Business Research
DOI 10.1007/s40685-014-0010-z

ORIGINAL RESEARCH

Let's talk strategy: the impact of voluntary strategy disclosure on the cost of equity capital

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Received: 10 October 2012 / Accepted: 7 February 2014

Abstract This paper deals with the impact of voluntary strategy disclosure in management reports on the cost of equity capital. Such an impact is not obvious, as investors might consider strategy information as "cheap talk" and therefore ignore it. We analyze a sample of 100 German listed firms from 2002 to 2008, measuring strategy disclosure levels using hand-collected strategy disclosure scores. We find that higher disclosure levels are, on average, associated with lower cost of equity capital even after controlling for overall disclosure quality. The paper contributes to the field by providing evidence that voluntary strategy disclosures in firms' management reports reduce the information asymmetry component of cost of capital and therefore can be considered as a relevant source of information for investors.

Responsible editor: Rainer Niemann (Accounting).

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Published online: 23 July 2014

Keywords Voluntary disclosure · Strategy · Management report · Management commentary · Cost of equity capital · Bid–ask spreads · Trading volume

JEL Classification M10 · M21 · M41

1 Introduction

A major issue in accounting research is the question of why managers should choose to share internal business information with investors (Healy and Palepu 2001). Our research applies to this context and focuses on the impact of voluntary strategy disclosure on firms' cost of equity capital.

A comprehensive disclosure of strategy information essentially encompasses prognostic information on businesses, strategic objectives, the resulting business strategies, and implementation priorities (Thompson and Strickland 2003). From an investor decision-making perspective, these insights into a firm's business strategies are of considerable relevance as they shed light on long-term managerial actions. Strategy disclosure therefore constitutes a key element in linking historical information presented in the financial statements to prospective cash flow forecasting (e.g., Barron et al. 1999).

Still, it is questionable whether investors really use voluntary strategy disclosure for decision-making purposes, as such information is often not verifiable and thus not necessarily credible. For example, whereas ex-ante information on a firm's intended strategy is largely non-financial and describes management's projected course of action, the ex-post information on strategy realization is mainly reflected by short-term financial results. Additionally, strategy implementation is subject to ad hoc reviews, if major environmental or intra-firm parameters change (Kachaner and Deimler 2008). Consequently, the two types of financial and non-financial information do not match structurally, so that verifying the implementation of announced strategies is not at all a straightforward task. If investors were to assume that forward-looking communication on strategy is costless as well as non-binding, they would then interpret such disclosures as not credible and rather as 'cheap talk' (Crawford and Sobel 1982). In such cases, information on strategy would only be used by investors under very restrictive conditions, e.g., if strategy disclosures were perceived as inducing proprietary costs on the firm side through damaging its competitive position in product markets (Verrecchia 1983; Gigler 1994).

Thus, our research question is whether voluntary strategy disclosures provide useful information for investor decision-making. We examine this issue by relating the level of firms' voluntary strategy disclosure to (a) the cost of equity capital and (b) to bid–ask spreads and trading volumes as complementary measures, which also relate to investor decision-making. To assess the level of strategy disclosure, we use self-constructed strategy disclosure scores (SDS) as a measurement instrument. Our sample comprises 100 listed German firms between 2002 and 2008 (resulting in 700 firm-year observations). Our measurement of strategy disclosure levels focuses on the management report ('Lagebericht'), as under German accounting regulation [par. 264 (1), 315a

HGB], the management report is the sole platform in which firms embed—albeit voluntarily—strategy disclosures as part of the mandatory annual financial reporting package (Baetge et al. 2013). Given that the management report is subject to the compulsory audit of annual financial statements, the auditor's examination of strategy disclosure provides a third-party validation that potentially enhances credibility.

We find evidence that an increased level of voluntary strategy disclosure in the management report is indeed on average associated with lower cost of equity capital, lower bid–ask spreads and higher trading volumes. Our results are robust to a variety of sensitivity tests concerning variable measurement as well as estimation procedures. A further analysis also indicates the incremental information content of strategy disclosures (Biddle et al. 1995), compared to other parts of the financial reporting package.

Our paper is embedded into the empirical literature on voluntary disclosure in financial accounting and its impact on investor decision-making (e.g., Botosan 1997; Hail 2002; Leuz and Verrecchia 2000; Healy and Palepu 2001; Botosan 2006; Daske 2006; Gu and Li 2007; Leuz and Wysocki 2008 or Glaum et al. 2011). Whereas this literature provides broad, though not unanimous evidence that an increase in credible voluntary disclosure is associated with a decreasing cost of equity capital and other, related measures, there is still a research gap regarding the impact of voluntary disclosures on strategy. This is not obvious per se due to the qualitative, prospective and subjective nature of strategy information.

