	(0.023)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
LEV[a]	7.539***	8.272***	7.732***	6.348***	7.503***	7.682***	7.628***
	-2.814	-2.326	-2.255	-2.210	-2.293	-2.255	-2.279
ROA[a]	-0.022	-0.035	-0.029	-0.008	-0.026	-0.028	-0.029
	(0.071)	(0.066)	(0.064)	(0.065)	(0.064)	(0.065)	(0.065)
TOBQ[a]	-0.012	-0.001	-0.009	-0.014	-0.008	-0.018	-0.014
	(0.082)	(0.080)	(0.084)	(0.082)	(0.082)	(0.082)	(0.082)
PVOLA[a]	0.135**	0.141**	0.148**	0.139**	0.142**	0.144**	0.144**
	(0.060)	(0.059)	(0.062)	(0.061)	(0.060)	(0.062)	(0.061)

TABLE 10 (continued)

Model	1	2	3	4	5	6	7
Hypothesis	3	3	3	3	3	3	3
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Dependent variable	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]
DIVEAR[a]	-0.003	-0.013	-0.029	-0.017	-0.018	-0.022	-0.026
	(0.103)	(0.102)	(0.102)	(0.103)	(0.102)	(0.102)	(0.102)
RDWEIGHTED[a]	0.083	0.078	0.071	0.052	0.065	0.074	0.072
	(0.090)	(0.081)	(0.082)	(0.082)	(0.084)	(0.081)	(0.083)
RDMISSING	-0.026	-0.011	-0.023	-0.040	-0.019	-0.024	-0.023
	(0.091)	(0.104)	(0.103)	(0.099)	(0.105)	(0.104)	(0.104)
VBM_SUM_PRED	-0.385	-0.594*	-0.482	-0.093	-0.399	-0.434	-0.439
	(0.613)	(0.344)	(0.308)	(0.335)	(0.317)	(0.299)	(0.315)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations / firm years	2,299	2,299	2,299	2,299	2,299	2,299	2,299
Adj. R^2	23.6%	23.6%	23.3%	23.3%	23.5%	23.3%	23.1%
Max. VIF	2.65	2.66	2.68	2.66	2.67	2.67	2.65

This table reports the robustness test results based on multivariate regressions following the control function approach (Wooldridge 2015). Robust standard errors, clustered at the firm level, are provided in parentheses below the standardized coefficients. All variables except of the dependent variables are lagged by one year. Variables in the interaction terms and control variables are mean-centered. a) Winsorized at the 1% level. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. Detailed variable descriptions are provided in the Appendix.

TABLE 11: Robustness – Fixed effects specifications

Model	1	2	3
Hypothesis	1	2	3
Estimation	OLS	OLS	OLS
Dependent variable	*LCITBOOK*[a]	*LCITBOOK*[a]	*LCITBOOK*[a]
Constant	-7.967***	-7.961***	-7.941***
	(0.522)	(0.526)	(0.462)
VBM_SUM	-0.048	-0.040	-0.023
	(0.128)	(0.124)	(0.186)
VBM_SUM × PEOPCENT		0.062**	
		(0.028)	
VBM_SUM × LTINV			0.164***
			(0.060)
PEOPCENT	-0.023	-0.106*	-0.022
	(0.050)	(0.061)	(0.050)
LTINV	-0.151	-0.159	-0.103
	(0.100)	(0.100)	(0.094)
LSIZE	-0.724***	-0.713***	-0.717***
	(0.126)	(0.122)	(0.124)
GROWTH[a]	-0.032	-0.033	-0.031
	(0.024)	(0.024)	(0.024)
LEV[a]	5.689***	5.671***	5.815***
	-1.734	-1.714	-1.733
ROA[a]	-0.006	-0.009	-0.001
	(0.063)	(0.063)	(0.063)
TOBQ[a]	-0.019	-0.027	-0.017
	(0.082)	(0.084)	(0.081)
PVOLA[a]	0.153**	0.153**	0.145**
	(0.061)	(0.061)	(0.061)
DIVEAR[a]	-0.033	-0.036	-0.009
	(0.102)	(0.103)	(0.102)
RDWEIGHTED[a]	0.132*	0.134*	0.145*
	(0.076)	(0.076)	(0.075)
RDMISSING	-0.094	-0.092	-0.090
	(0.100)	(0.100)	(0.098)
VBM_SUM_PRED	0.022	0.008	0.019
	(0.110)	(0.108)	(0.109)
Country fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations / firm years	2,299	2,299	2,299
Adj. R^2	22.8%	23.3%	23.4%
Max. VIF	6.24	6.25	3.80

This table reports the robustness test results based on multivariate regressions following the control function approach (Wooldridge 2015). Robust standard errors, clustered at the firm level, are provided in parentheses below the standardized coefficients. All variables except of the dependent variables are lagged by one year. Variables in the interaction terms and control variables are mean-centered. a) Winsorized at the 1% level. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. Detailed variable descriptions are provided in the Appendix.

(5)

Aligning shareholder value creation with payouts: The impact of value-based management sophistication levels on payout policies

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Aligning shareholder value creation with payouts: The impact of value-based management sophistication levels on payout policies

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Abstract

While value-based management (VBM) prioritizes shareholder value creation, payouts are central means of distributing created value to shareholders. To better understand how shareholder-oriented firms employ payout policies to fulfill shareholder interests, this paper examines the association between the implementation of VBM and payout types. We differentiate between levels of VBM sophistication, to measure the extent of VBM implementation within organizations, and payout types, specifically dividends and share repurchases. Using a sample of 1,365 European firm years, our findings indicate that firms with high levels of VBM sophistication (1) are more likely to pay dividends and repurchase shares, (2) have higher repurchase ratios, and (3) reduce dividend ratios if alternative investment opportunities exist. These results indicate that firms with high VBM levels appreciate the opportunity to actively distribute created value to shareholders. Simultaneously, the analyses suggest a strategic use of payout types. Particularly the identified higher share repurchase ratios and reduced dividend ratios in the presence of alternative investment opportunities suggest a preference of VBM users for the more flexible share repurchases. Further, the analyses demonstrate the importance of differentiating between sophistication levels of VBM.

Keywords: value-based management, shareholder value, payout policy, dividends, share repurchases

JEL: M41; G35

1 Introduction

This empirical study investigates the relationship between implementation levels of value-based management (VBM) and payout policy. Prior research on VBM and corporate payouts has predominantly focused on isolated contexts. By directly examining the association between VBM and different payout types, this study explores how shareholder-oriented companies utilize the opportunity to actively distribute generated shareholder value. VBM systems are widely adopted by companies in the United States and Europe to align decision-making with the objective of creating shareholder value (e. g., Fiss and Zajac 2004; Malmi and Ikäheimo 2003; Rapp et al. 2011). Designing comprehensive VBM systems is complex, as it has to align strategy, decision-making, performance measurement, firm processes and mindsets with value creation (Burkert and Lueg 2013; Ittner and Larcker 2001; Malmi and Ikäheimo 2003). Assessing the success of VBM adoption has received significant scholarly attention in terms of resulting firm performance (e. g., Firk et al. 2016; Knauer et al. 2018; Lueg and Schäffer 2010) and other economic outcomes (e. g., Brück et al. 2022; Mavropulo et al. 2021; Ryan and Trahan 2007; Wallace 1997). However, there is no explicit research on the final step to maximize shareholder wealth – the distribution of firms' generated value to shareholders. Considering the objective of VBM to fulfill shareholder interests, payout policies constitute central means in order to distribute generated value into cash for shareholders. The several advantages of payouts, such as reduced information asymmetries and signaling effects, differ between payout types such as dividend payouts and share repurchases (Farre-Mensa et al. 2014). Hence, a comprehensive empirical analysis of payout policies is required to understand how shareholder-oriented firms practically use existing options to actively distribute available funds.

VBM refers to a strategic management concept that prioritizes shareholder interests (Rappaport 1998). It is based on value-based metrics, which quantify the abstract goal of shareholder value creation and are the basis of managerial decision-making. The use and disclosure of VBM elements, such as using value-based metrics for steering business segments or determining executive compensation, signal management's commitment to align corporate decisions with shareholder interests (Brück et al. 2022). A corporate decision that directly affects shareholders is the distribution of available funds via payouts. Prior research on payout policy even acknowledges the potential of payouts to generate shareholder value (Farre-Mensa et al. 2014; Manconi et al. 2019).

In this study, we contribute to existing research on VBM and payout policy by examining the interrelation between two instruments that directly address shareholders' interests. We exploit this setting to further demonstrate the significance of differentiating between VBM's implementation levels to detect organizational outcomes. Prior research suggests that VBM is linked to improved decision-making quality (Brück et al. 2018). However, recent findings indicate that it is the deep organizational implementation of VBM that effectively facilitates decision-making (Firk et al. 2021). Hence, we analyze how different implementation levels affect the anticipated relationships between VBM and payout policy. For a comprehensive evaluation of payout policies, we separately analyze the impact of VBM on two major payout types: dividends and share repurchases. Considering relevant context factors, we further conduct a moderator analysis of firm's investment opportunities. This sheds light on how shareholder-oriented firms adjust payout policies when alternative investment opportunities exist that might be preferable for maximizing shareholder value.

Building upon identified positive signaling effects for dividend-paying firms (e. g., DeAngelo et al. 2000), we hypothesize a positive association between VBM and the likelihood of dividend payouts. In the case of share repurchases, we also predict a higher payout probability for

higher VBM levels due to potentially reduced agency costs (e. g., Miller and Rock 1985). Taking into account the continuity and varying flexibility levels of the two payout types, we infer that the binding character of dividends (e. g., dividend smoothing) should lead to lower dividend payout ratios of VBM users to spare resources for potentially shareholder value creating projects. On the other hand, share repurchases allow for more targeted and flexible distributions, potentially making them the preferred type of payout for VBM users. Lastly, we expect investment opportunities to moderate the association between VBM and payouts as rational shareholder-oriented payout policies should be strongly dependent on fund allocation alternatives that could contribute to maximizing shareholder value. Specifically, we anticipate that the negative association with dividends will be amplified, while the positive association with share repurchases will be mitigated.

To empirically examine this relationship, our study focuses on the 200 largest non-financial firms of the STOXX Europe 600 in terms of market capitalization from 2005 to 2014. Building on Firk et al. (2019b), we quantify levels of VBM implementation based on the VBM sophistication model, which considers the incorporation of various VBM elements by referring to disclosed information.[1] This measurement enables us to specifically focus on effects of deeply integrated VBM as compared to non-adopters and companies that only partially implement VBM elements.

Our findings highlight the relevance of the level of VBM sophistication. Specifically, we observe that several effects are more prominent, or even only visible, when VBM is deeply integrated. Comparing firms with high levels of VBM implementation to those without VBM adoption, we identify that deeply implemented VBM leads to: (1) a higher likelihood of payouts, i. e., of dividends and share repurchases, (2) higher share repurchase ratios, and (3) lower dividend ratios

[1] This concept assumes that firms using this practice will likely disclose specific information, particularly when they want to signal their intent to create value (e. g., Rapp et al. 2011; Crilly et al. 2016; Firk et al. 2019b).

if alternative investment opportunities exist. However, we cannot provide statistically significant support for the expected negative effect on dividend ratios overall, and in case of existing alternative investment opportunities. These findings demonstrate that shareholder-oriented firms are more likely to use the opportunity to actively distribute created value to shareholders Further, the results support the notion that firms with high levels of VBM implementation adopt a shareholder value-oriented payout policy. Payouts are identified as important means of distributing shareholder value and, potentially, value-enhancing signaling mechanism. At the same time, payouts can restrict investments into shareholder value-maximizing projects. Accordingly, the flexibility of share repurchases compared to more binding dividend payouts is expected to be a crucial consideration of VBM users and might explain these results.

This study expands prior literature on VBM, payout theory, and the broader field of agency theory (e. g., Chang et al. 2016; Chen et al. 2012; Denis and Osbov 2008; Knauer et al. 2018; Louis and Urcan 2015). It further extends the VBM research stream on VBM's potential organizational outcomes (e. g., Firk et al. 2019a; Firk et al. 2016; Knauer et al. 2018; Mavropulo et al. 2021; Rapp et al. 2011; Schultze et al. 2018). *Previous VBM research* has predominantly concentrated on financial performance effects and value generation, but not focused on the distribution of created shareholder value. In this study, we specifically investigate whether the use of funds aligns with shareholder interests. By doing so, we provide empirical evidence highlighting the significance of differentiating between levels of VBM sophistication (e. g., Burkert and Lueg 2013; Firk et al. 2021; Firk et al. 2019b). Our findings are supported by the analysis of Wallace (1997), which investigates payouts following the implementation of value-based compensation and observes increased payouts in the form of share repurchases. *Prior research on payout policies* has explored various theories to explain the economic considerations involved in determining the scope of

payouts and selecting a specific payout type (Farre-Mensa et al. 2014). In this study, we specifically draw on evidence supporting the flexibility hypothesis (e. g., Iyer et al. 2017; Oded 2020), the catering hypothesis (e. g., Golubov et al. 2020; Kulchania 2013), and agency costs of the free cash flow hypothesis (e. g., Attig et al. 2021; Louis and Urcan 2015). Our findings substantiate the presence of an agency cost mitigating effect of VBM, as firms with high VBM sophistication align their actions with shareholders' interests and restrict the discretion of managers. Lastly, by considering VBM sophistication as a measure of corporate governance quality, our study contributes to the research stream that examines payout policy as an outcome of corporate governance (e. g., Adjaoud and Ben-Amar 2010; Chae et al. 2009; Chang and Dutta 2012; Golubov et al. 2020; La Porta et al. 2000). This study also provides valuable managerial implications. We demonstrate that sophisticated VBM systems can foster awareness for the importance of aligning payout decisions with shareholder interests. However, the depth of implementation appears to be a crucial factor in order to realize these effects.

The remainder of this paper is organized as follows. Section 2 discusses relevant concepts and related literature. Section 3 develops the hypotheses. Section 4 presents the sample and research design. Section 5 reports the results. Section 6 presents our additional analyses. Finally, conclusions and implications are discussed in section 7.

2 Literature review

2.1 Payout policy

Payout policy has been extensively discussed in the literature (Farre-Mensa et al. 2014) and continues to be a highly debated topic in finance, capturing the attention of market participants and researchers (e. g., Kahle and Stulz 2021; Kaplan and Pérez-Cavazos 2022; Michaely and Moin 2022; Saeed 2021). While payouts have no impact on shareholder wealth in a frictionless world (Miller and Modigliani 1961), corporations adopt deliberate payout strategies in reality (Brav et al. 2005). The level and choice of payout mechanisms can influence shareholders' investment decisions, firm valuation, tax burden, and provide information about the firm's financial health (Farre-Mensa et al. 2014). Firms can distribute earnings either via dividend payments or share repurchases. Technically, both payout mechanisms reduce available free cash flow. Thus, payouts have the potential to mitigate agency conflicts, as proposed by Jensen's (1986) free cash flow theory, and empirical evidence robustly supports this rationale (Farre-Mensa et al. 2014).

However, dividends and repurchases are not considered perfect substitutes. One crucial aspect is the flexibility of the payout types. Empirical evidence suggests that dividends are less volatile compared to repurchases (Farre-Mensa et al. 2014). Dividend payments convey information about a firm's profitability and signal expectations of future cash flows, as firms can only sustain the associated payout costs[2] if they consistently generate a certain level of profits (Bhattacharya 1979; Miller and Rock 1985). Therefore, reducing dividends often results in negative market

[2] The costs of dividend payments are the related tax costs, costs of external financing, and opportunity costs of deferred investments (Miller and Rock 1985; Bhattacharya 1979; John and Williams 1985).

reactions, and firms strive to maintain smooth dividend payments (Larkin et al. 2017). Dividends are viewed as an informal payment obligation and are suitable for distributing recurring earnings.

On the other hand, share repurchases offer greater flexibility. As there is no market expectation for periodic repurchases, they are more suitable for one-time distributions of transient earnings or large non-recurring payments of accumulated excess cash (Farre-Mensa et al. 2014). Shareholders need to sell their stocks to monetize the payout from repurchases. This allows firms to structure the timing and amount of shareholder cash flows according to their needs, but also leads to transaction costs for shareholders and a relinquishment of voting rights. Additionally, if tax rates differ between dividends and capital gains from repurchases, the choice for one of the payout vehicles has implications for shareholders' tax burden (Farre-Mensa et al. 2014). Consequently, different shareholder groups may have preferences for either dividends or share repurchases based on their individual investment considerations.

2.2 Value-based management (VBM)

VBM is a strategic management approach that prioritizes the interests of shareholders (Firk et al. 2016; Rappaport 1998). By implementing VBM principles, firms can align their actions and decision-making processes with the goal of creating shareholder value (Firk et al. 2016; Scheipers et al. 2005). This involves considering the cost of capital in the decision-making process through the use of value-based metrics and compensation plans (Burkert and Lueg 2013; Knauer et al. 2018; Rappaport 1998). One of the key advantages of VBM is its potential to mitigate agency problems within a company. By promoting transparency through value-based reporting, VBM enhances monitoring and reduces information asymmetries between management and shareholders (Brück et al. 2022). Furthermore, value-based compensation plans can incentivize management to act in

the best interests of shareholders (Elgharbawy and Abdel-Kader 2013; Wallace 1997). Another aspect of VBM is its emphasis on long-term orientation and continuity. The broad planning horizon associated with VBM concepts signals stakeholders that the company is focused on sustainable value creation over time (Firk et al. 2019b; Fiss and Zajac 2006; Ittner and Larcker 2001). The sophistication of actually implemented VBM principles is positively related to the perceived economic benefits (Firk et al. 2019b). Overall, VBM provides a framework for organizations to align their strategies, decision-making processes, and compensation structures with the goal of maximizing shareholder value. It can thereby address agency problems, enhance transparency, and signal long-term shareholder value creation to stakeholders.

Previous research on VBM has explored two main areas: the characteristics of firms that adopt VBM and the potential effects of VBM on firm performance. Studies examining the adoption of VBM focus on understanding the factors that influence a company's decision to implement VBM principles. These factors may include organizational characteristics, management attitudes, industry dynamics, and external pressures (e. g., Brück et al. 2022; Dekker et al. 2012; Fiss and Zajac 2004; Lovata and Costigan 2002; Nowotny et al. 2022). On the other hand, research on the performance effects of VBM investigates the relationship between VBM implementation and various performance measures. This research generally indicates positive performance effects associated with VBM adoption (e. g., Firk et al. 2019a; Firk et al. 2016; Knauer et al. 2018; Mavropulo et al. 2021; Rapp et al. 2011; Schultze et al. 2018). By implementing VBM elements, companies have been found to improve their performance measurement systems (e. g., Garvey and Milbourn 2000; Rappaport 1986; Young and O'Byrne 2001) and enhance decision-making quality (e. g., Brück et al. 2018; McLaren 2004; Slater and Olson 1996; Stern et al. 1996). Overall, previous research

suggests that adopting VBM can have positive effects on firm performance, including improved performance measurement and decision-making.

2.3 VBM sophistication

VBM research traditionally relied on a binary variable to categorize firms as either adopter or non-adopter of VBM (Firk et al. 2019b). However, this binary classification does not reflect the diverging levels of implementation of a management practice (Ansari et al. 2010). Ittner and Larcker (2001) initially described basic elements of comprehensive VBM systems. Case-based evidence demonstrated considerable variations across implementation levels of such VBM elements (e. g., Claes 2006; Malmi and Ikäheimo 2003; Meyer and Höllerer 2010). Thus, we refer to the latest research on VBM adoption, which captures implementation levels more granular than the binary classification (Burkert and Lueg 2013; Firk et al. 2021; Firk et al. 2019b; Nowotny et al. 2022). Burkert and Lueg (2013) firstly addressed VBM measurement in their research design, which accounts for different levels of VBM sophistication. Malmi and Ikäheimo (2003) provide a framework to identify six dimensions of VBM use from the normative literature. Firk et al. (2019b) adjusted this sophistication framework to make it suitable for an outside perspective study by analyzing annual reports. We further refer to this framework, which is based on publicly available information, providing transparency and replicability of VBM data. The identification framework consists of five equally[3] weighted dimensions. Based on publicly available information in annual reports, the VBM sophistication measure reflects the extent of VBM implementation and signals of shareholder value orientation. It accounts for (Firk et al. 2019b):

[3] The relative importance of a single VBM element cannot be deduced from the VBM literature, so an equal-weight construct provides transparency and objectivity. (e. g., La Porta et al. 1998; Firk et al. 2019b).

- the general proclamation to the goal of shareholder value maximization,
- the use of a superordinate value-based metric,
- the embedding of a value-based metric into strategic management,
- the embedding of a value-based metric into management compensation plans, and
- the integration of value-based metrics into lower organizational levels such as business units or divisions.

Higher levels of VBM sophistication reflect a deeper incorporation of the VBM concept. Conversely, low levels of VBM sophistication may suggest a symbolic adoption of VBM, where firms merely proclaim adherence to VBM without fully incorporating its essential components into strategic planning or management compensation. This symbolic adoption can be driven by the pressure for social conformity if firms seek legitimacy in the capital market rather than pursuing the performance and decision-making benefits of VBM (Fiss and Zajac 2006; Tolbert and Zucker 1983). However, incomplete VBM implementation does not necessarily imply symbolic adoption. Firms may face challenges in successfully implementing VBM, such as limited acceptance within the organization (Malmi and Ikäheimo 2003) or concerns regarding potential costs of misfits associated with high levels of VBM sophistication (Ansari et al. 2010). On the other hand, higher levels of VBM sophistication are likely driven by the anticipated economic benefits linked to VBM and is expected to result in a management approach that is aligned with the shareholder value idea. Studies have shown that factors such as centralization, formalization, and horizontal integration are associated with higher levels of VBM sophistication (Nowotny et al. 2022), while organizationally deeply implemented VBM supports managerial decision-making (Firk et al. 2021). Based on these observations, the effects of VBM on payouts may vary across different levels of VBM sophistication and be particularly prominent for high levels of VBM sophistication. Consequently, we

configure our research design to specifically compare the effects of high levels of VBM with non-adoption and lower levels of VBM.

3 Hypotheses development

3.1 The association between shareholder orientation and payout policies

A shareholder value-oriented payout policy is focused on the interests of shareholders but needs to consider its signals to the capital market. If a firm distributes earnings via dividends, the capital market typically expects these payments to recur on a regular basis (e. g., Brav et al. 2005; Farre-Mensa et al. 2014). Accordingly, firms are expected to only initiate dividend payouts if they expect profitable operations in the long run. Therefore, paying dividends should signal a sustainably profitable business (Allen et al. 2000). Referring to previous research that documented positive performance effects of VBM (Firk et al. 2016; Lueg and Schäffer 2010) and better decision-making quality for profound VBM sophistication (Firk et al. 2021), we derive that firms with high VBM levels are likely to (1) generate sustainable profits, (2) have incentives to signal their continuously positive earnings expectations to the capital market, and (3) are aware of the signaling effect of dividend payments. Additionally, prior evidence suggests that dividend payments are associated with lower risk (Eije et al. 2014) – which is congruent with the objective of VBM to reduce the cost of capital.

Share repurchases represent another attractive payout mechanism for firms with a strong shareholder value orientation. Share repurchases provide flexibility and can be used to reduce the stock of free cash flow, thereby mitigating agency conflicts within the firm (Brav et al. 2005). By repurchasing shares, firms effectively return capital to shareholders while maintaining control over the allocation of (future) funds.

In summary, a shareholder value-oriented payout policy should consider both dividends and share repurchases as effective payout mechanisms. Firms with high VBM levels are likely to exhibit improved performance, signal positive earnings expectations, and exploit the signaling effect of dividends. Moreover, they may also employ share repurchases more frequently to reduce agency conflicts and enhance shareholder value. Therefore, we formulate hypotheses 1a and 1b:

H1a. *Compared to VBM non-adoption, firms with high levels of VBM sophistication are more likely to pay out dividends.*

H1b. *Compared to VBM non-adoption, firms with high levels of VBM sophistication are more likely to repurchase shares.*

Considering the level of payouts, we expect that firms with high VBM levels should be likely to payout moderate dividend ratios (i. e., the ratio of cash dividends to earnings) and favor share repurchases for substantial payouts.

Firstly, following the dividend smoothing theory, high levels of dividend payout ratios persistently restrict the scope of reinvesting earnings (e. g., Brav et al. 2005; Iyer et al. 2017). Thus, excessive dividend payouts can compromise the financial stability, flexibility and future growth prospects. Further, we expect firms with high VBM levels to payout less dividends as shareholder value might benefit rather from investing cash flows into value generating businesses than from sticking to informal dividend payout obligations. If shareholder value-oriented firms aspire to reduce free cash flows, they might prefer share repurchases as more flexible payout mechanism without associated informal payout obligation (Brav et al. 2005).

Secondly, signaling theory supports the argument for moderate dividend ratios. The governance mechanism of VBM increases transparency and reduces agency costs. The free cash flow

theory also provides arguments for reduced agency costs through dividend payouts. Generally, cost arguments support a substitutional relation between similar and simultaneous agency mechanisms (Bhat et al. 2006; Core et al. 2015). If both mechanisms – i. e., VBM and dividends – provide an equivalent effect of reducing agency costs, the cheaper option might be prioritized. Accordingly, dividends' binding constraints on future cash flows results in financial risk, which is costly for the firm. As firms with high VBM levels already implemented VBM systems, the need to eliminate agency costs via high dividend payouts should be lower. Following La Porta et al. (2000), who investigate agency models of dividends under legal shareholder protection, a substitutional relationship between VBM and dividends appears possible if firms need to raise funds from external capital markets. To gain market participants' trust, firms can improve their reputation either through value-based reporting or by distributing earnings. While the first signals a management approach that is in line with shareholders' interests, earnings distributions reduce the risk of misused funds. Compared with low VBM levels, higher VBM levels are supposed to be associated with increasing implementation costs and better organizational VBM implementation. This can increase the credibility of the signals of shareholder value orientation and reduce the need for signaling effects of dividend payments.

Thirdly, tax considerations support the argument that share repurchases might be preferred by shareholder value-oriented organizations as compared to dividend payouts. While share repurchase programs offer the opportunity for shareholders to defer tax payments on capital gains, dividends are typically taxed in the period of dividend payout.[4] Given the time value of money, repurchases can contribute to higher individual capital gains in the long term, as shareholders do not need to pay taxes on the capital gains until they sell the shares (Chetty and Saez 2005).

[4] We acknowledge that national taxation laws vary (e. g., La Porta et al. 2000).

Fourthly, paying out free cash flows with share repurchases instead of dividends is also in line with the shareholder value maxime, as empirical evidence also suggests associated reductions in systematic risk and cost of capital (Grullon and Michaely 2004). Hence, VBM adopters might find few reasons to prefer dividends for substantial payout levels.

In summary, firms with high VBM levels are likely to structure their payout policies with moderate dividend ratios and a preference for share repurchases. This approach allows to prioritize shareholder value-maximizing investments and reduce agency costs in order to fulfill shareholder interests. Concluding, we propose the hypotheses 2a and 2b:

H2a. *Compared to VBM non-adoption, high levels of VBM sophistication have a negative influence on dividend payout ratios.*

H2b. *Compared to VBM non-adoption, high levels of VBM sophistication have a positive influence on share repurchase ratios.*

3.2 The influence of investment opportunities on shareholder-oriented payout decisions

Finally, we examine the moderating effect of firms' investment opportunities and investigate whether agency theory or dividend smoothing theory can explain the expected negative effect of VBM on dividend levels. Dividend payout theory argues that firms' agency costs increase as free cash flows grow (Jensen 1986). Investments reduce free cash flows and thereby decrease agency costs. Hence, a significant influence of firms' investment opportunities on the VBM-to-payout relationship can be expected. With promising growth prospects, shareholders are likely to accept lower payout ratios due to potentially higher returns from earnings reinvestment. This association relies on an adequate use of retained earnings (La Porta et al. 2000). By trusting in management's

shareholder value orientation, and simultaneously *promising investment opportunities*, dividend payouts might lose their associated signaling effects. If high VBM levels provide a more reliable signal of shareholder value orientation as compared to low VBM levels, firms' investment opportunities will moderate the association between VBM sophistication and dividend payments. Accordingly, *promising investment opportunities* should induce firms with high VBM levels to reduce dividend payouts. Conversely, higher payouts might be reasonable options with *poor investment opportunities*. Further, reporting value-based metrics enables shareholders to better evaluate (past) investment options, which can cause additional pressure to distribute available funds.

However, low VBM levels might fail to convey a reliable signal of shareholder value orientation. Consequently, shareholders might have less trust in the appropriate use of retained earnings. Even with *promising investment opportunities*, shareholders of firms with low VBM levels are less likely to accept full retention of earnings. Under such circumstances, the payout ratios of firms with low VBM levels are expected to be higher, in contrast to firms with high VBM levels. With *poor investment opportunities*, firms with low VBM levels should still be encouraged to target high dividend payout ratios. Similar to the arguments for firms with high VBM levels, the payout ratios of firms with low VBM levels are expected to be higher as compared to promising investment opportunities. However, the moderating effect of investment opportunities is anticipated to be more pronounced for firms with high VBM levels than for those with low levels due to two reasons: Firstly, low-level VBM adopters are expected to have fundamentally higher payout ratios, which would limit their scope for further increases. Secondly, the information effect regarding available investment opportunities is depending on the VBM level. Hence, the pressure to distribute earnings with poor investment opportunities should be particularly salient for firms with high VBM levels.

In summary, the moderating effect of investment opportunities on the association between VBM and dividends is expected to be stronger for firms with high VBM levels as compared to firms without VBM adoption or with low levels. Hence, we propose hypothesis 3a:

H3a. *The level of investment opportunities moderates the negative effect of VBM on dividend payout ratios, i. e., – compared to VBM non-adopters – firms with high VBM levels have even lower dividend payout ratios if the level of investment opportunities is high.*

The same arguments apply to share repurchases. With promising growth prospects and high VBM levels, particularly rational shareholders may prefer lower payouts and forgo share repurchases. Shareholders can expect that retained earnings are used for shareholder value-enhancing investments. On the other hand, firms with low VBM levels and poor investment opportunities are more likely to repurchase shares to attract investors and signal their value creation potential. The moderating effect of investment opportunities on the relationship between VBM and share repurchases is expected to be stronger for firms with high VBM levels compared to those without VBM adoption or with low levels. This argumentation results in our concluding hypothesis 3b:

H3b. *The level of investment opportunities negatively moderates the positive effect of VBM on share repurchase ratios, i. e., – compared to VBM non-adopters – firms with high VBM levels have lower share repurchase ratios if the level of investment opportunities is high.*

4 Sample and research design

4.1 Sample selection

Our sample is based on the 200 largest European non-financial firms as measured by market capitalization. To avoid survivorship bias, we selected the largest constituents of the STOXX Europe 600 index at the end of our first observation year 2005 and tracked their performance until 2014. Starting with 2,000 firm years, our sample was reduced by 139 firm years due to stock delisting and liquidations. Despite extensive research, 126 annual reports were not available, leading to a further reduction in our sample. Multiple listings resulted in the exclusion of 89 additional firm years. Missing regression-relevant firm data reduced the final sample size by 281 firm years to 1,365 observations. Table 1 summarizes the sample construction.

[Insert TABLE 1 here.]

The European setting provides a sample with widespread VBM diffusion (Bezemer et al. 2015; Burkert and Lueg 2013; Cooper and Crowther 2008). The firm years in the sample are distributed across numerous countries, with Great Britain (23.4%), France (19.2%), and Germany (13.4%) being the most represented. Regarding industry classification benchmark (ICB) sectors, our sample has large proportions of industrial (19.6%), consumer goods (19.5%) and consumer services (17.2%) clusters. Table 2 summarizes the characteristics of the samples.

[Insert TABLE 2 here.]

4.2 Research method

Variable definitions

The *dependent variables* were obtained from the Refinitiv Eikon database. *DIVPAYER* is a dichotomous variable, which takes the value of one if a firm has paid cash dividends in a respective firm year, and zero else. *SRPAYER* is a dichotomous variable, which takes the value of one if a firm has repurchased shares in a respective firm year, and zero else. The variable *DIVEAR* is a measure of dividend payments. Following previous agency theory-related dividend research, we calculated the dividend payout ratio *DIVEAR* as cash dividends divided by the prior year's earnings (La Porta et al. 2000; Mancinelli and Ozkan 2006). Earnings were measured after taxes and interests, but before extraordinary items. Special dividends have been excluded due to special characteristics such as irregular payouts, impeding an aggregation with regular dividends (DeAngelo et al. 2000; John et al. 2011). The variable *SREAR* measures the share repurchase ratio. We follow the calculation of our dividend measure and scale it by earnings as fundamental determinant of share repurchases (Skinner 2008).

The *independent variables VBM_LOW* and *VBM_HIGH* are based on the level of VBM sophistication according to Firk et al. (2019b) and Firk et al. (2021). VBM sophistication is determined based on five elements: the general commitment to shareholder value orientation,[5] the use of value-based metrics as steering instruments in general,[6] official targets for value-based metrics,[7] the use of value-based metrics for steering business units,[8] and value-based metrics as component

[5] The aim to create value is specifically stated in corporate annual reports.
[6] A value-based metric is used to measure a firm's performance.
[7] The target for an adopted value-based metric is specified in corporate annual reports.
[8] Value-based metrics are reported or discussed for business units or market segments within annual reports.

to determine management compensation.[9] Previously, the binary scored elements have been aggregated as the equally weighted sum[10] to derive a VBM sophistication score ranging from zero to five. In this study, we explicitly focus on the effects of deeply implemented VBM, as adjusting payout policy in line with shareholder value maximization represents a significant strategic intervention, which is only expected with comprehensively implemented VBM systems. Hence, we distinguish between firms without any VBM element, firms with partially implemented VBM and deeply implemented VBM. *VBM_LOW* captures partially implemented VBM with one, two or three implemented VBM elements. *VBM_HIGH* aggregates firm years with deeply implemented VBM and at least four implemented VBM elements. This allocation guarantees a comprehensive implementation of the VBM system and ensures that at least one of the two elements that typically indicate a deep implementation – the use of value-based metrics for segments or management compensation – is observed.

As firm-specific data regarding VBM elements are not available in extant databases, we hand-collected them following Lovata and Costigan (2002), Rapp et al. (2011), Firk et al. (2016), and Knauer et al. (2018). We conducted a content analysis of corporate annual reports[11] and carefully searched for text passages[12] that indicate the use of VBM elements. This data collection

[9] Executive compensation is linked to a firm's value-based metric or the annual reports state that top-management compensation is based on value-based metrics.

[10] The relative importance of a single VBM element cannot be deduced from the VBM literature; thus, a construct with equal weights provides transparency and objectivity (e. g., La Porta et al. 1998; Firk et al. 2019b).

[11] Corporate annual reports typically offer comprehensive information about yearly activities, financial performance, and strategic goals. As such, they have a key function for stakeholder information, including the employment of VBM elements Firk et al. 2019b. We assumed that firms that want to signal shareholder value orientation through VBM incorporation are likely to provide so according to disclosures on VBM.

[12] We searched for text passages in annual reports containing words such as "EVA", "CVA", "ROCE", ROIC", "value added", "economic value", "return on", "WACC", "shareholder value", and "value creation". We also spelled out abbreviations and used modifications of search terms such as "cost of capital", "capital cost", and "capital charge". We carefully analyzed the text passages containing such search words to verify whether the firm under consideration reports the use of value-based metrics. This verification was particularly important for search terms such as "return on", which are used in several contexts. Furthermore, we read the remuneration report to ascertain whether value-based metrics were used for management compensation.

method follows the assumption of previous studies, that VBM users are likely to disclose specific information on this practice, particularly when firms want to signal their objective to create value (e. g., Rapp et al. 2011; Crilly et al. 2016; Firk et al. 2019b). We defined an ex-ante coding scheme to mitigate subjectivity, ensure consistent coding, and double-checked the results. We only acknowledged a VBM element if the respective metric accounts for the cost of capital, as do residual income measures. Following Firk et al. (2019b), we distinguished between five VBM elements on a binary scale, i. e., allocating the value of one if this element was explicitly described in the annual report, and zero otherwise.

In all regression models we chose the non-adoption of VBM, i. e., no implemented VBM element, as our base category of the factor variable which additionally contains the VBM levels *VBM_LOW* and *VBM_HIGH*. This approach allows the comparison of each VBM level with VBM non-adoption.

Controlling for the determinants of payout policy, we aim to exclude effects other than that of VBM on payout ratios. The control variables were obtained from the Refinitiv Eikon database, unless explicitly stated.

First, share repurchases may affect dividend payout ratios. Even though dividends and share repurchases emit different signals to the capital market (Brav et al. 2005), it is conceivable that decisions for dividends and share repurchases are highly interconnected. To control for this issue, we include *SREAR* as a control variable in all models with a measure for dividends as the dependent variable, and *DIVEAR* as a control variable in all models with a dependent variable of share repurchases.

Second, previous dividend research shows that large firms realize higher dividend payout ratios than small firms (DeAngelo and DeAngelo 2006; Denis and Osbov 2008; Grullon et al.

2002). Firm size typically improves possibilities for external financing and reduces the need to retain earnings for internal financing (Holder et al. 1998). Following Chang et al. (2016) and Desai and Jin (2011), we control for firm size by including *LSIZE*, calculated as the natural logarithm of a firm's market capitalization. Taking the natural logarithm reduces the effect of outliers in skewing the distribution.

Third, high-growth firms typically pay significantly lower dividends (Grullon et al. 2002; La Porta et al. 2000; Mancinelli and Ozkan 2006). If value-creating growth opportunities are available, earnings are likely to be retained and invested in value creation, rather than using them for dividend payments. Following previous research, we account for investment opportunities and include the market-to-book ratio *MTB*, which divides the market value of assets by the book value of assets (Mancinelli and Ozkan 2006).

Fourth, similar to the restricting effects of dividend payments described by the free cash flow theory, also debt interests restrict managers' scope of action (Berk and DeMarzo 2020; Bøhren et al. 2012). Thus, high debt potentially influences managers' intentions to pay dividends. We control for the debt ratio with *DEBTAS*, the book value ratio of debt to total assets, to capture interdependency effects in agency cost reduction.

Fifth, we control for operating risk by including *CFVOL* in our regression models, the three-year volatility measured by standard deviations of cash flows divided by revenue. Riskier business models require sufficient risk buffers that are likely to be built through retained earnings, resulting in lower payout ratios (Firk et al. 2019b; Stacescu 2006).

Sixth, high profitability reduces the need for external financing, enabling higher dividend payments (DeAngelo et al. 2006; Grullon et al. 2002; Stacescu 2006). Furthermore, profitability controls for the potentially mediating effect of VBM users' financial conditions, which might affect

dividend payments. Therefore, we control for profitability by including the return on total assets *ROA*.

Seventh, prior research demonstrated a positive association between dividend payments and institutional investors (e. g., Crane et al. 2016; Gaspar et al. 2013; Redding 1997). Hence, we control for the share of institutional shareholders with at least 5% ownership by including *NOSHIC*.

Finally, we control for *year and firm*[13] *fixed effects* in our linear regression models. The significant chi squares in Hausman's (1978) specification test for endogeneity support this approach.

To test the moderating effect of investment opportunities (H3a, H3b), we add interaction terms between the VBM levels and investment opportunities, measured by *MTB* ($VBM\_LOW_i \times MTB_i$; $VBM\_HIGH_i \times MTB_i$). In all models, we winsorize *DIVEAR*, *DEBTAS*, and *ROA* at the 1st and 99th percentile levels in line with prior research, such as Desai and Jin (2011) and Firth et al. 2016, to avoid outliers affecting the prediction. Finally, we use firm clustered standard errors in all our models to account for heteroskedasticity across firms.

Statistical model

Based on the above-mentioned specifications, we test the impact of VBM levels to increase the likelihood of paying out dividends (H1a) and share repurchases (H1b). Therefore, we use the following logistic regression models:

[13] Due to limited variation in dividend payer status within our sample period, we were unable to include firm fixed effects in our logistic models. This restriction resulted in the exclusion of 1,095 observations from our analysis. Consequently, the remaining sample size of 270 firm years, including only 15 observations with VBM level four and 20 observations with VBM level five, would not provide sufficient data to draw meaningful inferences regarding high VBM sophistication. To keep an adequately large sample size but still considering fixed effects, we include country and industry fixed effects instead of firm fixed effects in the first two models.

$$\text{Log}\,(DIVPAYER_i) = \gamma_0 + \gamma_1\, VBM\_LOW_i + \gamma_2\, VBM\_HIGH_i + \gamma_3\, SREAR_i + \gamma_4\, LSIZE_i + \gamma_5\, MTB_i + \gamma_6\, DEBTAS_i + \gamma_7\, CFVOL_i + \gamma_8\, ROA_i + \gamma_9\, NOSHIC_i + \textit{Year Fixed Effects} + \textit{Country Fixed Effects} + \textit{Industry Fixed Effects} + \varepsilon_i. \quad (1)$$

$$\text{Log}\,(SRPAYER_i) = \gamma_0 + \gamma_1\, VBM\_LOW_i + \gamma_2\, VBM\_HIGH_i + \gamma_3\, DIVEAR_i + \gamma_4\, LSIZE_i + \gamma_5\, MTB_i + \gamma_6\, DEBTAS_i + \gamma_7\, CFVOL_i + \gamma_8\, ROA_i + \gamma_9\, NOSHIC_i + \textit{Year Fixed Effects} + \textit{Country Fixed Effects} + \textit{Industry Fixed Effects} + \varepsilon_i. \quad (2)$$

To analyze the impact of VBM levels on dividend ratios (H2a) and repurchase ratios (H2b), we use ordinary least squares (OLS) regressions with the following models:

$$DIVEAR_i = \gamma_0 + \gamma_1\, VBM\_LOW_i + \gamma_2\, VBM\_HIGH_i + \gamma_3\, SREAR_i + \gamma_4\, LSIZE_i + \gamma_5\, MTB_i + \gamma_6\, DEBTAS_i + \gamma_7\, CFVOL_i + \gamma_8\, ROA_i + \gamma_9\, NOSHIC_i + \textit{Firm Fixed Effects} + \textit{Year Fixed Effects} + \varepsilon_i. \quad (3)$$

$$SREAR_i = \gamma_0 + \gamma_1\, VBM\_LOW_i + \gamma_2\, VBM\_HIGH_i + \gamma_3\, DIVEAR_i + \gamma_4\, LSIZE_i + \gamma_5\, MTB_i + \gamma_6\, DEBTAS_i + \gamma_7\, CFVOL_i + \gamma_8\, ROA_i + \gamma_9\, NOSHIC_i + \textit{Firm Fixed Effects} + \textit{Year Fixed Effects} + \varepsilon_i. \quad (4)$$

Testing H3a and H3b, we solely add interaction terms of the VBM levels with the level of investment opportunities ($VBM\_LOW_i \times MTB_i$; $VBM\_HIGH_i \times MTB_i$) to the two formulas (3) and (4) and obtain the models (5) and (6), which are not illustrated separately.

5 Results

5.1 Descriptive results and correlations

Table 3 provides descriptive statistics for our regression variables, clustered by VBM level and overall. In total, our sample firms distributed 38% of their earnings (*DIVEAR*), while dividends were paid in 92% of all firm years. The average share repurchase ratio is 135%. However, this number is heavily affected by irregular share repurchases. The overall likelihood of 83% for share repurchases in our sample is comparatively high though. The average VBM sophistication (*VBM_SUM*) is 1.4 (median 1), which is in a similar range compared to prior VBM sophistication measurements by Firk et al. (2019b). The resulting distribution of VBM levels is distributed into 58% of firm years with lower VBM levels (*VBM_LOW*) and 15% with higher VBM levels (*VBM_HIGH*), while the remaining firm years are not associated with VBM.

Panel A of Table 4 highlights the distribution of the five VBM elements overall and clustered by year, country and industry. The commitment to value orientation was expressed in approximately 72% of the annual reports, while further VBM elements were detected in approximately 13% to 21% of the annual reports. As tabulated in Panel B of Table 4, the VBM level classified as low is driven by firm years with only one VBM element (48% of 58% for *VBM_LOW*), while the further VBM sophistication levels are distributed more evenly (4-9%). The reference category of VBM non-adopters is represented in 26% of the firm years. The development of VBM is stagnating, which is also in line with prior observations by Firk et al. (2019b) and supports the notion that VBM adoption has stabilized (e. g., Bezemer et al. 2015; Burkert and Lueg 2013; Fiss and Zajac 2004). Nevertheless, there was a shift of high VBM sophistication users. Analyzing the distribution within countries and industries, particularly high VBM sophistication levels can be identified in

Germany and the health care industry. Referring to firm years without adoption, VBM appears to be less prevalent in France and the technology sector.

Table 5 quantifies the distribution of dividend and share repurchase ratios in total, per year, and per industry. While dividend payout ratios increased during the observation period, there is a higher volatility in share repurchase ratios, but clearly the lowest figures after the financial crisis in 2009. Lastly, we also present Spearman and Pearson correlations between our regression variables in Table 6.

[Insert TABLES 3, 4, 5 and 6 here.]

5.2 Hypotheses tests

Table 7 reports the results for our regression models of the main analysis. All models obtain significant F-statistics and adequate adjusted coefficients of determination (R^2) above 19% for the dividend models, respectively 9% for the share repurchase models. We further calculate variance inflation factors (VIFs) with mean values under 2.7. However, a maximum VIF of 11.9, driven by the variable *LSIZE* (i. e., natural logarithm of market capitalization), raises potential multicollinearity concerns. Hence, we specifically focus on its impact in additional analyses.

Hypothesis 1a predicts that firms with high levels of VBM sophistication are more likely to pay dividends. In line with our hypothesis, the results are significant for *VBM_HIGH* at the 1% level. Interestingly, also the results of *VBM_LOW* are significant ($p < 5\%$), although coefficients are smaller. This result suggests that VBM adopters are more likely to pay dividends than non-adopters. Further, this effect is particularly pronounced if VBM is deeply implemented.

Hypothesis 1b predicts that firms with high levels of VBM sophistication are more likely to repurchase shares. We find a significant positive odds-ratio for *VBM_HIGH* at the 10% level, while

there is no significance for *VBM_LOW*. This result suggests that deeply implemented VBM is required to potentially increase the likelihood of share repurchases.

Hypothesis 2a predicts that deeply implemented VBM sophistication leads to lower dividend ratios as compared to non-adoption. Even though the negative coefficients of *VBM_HIGH* directionally align with the hypothesis, they are not significant. Also the positive coefficients of *VBM_LOW* are not significant. Consequently, hypothesis 2a cannot be supported.

Hypothesis 2b predicts that high VBM levels are associated with higher share repurchase ratios. In line with our hypothesis, we find significant positive coefficients for *VBM_HIGH* ($p < 5\%$). The results for *VBM_LOW* point in the same direction, although with smaller coefficients and a lower significance level ($p < 10\%$). In line with Wallace (1997), finding firms to increase payout ratios through share repurchases after adoption of a residual income measure, these results support hypothesis 2b. Further, the contrary coefficient signs compared to dividend ratios in hypothesis H2a indicate that firms with high VBM levels potentially prefer payouts via share repurchases.

Hypothesis 3a predicts that the level of investment opportunities, operationalized by the market-to-book ratio *MTB*, moderates the negative effect of VBM on dividend payout ratios. In line with our hypothesis, we find a negative significant coefficient of the the interaction term *VBM_HIGH* × *MTB* at the 1% level. Remarkably, the interaction term *VBM_LOW* × *MTB* has a slightly positive, and also significant coefficient at the 1% level – indicating a contrary effect if VBM is only partially implemented.

Hypothesis 3b predicts that the level of investment opportunities (*MTB*) negatively moderates the positive effect of VBM on share repurchase ratios. Consequently, high levels of VBM sophistication would be more negatively associated with share repurchase ratios if the level of investment opportunities is high. While the coefficient of *VBM_HIGH* × *MTB* shows the expected

negative sign, it is not significant. Hence, the results do not support hypothesis 3b. Possible explanations include the potentially shareholder value fostering effects of repurchasing shares, e. g., through better access to finance, or a generally higher pressure for VBM users to payout previously accumulated cash.

Overall, the results of the main analysis indicate shareholder value-oriented payout policies of firms with deeply implemented VBM. This reasoning is supported by a generally increased likelihood of paying out dividends (H1a) and repurchasing shares (H1b), while the levels of the two payout types seem to depend on shareholder value relevant context factors. Hence, firms with deeply implemented VBM seem to prefer higher payouts through share repurchases (H2b). Further, the existence of potentially shareholder value creating investment opportunities leads to reduced dividend ratios (H3a), which might restrict alternative investments.

[Insert TABLE 7 here.]

6 Additional analyses

6.1 Model specification

To test the robustness of the results in our main analysis, we conduct additional analyses. Specifically, we verify our model specifications and variable selection and discuss potential endogeneity concerns.

First, we examine the model specifications. While our main tests for hypothesis 1a and 1b are based on logit models for better result interpretation, we verify these tests with a probit model and calculate marginal effects. The probit results fully support the main results at the same

significance levels. Hence, we further obtain significant coefficients for *VBM_HIGH* in the tests for the hypotheses 1a ($p < 1\%$) and 1b ($p < 10\%$).

As payouts cannot be negative, our dependent variable is left-censored. Hence, we further validate the OLS results of hypotheses 2 and 3 by conducting tobit regressions. Again, the tobit regression results fully support our main results. Accordingly, the relevant coefficients for *VBM_HIGH* remain at the same significance levels in hypothesis 2b ($p < 5\%$) as well as for *VBM_HIGH* × *MTB* ($p < 1\%$) in the hypothesis test of H3a.

Thus, we conclude that neither the choice for a logit model nor left-censored data affect the implications of our main analysis. The respective results are displayed in Table 8.

[Insert TABLE 8 here.]

6.2 Variable selection

We further examine how our choice of variables potentially affects the results. Therefore, we challenge the measurement of the dividend variable in our hypotheses 2a and 2b as well as the operationalization of investment opportunities in our hypotheses 3a and 3b.

In our main analysis, we measure dividend ratios excluding special dividends due to special characteristics, such as irregular payments. Nevertheless, special dividends are also part of firms' dividend policy. Therefore, we repeat our analyses with dividends including special dividends scaled by earnings (*DIVEAR_SP*). The respective data was obtained from the Refinitiv Eikon database. The results even strengthen our main analysis. While the negative coefficient of *VBM_HIGH* remains insignificant in hypothesis 2a, the positive coefficient in hypothesis 2b is even at the 1% level if special dividends are included in the control variables. Hence, the positive

effect of VBM on share repurchase ratios is even clearer when the effect of special dividends is considered.

We also validate our interaction term variables in hypotheses 3a and 3b, which operationalize the moderating effect of investment opportunities. While we proxy investment opportunities in our main analysis with the market-to-book ratio (*MTB*), we challenge this configuration by exchanging this variable with the annual sales growth. Overall, the significance levels support the main implications as the negative coefficient of *VBM_HIGH* × *GROWTH* is still significant at the 10% level. Not in line with the initial prediction, the respective coefficient turns positive in H3b. However, as this coefficient remains insignificant, no definite implications should be derived for the impact of investment opportunities on the association between VBM and share repurchase ratios. The results of the alternative variable selections are presented in Table 9.

[Insert TABLE 9 here.]

6.3 Endogeneity

We acknowledge potential endogeneity concerns associated with our analyses, particularly regarding the causal relationship between VBM and payout policy. While our research design presumes that VBM influences payout policy, we cannot fully exclude the possibility of simultaneity bias, wherein payout policy may also influence VBM. However, it appears more plausible that deeply implemented management approaches, such as VBM, influence elements of annual payouts rather than the reverse. This view is supported by previous research on the association between dividends and corporate governance (Adjaoud and Ben-Amar 2010; Jiraporn and Ning 2006).

We also consider self-selection bias to be unlikely as our sample includes both VBM adopters and non-adopters, as well as firms with and without payouts. To mitigate a potential omitted

variables bias, we incorporate firm-fixed effects in all appropriate models. Future research might consider instrumental variable approaches to further control for exogenous variations. However, our chosen research design did not allow to incorporate an adequate VBM instrument. The common approach in VBM literature of using the average VBM prevalence within industries as an instrument (e. g., Firk et al. 2021; Knauer et al. 2018; Rapp et al. 2011) was not applicable due to the nature of our data. Our research design is dependent on a discrete ordinal VBM variable and cannot be applied based on average continuous values.

7 Conclusion

VBM incorporates the idea of maximizing shareholder value in all organizational decisions and activities. How VBM users align this idea with the distribution of generated value to shareholders has not been empirically examined yet. Hence, this study investigates how the focus on shareholder interests influences payout policies. To specifically capture the effects of deeply implemented and supposedly efficient VBM systems, we compare firms with high levels of VBM sophistication to those with no and low levels of VBM. For a comprehensive analysis of payout policies, we differentiate between the two primary payout types: dividends and share repurchases. By analyzing 1,365 firm-years of the 200 largest non-financial firms in the STOXX Europe 600 from 2005 to 2014, we identify a multifaceted relationship between VBM and these payout types.

Overall, our results indicate that VBM leads to more payouts, with payout levels adjusted based on payout type and context factors. Specifically, our analysis reveals that firms with high VBM levels (1) are more likely to pay dividends or repurchase shares, (2) exhibit higher share repurchase ratios, and (3) reduce dividend ratios with increasing investment opportunities. These findings are robust to alternative regression model and variable specifications. Practically, they

suggest a strategic use of payout policies to maximize shareholder value, with a preference among VBM users for share repurchases as the less binding payout type as compared to dividends.

This study contributes to existing VBM and payout literature in several ways. With regard to VBM research, we firstly respond to calls for studying variations in VBM sophistication (Burkert and Lueg 2013; Lueg and Schäffer 2010) and outcome effects associated with different levels of VBM sophistication (Firk et al. 2019b). We contribute through our research design that specifically investigates the effects of high VBM levels on payout policy. This analysis demonstrates the importance of considering different sophistication levels, and that certain effects only materialize for comprehensive implementations. Secondly, we address a research gap by analyzing how VBM users align shareholder value creation with its distribution to shareholders. By illustrating that firms with high VBM levels align strategies with shareholder interests and consequently limit the scope of managers' actions, we support an agency cost mitigating effect of VBM. Thirdly, while prior research argues that VBM disclosure substantiates shareholder value orientation (Brück et al. 2022), and VBM improves managerial decision-making and firm resource efficiency (Knauer et al. 2018; Rapp et al. 2011; Schultze et al. 2018), we provide evidence that VBM also leads to a more shareholder value-oriented payout policy. We thereby respond to the call of Brück et al. (2022) to investigate the external purpose of VBM. Furthermore, we contribute to the literature on payout policy by establishing a connection between payout behavior and the overarching management orientation. Our findings illustrate the influence of corporate governance mechanisms on payout decisions, thus expanding the research stream examining the impact of corporate governance on payout choices (e. g., Adjaoud and Ben-Amar 2010; Chang and Dutta 2012; La Porta et al. 2000).

Our study has several limitations. Firstly, the accuracy of our VBM data collection relies on the validity and reliability of the information disclosed in firms' annual reports. Firms may under- or overreport implemented VBM elements, e. g., to meet shareholder expectations. However, this limitation is inherent in the methodology and has been acknowledged in previous literature (e. g., Firk et al. 2021; Knauer et al. 2018). Secondly, our research design involves comparisons of unbalanced groups with varying VBM levels, which may impact the generalizability of our findings. Specifically, the group representing high VBM levels is relatively small. Thirdly, our sample consists of European listed firms, aiming for cross-national evidence. However, the transferability of our findings to non-listed and non-European firms may be limited. Lastly, although most of our models include firm-fixed effects to account for potential omitted variables, employing an instrumental variable approach could control for exogenous variations more effectively. While prior VBM studies used industry peers' averages as instruments (e. g., Firk et al. 2021; Knauer et al. 2018; Rapp et al. 2011), this approach was not applicable to our research design. Comparing groups of firms with high VBM levels with groups of no VBM use and low VBM levels requires a discrete ordinal variable and cannot be based on continuous variables.

This study opens avenues for future research. Firstly, coming analyses could delve into the observations that firms with high VBM levels tend to higher share repurchase ratios and lower dividend ratios if promising investment opportunities exist. Interview- and survey-based studies could shed light on the mechanisms behind these relationships and explore the role of VBM in investment decisions and capital allocation strategies. Another research avenue could examine whether payouts mediate the relationship between VBM and shareholder value. Investigating how VBM influences the decision to distribute value to shareholders through dividends or share repurchases, and how these decisions translate into shareholder value creation, could further enhance

research on the financial performance effects of VBM. Future research could also employ event studies to analyze the impact of specific VBM element implementations (e. g., use of value-based metrics or value-based compensation) on payout changes. By examining how the introduction or modification of VBM practices influence firms' payout decisions, the results of this study could be challenged. Addressing these research areas would further improve the understanding of implications of VBM adoption for corporate decision-making and subsequent outcomes for shareholders.

Appendix

Appendix A. Variable overview, descriptions, and data sources

Variable	Description (Refinitiv Eikon code in parentheses)	Source[1)]
Section A: Variables of the main analysis		
DIVPAYER	Dichotomous variable: If a firm has paid dividends (DPS > 0), this variable takes the value one in the corresponding period, and zero else.	Refinitiv Eikon; Firth et al. (2016), p. 9
SRPAYER	Dichotomous variable: If a firm has repurchased shares (TR.F.ComStockBuybackNet > 0), this variable takes the value one in the corresponding period, and zero else. Missing values were interpreted as no share repurchase in the respective period.	Refinitiv Eikon
DIVEAR	Total dividend payout divided by earnings, multiplied by 100. To exclude special dividends, dividends are calculated by the product of dividends per share excluding special dividends (DPS) and the number of shares (NOSHFF). Earnings are measured after tax and interest, but before extraordinary items (WC01551).	Refinitiv Eikon; La Porta et al. (2000), p. 12
SREAR	Amount of annual share repurchases (TR.F.ComStockBuybackNet) divided by earnings, multiplied by 100. Share repurchases are set to zero if no repurchase is recorded. Earnings are measured after tax and interest, but before extraordinary items (WC01551).	Refinitiv Eikon
VBM_SUM	VBM sophistication on a scale from zero to five based on binary individual ratings of zero (absent) or one (present) for each VBM element. Definitions of the VBM elements are presented in Appendix B.	Annual reports; Firk et al. (2019b), p. 421
VBM_HIGH	Dichotomous variable: If a firm has a high level of VBM sophistication, this variable takes the value one in the corresponding period, and zero else. A high VBM sophistication is defined as four or five implemented VBM elements. The variable takes the value of one if the variable *VBM_SUM* takes the value four, or five, and zero else.	Own calculation based on *VBM_SUM* values
VBM_LOW	Dichotomous variable: If a firm has a low level of VBM sophistication, this variable takes the value one in the corresponding period, and zero else. A low VBM sophistication is defined as one to three implemented VBM elements. The variable takes the value of one if the variable *VBM_SUM* takes the value one, two, or three, and zero else.	Own calculation based on *VBM_SUM* values
LSIZE	Natural logarithm of market capitalization (MV).	Refinitiv Eikon
MTB	The market value of assets divided by the book value of assets (WC02201) at the year end. Market value of assets is defined as the market value of equity (MV) plus book value of debt (WC03255).	Refinitiv Eikon; Firth et al. (2016), p. 97
DEBTAS	Book value of liabilities (WC03255) divided by total assets (WC02201), multiplied by 100.	Refinitiv Eikon; Bøhren et al. (2012), p. 2859
CFVOL	Standard deviation of cash flows (WC04201) divided by sales (WC01001) over three years.	Refinitiv Eikon; Firk et al. (2019b), p. 444
ROA	Net income (WC01551) divided by the previous year's total assets (WC02201), multiplied by 100.	Refinitiv Eikon; Stacescu (2006), p. 160
NOSHIC	Shares held by investment banks and institutions with at least 5% of the total shares issued (NOSHIC).	Refinitiv Eikon; Firth et al. (2016), p. 106

Variable	Description (Refinitiv Eikon code in parentheses)	Source[1)]
Section B: Further variables in additional analyses		
DIVEAR_SPEC	Total dividend paid in the fiscal year including special dividend (WC05376) divided by profit after tax and interest but before extraordinary items (WC01551) multiplied by 100.	Refinitiv Eikon; La Porta et al. (2000), p. 12
GROWTH	Annual sales growth (WC01001) of the current year divided by that of the previous year, multiplied by 100.	Refinitiv Eikon; Firth et al. (2016), p. 104. La Porta et al. (2000), p. 11.

Notes: This table displays the variable descriptions and data sources. The abbreviations in brackets in the second column (not italicized) correspond to the variable abbreviation for Refinitiv Eikon. 1) In the third column, literature sources for the use of the respective variables are indicated.

Appendix B. Overview of VBM elements

VBM element (Firk et al. 2019b, p. 421)	Scoring criteria (criterium fulfilled = 1; criterium not fulfilled = 0)
Shareholder value orientation	
	The annual report contains an explicit statement that the goal to increase shareholder value is pursued. Solely mentioning the goal to increase value without specifically referring to shareholders is insufficient
Value-based metric adoption	
	The annual report refers at least to one cash flow- or profit-based value-based metric. A metric is only categorized as value-based metric if the metric includes an explicit comparison with the cost of capital.
Target setting for value-based metrics	
	The annual report provides an explicit quantifiable target for at least one of the used value-based metrics.
Operational use of value-based metrics	
	The annual report illustrates the use of at least one value-based metric for steering or controlling business units or segments.
Compensation linking of value-based metrics	
	The annual report explicitly indicates the use of a value-based metric as at least one component of the executive board's compensation criteria. It is not required to base the compensation entirely on value-based metrics.

Notes: This overview describes the evaluation criteria of VBM elements. If the criteria are fullfilled, the respective VBM sophistication score increases by one. The VBM sophistication score reflects the extent to which a firm applied VBM elements in a respective financial year, based on an assessment of the annual report.

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Tables

TABLE 1. Sample construction.

Selection sequence	Firm years
Listed firm years of the 200 largest non-financial firms of STOXX Europe 600 (2005–2014)	2,000
- delistings and liquidations	139
- missing annual reports	126
- multiple listings	89
- firm years with missing firm data	281
Final sample	1,365

Notes: This table summarizes the sample construction. The 200 largest firms were selected by market capitalization at the end of 2005. To avoid survivorship bias, we followed these firms until 2014, causing a subsequent sample reduction due to delistings and liquidations.

TABLE 2. Sample selection per country and industry.

	Firm years	Sample proportion in percent
Country distribution		
Austria	9	0.7
Belgium	35	2.6
Denmark	27	2.0
Finland	34	2.5
France	262	19.2
Germany	183	13.4
Gibraltar	6	0.4
Great Britain	320	23.4
Greece	10	0.7
Ireland	18	1.3
Italy	69	5.1
Jersey	15	1.1
Luxembourg	20	1.5
Netherlands	76	5.6
Norway	26	1.9
Portugal	16	1.2
Spain	88	6.4
Sweden	70	5.1
Switzerland	81	5.9
Total	1,365	100.0
ICIndustry cluster		
Consumer Goods	266	19.5
Health Care	112	8.2
Basic Materials	134	9.8
Telecommunications	101	7.4
Industrials	268	19.6
Consumer Services	235	17.2
Utilities	113	8.3
Technology	43	3.2
Oil & Gas	93	6.8
Total	1,365	100.0

Notes: This table provides the distribution of firm years clustered by countries and industries.

TABLE 3. Descriptive statistics on regression variables per VBM sophistication level.

VBM level	Variable	n	Mean	Min.	Q25	Median	Q75	Max.	Std. dev.
No VBM	*DIVPAYER*	358	0.9	0.0	1.0	1.0	1.0	1.0	0.4
	SRPAYER	358	0.8	0.0	1.0	1.0	1.0	1.0	0.4
	DIVEAR°	358	32.6	0.0	14.2	31.8	47.0	93.1	24.3
	DIVEAR_SPEC°	334	38.1	0.0	21.0	35.4	51.0	95.5	24.3
	SREAR°	358	92.8	-373.1	0.0	0.0	66.8	1994.2	253.1
	VBM_SUM	358	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	VBM_LOW	358	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	VBM_HIGH	358	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	LSIZE	358	9.5	5.7	8.9	9.5	10.1	11.8	1.0
	DEBTAS°	358	118.3	0.0	29.0	72.3	115.8	835.3	162.0
	CFVOL	358	0.0	0.0	0.0	0.0	0.0	0.2	0.0
	ROA°	358	23.3	-22.5	8.5	17.5	30.2	110.8	24.6
	NOSHIC	358	3.3	0.0	0.0	0.0	6.0	33.0	5.8
	MTB	358	4.8	-20.5	1.4	2.1	3.5	646.7	34.4
	GROWTH	358	6.7	-66.8	-0.8	5.2	12.6	182.4	19.5
VBM_LOW	*DIVPAYER*	797	0.9	0.0	1.0	1.0	1.0	1.0	0.2
	SRPAYER	797	0.8	0.0	1.0	1.0	1.0	1.0	0.4
	DIVEAR°	797	40.1	0.0	24.3	40.7	55.5	93.1	22.9
	DIVEAR_SPEC°	764	44.2	0.0	30.1	43.7	58.0	95.5	21.6
	SREAR°	797	154.0	-373.1	0.0	0.9	180.6	1994.2	294.1
	VBM_SUM	797	1.3	1.0	1.0	1.0	1.0	3.0	0.6
	VBM_LOW	797	1.0	1.0	1.0	1.0	1.0	1.0	0.0
	VBM_HIGH	797	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	LSIZE	797	9.8	6.7	9.1	9.7	10.5	12.2	1.0
	DEBTAS°	797	123.1	0.0	45.6	82.2	145.2	835.3	137.4
	CFVOL	797	0.0	0.0	0.0	0.0	0.0	0.6	0.0
	ROA°	797	27.7	-22.2	13.0	23.0	38.2	110.8	20.6
	NOSHIC	797	3.4	0.0	0.0	0.0	6.0	37.0	6.0
	MTB	797	2.9	-266.1	1.5	2.5	3.7	230.9	16.1
	GROWTH	797	6.6	-58.4	-0.9	5.7	12.4	147.7	16.8
VBM_HIGH	*DIVPAYER*	210	1.0	0.0	1.0	1.0	1.0	1.0	0.2
	SRPAYER	210	0.8	0.0	1.0	1.0	1.0	1.0	0.4
	DIVEAR°	210	36.7	0.0	18.1	33.2	49.3	93.1	23.0
	DIVEAR_SPEC°	201	40.5	0.0	27.3	36.2	51.0	95.5	22.2
	SREAR°	210	135.2	0.0	0.0	0.0	56.9	1994.2	351.9
	VBM_SUM	210	4.4	4.0	4.0	4.0	5.0	5.0	0.5
	VBM_LOW	210	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	VBM_HIGH	210	1.0	1.0	1.0	1.0	1.0	1.0	0.0
	LSIZE	210	9.8	7.5	9.1	9.7	10.5	11.7	0.9
	DEBTAS°	210	76.2	1.7	37.1	52.5	91.2	495.3	74.4
	CFVOL	210	0.0	0.0	0.0	0.0	0.0	0.2	0.0
	ROA°	210	14.6	-19.7	7.2	11.3	18.3	110.8	15.4

TABLE 3 (continued). Descriptive statistics on regression variables per VBM sophistication level.

VBM level	Variable	n	Mean	Min.	Q25	Median	Q75	Max.	Std. dev.
VBM_HIGH	*NOSHIC*	210	4.2	0.0	0.0	0.0	6.0	28.0	6.9
	MTB	210	2.2	0.5	1.4	2.0	2.9	5.6	1.0
	GROWTH	210	5.2	-60.4	-0.6	4.9	10.2	77.5	12.4
Total	*DIVPAYER*	1,365	0.9	0.0	1.0	1.0	1.0	1.0	0.3
	SRPAYER	1,365	0.8	0.0	1.0	1.0	1.0	1.0	0.4
	DIVEAR°	1,365	37.6	0.0	19.8	36.3	52.2	93.1	23.5
	DIVEAR_SPEC°	1,299	42.1	0.0	28.1	41.1	56.1	95.5	22.5
	SREAR°	1,365	135.0	-373.1	0.0	0.0	139.3	1994.2	294.8
	VBM_SUM	1,365	1.4	0.0	0.0	1.0	2.0	5.0	1.5
	VBM_LOW	1,365	0.6	0.0	0.0	1.0	1.0	1.0	0.5
	VBM_HIGH	1,365	0.2	0.0	0.0	0.0	0.0	1.0	0.4
	LSIZE	1,365	9.7	5.7	9.1	9.6	10.4	12.2	1.0
	DEBTAS°	1,365	114.7	0.0	38.9	73.9	128.4	835.3	137.9
	CFVOL	1,365	0.0	0.0	0.0	0.0	0.0	0.6	0.0
	ROA°	1,365	24.5	-22.5	10.2	18.9	33.3	110.8	21.6
	NOSHIC	1,365	3.5	0.0	0.0	0.0	6.0	37.0	6.1
	MTB	1,365	3.3	-266.1	1.5	2.4	3.4	646.7	21.5
	GROWTH	1,365	6.4	-66.8	-0.8	5.4	12.0	182.4	16.9

Notes: This table presents the descriptive statistics on the regression variables clustered by VBM sophistication level and in total. Variables with superscript ° are winsorized at the 1st and 99th percentile levels. *GROWTH* and *DIVEAR_SPEC* are used for robustness checks only. The variable definitions are provided in Appendix A.

TABLE 4. Sample proportions of VBM sophistication elements and levels.

Panel A: Sample proportions in percent of VBM sophistication elements.

	n	Value Orientation	Value-based metrics	Value-based target setting	Value-based segment steering	Value-based compensation
Total	1,365	72.3	21.4	20.2	12.5	16.0
Per year						
2005	155	71.0	23.2	20.6	12.3	13.5
2006	145	71.0	25.5	22.8	12.4	17.2
2007	148	70.9	23.0	22.3	12.2	18.9
2008	132	67.4	19.7	19.7	9.1	15.2
2009	118	70.3	16.9	16.1	8.5	10.2
2010	146	74.0	24.0	23.3	14.4	17.1
2011	140	73.6	17.1	16.4	10.0	12.9
2012	127	74.8	21.3	19.7	15.0	16.5
2013	129	75.2	20.9	19.4	14.7	19.4
2014	125	75.2	20.8	20.8	16.8	19.2
Per country						
Austria	9	100.0	100.0	100.0	22.2	0.0
Belgium	35	100.0	0.0	0.0	0.0	0.0
Denmark	27	48.1	0.0	37.0	0.0	37.0
Finland	34	76.5	2.9	2.9	0.0	0.0
France	262	32.8	8.0	6.1	2.3	4.6
Germany	183	97.3	73.8	65.0	59.6	45.9
Gibraltar	6	66.7	0.0	0.0	0.0	0.0
Great Britain	320	90.6	16.3	11.3	5.0	12.5
Greece	10	40.0	0.0	0.0	0.0	0.0
Ireland	18	44.4	0.0	0.0	0.0	0.0
Italy	69	47.8	15.9	5.8	10.1	7.2
Jersey	15	100.0	66.7	26.7	0.0	0.0
Luxembourg	20	50.0	0.0	0.0	0.0	10.0
Netherlands	76	86.8	27.6	28.9	2.6	21.1
Norway	26	80.8	11.5	11.5	11.5	7.7
Portugal	16	100.0	0.0	0.0	0.0	12.5
Spain	88	80.7	0.0	0.0	0.0	0.0
Sweden	70	85.7	24.3	31.4	24.3	25.7
Switzerland	81	51.9	14.8	37.0	11.1	34.6

TABLE 4 (continued). Sample proportions in percent of VBM sophistication elements and levels.

	n	Value Orientation	Value-based metrics	Value-based target setting	Value-based segment steering	Value-based compensation
Per ICIndustry						
Basic Materials	134	88.1	25.4	34.3	9.7	23.1
Consumer Goods	266	77.4	26.3	18.0	18.0	13.5
Consumer Services	235	67.2	18.7	17.0	5.1	14.9
Health Care	112	72.3	16.1	33.9	10.7	25.0
Industrials	268	63.8	30.6	24.6	21.6	23.9
Oil & Gas	93	66.7	9.7	9.7	2.2	0.0
Technology	43	60.5	2.3	0.0	0.0	0.0
Telecommunications	101	66.3	7.9	3.0	3.0	1.0
Utilities	113	86.7	23.0	23.0	20.4	21.2

Panel B: Sample proportions in percent of VBM sophistication level.

VBM sophistication	0	1	2	3	4	5
VBM level	No VBM	*VBM_LOW*			*VBM_HIGH*	
Total	26.2	48.4	4.4	5.6	8.5	6.9
Per year						
2005	27.7	47.7	1.9	4.5	14.8	3.2
2006	26.2	45.5	5.5	4.8	11.7	6.2
2007	27.0	46.6	3.4	5.4	10.1	7.4
2008	31.1	43.9	5.3	7.6	6.8	5.3
2009	28.0	53.4	2.5	5.9	5.1	5.1
2010	24.7	46.6	5.5	6.2	8.9	8.2
2011	25.7	52.9	4.3	5.0	7.1	5.0
2012	24.4	49.6	4.7	6.3	5.5	9.4
2013	24.0	48.1	7.0	5.4	6.2	9.3
2014	23.2	50.4	4.0	5.6	6.4	10.4

TABLE 4 (continued). Sample proportions of VBM sophistication elements and levels.

VBM sophistication	0	1	2	3	4	5
VBM level	No VBM	*VBM_LOW*			*VBM_HIGH*	
Per country						
Austria	0.0	0.0	0.0	77.8	22.2	0.0
Belgium	0.0	100.0	0.0	0.0	0.0	0.0
Denmark	51.9	11.1	0.0	37.0	0.0	0.0
Finland	20.6	76.5	2.9	0.0	0.0	0.0
France	66.8	22.5	4.2	4.2	1.1	1.1
Germany	2.7	21.9	3.8	3.3	39.3	29.0
Gibraltar	33.3	66.7	0.0	0.0	0.0	0.0
Great Britain	9.4	72.5	4.7	3.4	6.6	3.4
Greece	60.0	40.0	0.0	0.0	0.0	0.0
Ireland	55.6	44.4	0.0	0.0	0.0	0.0
Italy	43.5	44.9	1.4	4.3	2.9	2.9
Jersey	0.0	33.3	40.0	26.7	0.0	0.0
Luxembourg	50.0	40.0	10.0	0.0	0.0	0.0
Netherlands	11.8	55.3	5.3	11.8	13.2	2.6
Norway	19.2	69.2	0.0	0.0	3.8	7.7
Portugal	0.0	87.5	12.5	0.0	0.0	0.0
Spain	19.3	80.7	0.0	0.0	0.0	0.0
Sweden	14.3	54.3	0.0	7.1	5.7	18.6
Switzerland	34.6	27.2	13.6	13.6	1.2	9.9
Per ICIndustry						
Basic Materials	11.2	54.5	0.7	11.2	20.9	1.5
Consumer Goods	22.6	48.5	6.8	3.4	12.8	6.0
Consumer Services	32.8	45.5	4.7	3.8	9.4	3.8
Health Care	18.8	42.9	12.5	16.1	7.1	2.7
Industrials	34.7	32.5	4.5	7.1	4.5	16.8
Oil & Gas	33.3	57.0	0.0	7.5	2.2	0.0
Technology	37.2	62.8	0.0	0.0	0.0	0.0
Telecommunications	29.7	66.3	1.0	0.0	2.0	1.0
Utilities	13.3	61.1	2.7	0.0	7.1	15.9

Notes: Value orientation = commitment to shareholder value orientation; Value-based metrics = value-based-metrics as key performance indicator; Value-based target setting = objectives for value-based-metrics; Value-based segment steering = use of value-based-metrics for segments; Value-based compensation = linking value-based-metrics with compensation of the executive board.

TABLE 5. Descriptive statistics on dividend to earnings and share repurchase to earnings.

	DIVEAR°			*SREAR°*		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Total	37.6	36.3	23.5	135.0	0.0	294.8
Per year						
2005	29.2	29.7	20.4	134.8	0.0	252.0
2006	29.5	28.3	20.0	170.0	3.6	313.1
2007	34.1	31.1	21.6	292.1	70.3	485.0
2008	39.8	40.1	21.4	207.8	86.5	325.4
2009	39.3	42.4	24.6	44.6	0.0	135.6
2010	36.2	36.7	22.7	60.0	0.0	173.8
2011	41.4	43.7	22.8	120.5	0.0	239.2
2012	42.2	40.5	24.2	88.8	0.0	232.5
2013	43.4	43.1	26.2	83.6	0.0	202.7
2014	44.3	43.7	26.1	121.4	0.0	319.2
Per country						
Austria	28.0	27.1	11.6	20.9	0.0	49.1
Belgium	45.0	43.5	24.3	50.7	0.0	109.1
Denmark	13.7	4.9	25.6	171.2	0.0	260.4
Finland	47.1	43.8	26.3	111.3	0.0	281.8
France	37.4	34.1	22.0	87.4	0.0	187.8
Germany	33.3	31.3	21.2	67.3	0.0	212.7
Gibraltar	6.1	0.0	14.8	-6.9	0.0	80.3
Great Britain	42.8	45.0	21.5	180.6	34.6	294.0
Greece	28.0	18.8	32.8	18.0	0.0	50.7
Ireland	21.9	0.0	32.4	116.8	0.0	289.5
Italy	47.8	48.4	24.8	53.5	0.0	253.9
Jersey	34.8	40.1	17.0	264.2	210.4	269.4
Luxembourg	37.3	42.7	12.6	165.7	0.0	450.0
Netherlands	26.0	23.7	22.8	344.8	0.0	573.6
Norway	30.0	25.0	23.3	113.2	18.7	169.5
Portugal	55.1	51.9	16.0	235.1	0.0	557.9
Spain	34.8	34.0	21.3	126.0	0.0	256.5
Sweden	42.1	40.5	27.5	109.4	0.0	362.6
Switzerland	37.3	41.8	22.2	198.4	87.2	266.7
Per ICIndustry						
Basic Materials	30.7	31.1	21.1	141.3	0.5	303.6
Consumer Goods	34.4	33.4	21.6	106.0	0.0	227.7
Consumer Services	37.0	38.0	23.3	173.6	8.2	353.4
Health Care	40.4	38.1	21.4	231.0	48.5	348.2
Industrials	35.2	32.5	24.5	91.5	0.0	240.2
Oil & Gas	38.0	34.7	20.7	83.3	0.7	197.1
Technology	27.8	26.1	24.3	283.2	0.0	492.3
Telecommunications	48.5	48.4	26.7	180.1	0.0	354.2
Utilities	50.6	50.4	21.0	69.8	0.0	192.5

Notes: Variables with superscript ° are winsorized at the 1st and 99th percentile levels. The variable definitions are provided in Appendix A.

TABLE 6. Correlations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	DIVPAYER	*SRPAYER*	*DIVEAR°*	*SREAR°*	*VBM_SUM*[a]	*VBM_HIGH*	*VBM_LOW*	*LSIZE*	*MTB*	*DEBTAS°*	*CFVOL*	*ROA°*	*NOSHIC*
(1)		-0.02	0.46***	0.10***	0.13***	0.07**	0.08***	0.25***	0.04	0.08***	-0.13***	0.25***	-0.06**
(2)	-0.02		-0.02	0.39***	-0.02	-0.02	0.00	0.09***	0.06**	-0.03	-0.02	0.03	-0.02
(3)	0.46***	-0.02		0.04	0.07***	-0.03	0.14***	0.13***	0.04	0.23***	-0.04	0.04	-0.03
(4)	0.02	0.21***	0.04		0.06**	-0.05*	0.13***	0.20***	0.14***	-0.07***	-0.03	0.19***	0.10***
(5)	0.10***	-0.02	0.02	0.04		0.67***	0.24***	0.09***	0.01	-0.07**	-0.05*	-0.09***	0.04
(6)	0.07**	-0.02	-0.02	0.00	0.87***		-0.51***	0.03	-0.10***	-0.13***	-0.05*	-0.25***	0.03
(7)	0.08***	0.00	0.13***	0.08***	-0.12***	-0.51***		0.09***	0.11***	0.15***	0.05*	0.25***	-0.01
(8)	0.27***	0.09***	0.14***	0.08***	0.06**	0.03	0.09***		0.25***	-0.05*	-0.04	0.31***	-0.09***
(9)	-0.05*	0.01	0.00	0.01	-0.03	-0.02	-0.02	-0.03		-0.14***	-0.03	0.34***	0.11***
(10)	0.07***	-0.03	0.18***	-0.07**	-0.14***	-0.12***	0.07***	-0.14***	0.02		0.20***	0.30***	0.00
(11)	-0.15***	-0.02	-0.05**	-0.02	-0.05**	-0.05*	0.05*	-0.12***	-0.02	0.10***		0.15***	0.04
(12)	0.22***	0.02	0.01	0.04	-0.17***	-0.20***	0.17***	0.18***	-0.04	0.49***	0.11***		0.02
(13)	-0.08***	-0.04	-0.08***	0.17***	0.07**	0.05*	-0.02	-0.11***	0.00	0.00	0.01	0.02	

Notes: Pearson's correlation coefficients are shown in the lower triangle while Spearman's rank correlations appear above the diagonal. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Variables with superscript ° are winsorized at 1st and 99th percentile levels. a: Variable not included in main analysis. The variable definitions are provided in Appendix A.

TABLE 7. Regression output main analysis.

Model	(1)	(2)	(3)	(4)	(5)	(6)
Method	Logit	Logit	OLS	OLS	OLS	OLS
Related hypothesis	H1a	H1b	H2a	H2b	H3a	H3b
Dependent variable	*DIVPAYER*	*SRPAYER*	*DIVEAR°*	*SREAR°*	*DIVEAR°*	*SREAR°*
VBM_LOW	3.161**	0.984	1.716	54.149*	1.091	53.371*
	(1.652)	(0.218)	(2.754)	(28.550)	(2.787)	(28.821)
VBM_HIGH	5.301***	1.854*	-2.624	140.415**	10.092	149.986
	(5.228)	(0.673)	(4.992)	(54.701)	(7.498)	(105.991)
VBM_LOW × MTB					0.064***	0.142
					(0.024)	(0.228)
VBM_HIGH × MTB					-6.118***	-4.682
					(2.210)	(41.570)
Control Variables						
DIVEAR°		0.999		1.190		1.176
		(0.005)		(0.723)		(0.721)
SREAR°	1.000		0.005*		0.004*	
	(< 0.000)		(0.003)		(0.003)	
LSIZE	3.056***	1.209	6.182***	-40.069	7.017***	-39.377
	(0.884)	(0.172)	(2.324)	(26.997)	(2.299)	(28.317)
MTB	1.000	1.000	-0.037*	-0.141	-0.057***	-0.189**
	(0.003)	(0.002)	(0.022)	(0.110)	(0.009)	(0.089)
DEBTAS°	1.002	1.000	0.019*	-0.108	0.019*	-0.108
	(0.003)	(0.001)	(0.010)	(0.142)	(0.011)	(0.142)
CFVOL	< 0.000**	0.035	-13.902	-571.294*	-14.493	-573.211*
	(< 0.000)	(0.098)	(16.495)	(292.103)	(16.135)	(291.479)
ROA°	1.081***	1.000	-0.292***	-0.823	-0.290***	-0.820
	(0.031)	(0.006)	(0.061)	(0.709)	(0.062)	(0.711)
NOSHIC	0.962	0.983	0.169	-0.127	0.182	-0.119
	(0.024)	(0.016)	(0.142)	(2.080)	(0.142)	(2.098)
Constant	8350300***	3.195	31.030***	104.209**	31.426***	105.140**
	(< 0.000)	(2.370)	(2.989)	(46.351)	(3.041)	(46.173)
Firm fixed effects	No	No	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	No	No	No	No
Industry fixed effects	Yes	Yes	No	No	No	No
Observations	1,365	1,365	1,365	1,365	1,365	1,365
R^2 / Pseudo R^2 (logit)	0.438	0.160	0.183	0.095	0.196	0.095
F-statistic (p-value)	n/a	n/a	< 0.001	< 0.001	< 0.001	< 0.001
Chi^2-statistic (p-value)	< 0.001	< 0.001	n/a	n/a	n/a	n/a
Max. VIF	4.53	4.87	3.36	3.78	6.02	6.06

Notes: Robust standard errors in parentheses. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Variables with superscript ° are winsorized at 1st and 99th percentile levels. Variable *LSIZE* is mean-centered to reduce multi-collinearity. The values for the logit models are the odds ratios. The variable definitions are provided in Appendix A.

TABLE 8. Regression output additional analysis: Model specification.

Model	(7)	(8)	(9)	(10)	(11)	(12)
Method	Probit	Probit	Tobit	Tobit	Tobit	Tobit
Related hypothesis	H1a	H1b	H2a	H2b	H3a	H3b
Dependent variable	*DIVPAYER*	*SRPAYER*	*DIVEAR°*	*SREAR°*	*DIVEAR°*	*SREAR°*
VBM_LOW	0.532**	-0.0137	1.250	145.912**	0.365	130.704*
	(0.260)	(0.124)	(2.989)	(68.234)	(3.022)	(72.586)
VBM_HIGH	0.951***	0.339*	-2.762	296.709**	10.381	317.895
	(0.350)	(0.202)	(5.251)	(119.289)	(8.056)	(250.419)
VBM_LOW × MTB					0.123***	5.739
					(0.038)	(11.711)
VBM_HIGH × MTB					-6.359***	-9.936
					(2.387)	(92.777)
Control Variables						
DIVEAR°		-0.001		2.145		2.091
		(0.003)		(1.421)		(1.415)
SREAR°	< -0.000		0.005*		0.005*	
	(< 0.000)		(0.003)		(0.003)	
LSIZE	0.598***	0.098	7.779***	-29.022	8.619***	-25.939
	-0.136	(0.075)	(2.635)	(58.260)	(2.625)	(59.608)
MTB	< 0.000	< 0.000	-0.041	-0.524	-0.095***	-6.053
	(0.002)	(0.001)	(0.032)	(0.330)	(0.030)	(11.655)
DEBTAS°	< 0.000	< -0.000	0.020*	-0.206	0.020*	-0.204
	(0.001)	(< 0.000)	(0.011)	(0.470)	(0.011)	(0.469)
CFVOL	-5.451*	-1.706	-35.014	-1,657.488**	-33.104	-1,646.911**
	(3.104)	(1.621)	(26.701)	(742.902)	(25.935)	(734.711)
ROA°	0.030***	0.001	-0.303***	-1.068	-0.304***	-1.082
	(0.011)	(0.003)	(0.065)	(1.442)	(0.067)	(1.451)
NOSHIC	-0.015	-0.011	0.144	-3.938	0.160	-3.948
	(0.013)	(0.009)	(0.164)	(3.234)	(0.164)	(3.257)
Constant	5.100***	0.617	26.120***	-365.575***	25.606***	-350.262***
	(0.633)	(0.396)	(3.573)	(111.672)	(3.661)	(115.050)
Firm fixed effects	No	No	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	No	No	No	No
Industry fixed effects	Yes	Yes	No	No	No	No
Observations	1,365	1,365	1,365	1,365	1,365	1,365
Pseudo R^2	0.425	0.159	0.108	0.077	0.11	0.077
F-statistic (p-value)	n/a	n/a	n/a	n/a	n/a	n/a
Chi^2-statistic (p-value)	< 0.001	< 0.001	n/a	n/a	n/a	n/a
Max. VIF	4.53	4.87	n/a	n/a	n/a	n/a

Notes: Robust standard errors in parentheses. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Variables with superscript ° are winsorized at 1st and 99th percentile levels. Variable *LSIZE* is mean-centered to reduce multicollinearity. The variable definitions are provided in Appendix A.

TABLE 9. Regression output additional analysis: Variable selection.

Model	(13)	(14)	(15)	(16)
Method	OLS	OLS	OLS	OLS
Related hypothesis	H2a	H2b	H3a	H3b
Dependent variable	*DIVEAR_SP°*	*SREAR°*	*DIVEAR°*	*SREAR°*
VBM_LOW	0.597	54.474*	2.244	45.721
	(3.034)	(29.715)	(2.869)	(29.025)
VBM_HIGH	-7.417	161.227***	-0.911	126.972**
	(4.674)	(59.652)	(5.167)	(55.747)
VBM_LOW × GROWTH			-0.041	1.363
			(0.065)	(0.869)
VBM_HIGH × GROWTH			-0.253*	1.945
			(0.136)	(2.574)
Control Variables				
DIVEAR°				1.205*
				(0.719)
DIVEAR_SP°		1.343*		
		(0.703)		
SREAR°	0.005**		0.005*	
	(0.003)		(0.003)	
LSIZE	4.320*	-59.020**	6.451***	-36.804
	(2.532)	(26.890)	(2.340)	(26.600)
MTB	0.026	-0.187		
	(0.017)	(0.233)		
GROWTH			0.009	-1.634**
			(0.051)	(0.695)
DEBTAS°	0.021	-0.044	0.018*	-0.101
	(0.013)	(0.155)	(0.010)	(0.141)
CFVOL	-30.663	-566.807*	-16.046	-586.335**
	(22.835)	(310.783)	(15.850)	(267.406)
ROA°	-0.326***	-1.363*	-0.275***	-0.673
	(0.051)	(0.792)	(0.063)	(0.724)
NOSHIC	-0.084	-1.703	0.169	-0.130
	(0.144)	(1.871)	(0.142)	(2.065)
Constant	43.403***	103.931*	30.674***	113.629**
	(3.346)	(53.455)	(2.933)	(46.555)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No
Industry fixed effects	No	No	No	No
Observations	1,299	1,299	1,365	1,365
R^2 / Pseudo R^2 (for probit and tobit)	0.137	0.108	0.186	0.098
F-statistic (p-value)	< 0.001	< 0.001	< 0.001	< 0.001
Chi^2-statistic (p-value)	n/a	n/a	n/a	n/a
Max. VIF	3.48	4.29	3.52	3.85

Notes: Robust standard errors in parentheses. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Variables with superscript ° are winsorized at 1st and 99th percentile levels. Variable *LSIZE* is mean-centered to reduce multicollinearity. The variable definitions are provided in Appendix A.