Our study therefore extends the existing empirical literature on voluntary disclosure in several respects. First, we analyze specifically whether information on a firm's strategy provided in the management report is on average useful for investors. Second, our paper adds to the literature on mechanisms for enhancing the credibility of voluntary disclosure (Healy and Palepu 2001), by using voluntary strategy disclosures provided in the management report as a part of the firm's mandatory annual financial reporting package in Germany. Third, we not only use the cost of equity capital to find evidence of an impact of increased voluntary strategy disclosure on investor decision-making, but validate our analysis using bid–ask spreads and trading volumes as complementary measures.

Therefore, the contribution of our study is twofold. On the one hand, our results suggest the acquisition of private benefits if firms use the management report for communicating strategy information to investors. For example, in line with Dhaliwal et al. (2011), firms can augment their level of strategy disclosure to enhance market value, e.g., in advance of an intended increase of equity capital. Even though our study does not deal with the specific content of firms' strategies, but only with the level of comprehensiveness of strategy disclosure per se, our results indicate that firms which communicate their strategy more thoroughly on average enjoy advantages with respect to cost of equity capital, compared to firms that tend to conceal their intended strategies.

On the other hand, the benefit of providing useful and credible strategy information in the management report may not only be private to the disclosing firms' in question, but could also have social value. For example, Lambert et al. (2007) provide a model in which they analyze the relationship between increased disclosure and stock returns, under the assumption that there are multiple firms whose cash flows are correlated. They show that, in such a setting, disclosure not only has an impact on the CAPM beta as determinant of a single firm's cost of

equity capital, but may also reduce the market-risk premium and thus provide positive externalities for other firms as well.

In this context, our study contributes to the debate on the extent of mandatory information that should be provided in a firm's financial reporting package (e.g., Dye 1990; Admati and Pfleiderer 2000). Even though regulators and standard-setting bodies consider strategy disclosure as highly relevant information (Gu and Li 2007), it has not yet been made mandatory under either German GAAP or under IFRS (for details on the regulatory environment in Germany, see "Appendix 1"). While our results do not indicate whether evidence of such externalities exists and/or whether they are outweighed by negative consequences, they could still be used as a further argument for standard-setters at least to continue debating whether to require mandatory strategy disclosure.

The remainder of our paper is structured as follows. In Sect. 2, we review the literature on related research questions. In Sect. 3, we develop our hypotheses and in Sect. 4, we describe the sample selection procedure as well as the sample characteristics. In Sect. 5, we specify our empirical model and the measurement of all variables employed. In Sect. 6, we present the empirical results. Section 7 contains robustness checks and further analysis. Section 8 concludes with a short summary and discussion.

2 Literature review

Our paper is related to other studies on the impact of increased disclosure levels either in general or in the management report or with respect to comparable parts of the financial reporting package on investor decision-making.

Botosan (1997) provides a seminal study examining the relationship between a self-constructed annual report disclosure score and the cost of equity capital. She finds evidence of the hypothesized negative association of both variables, but only for firms with low analyst followings. Additionally, her analysis is limited to only one industry and one year. In a subsequent study, Hail (2002) also provides evidence of a negative association between disclosure quality in general and the cost of equity capital, using a sample of 73 Swiss firms. Petrova et al. (2012) confirmed this notion for another sample of 121 listed Swiss firms. Comparably, Urquiza et al. (2012) find, for a sample of 36 Spanish firms, that forward-looking information in the annual report is associated with a decrease in the cost of equity capital.

Leuz and Verrecchia (2000) use the choice of accounting standard (IFRS and/or US-GAAP vs. German GAAP) as a proxy for disclosure level and find evidence of a hypothesized association with bid–ask spreads and trading volumes. Gassen and Sellhorn (2006) also find smaller bid–ask spreads for German firms adopting IFRS from 1998 to 2004, even though volatility increases. On the other hand, Daske (2006) finds either unchanged or even increasing cost of capital, after international GAAP adoption in German firms, for a sampling period from 1993 to 2002. In a similar vein, Cuijpers and Buijink (2005) do not find any cost of equity capital effects for a sample of 133 firms voluntarily adopting non-local GAAP within the European Union in 1999. Finally, Grüning (2011) provides mixed evidence, finding

higher disclosure levels to be associated with increased share turnover, smaller bid–ask spreads and increased market capitalization, but no direct association with cost of equity capital for 556 German Prime Standard firms in 2006.

In contrast to these papers addressing disclosure levels rather generally, our study focuses explicitly on the voluntary disclosure of strategy information. This relates for example to Barron et al. (1999) who provide an in-depth analysis of the effects of overall MD&A quality on analysts' earnings forecasts. They find that high MD&A quality is negatively associated with forecast error and/or dispersion. Vanstraelen et al. (2003) extend these results to corporate non-financial disclosures. They observe that higher levels of forward-looking disclosures lead to increased forecast accuracy. Glaum et al. (2011) also use analysts' earnings forecasts as the dependent variable and associate it with the introduction of international accounting standards and disclosure quality in the notes, as well as in the management report. They find that disclosure quality in the notes has a positive association with forecast error, whereas disclosure quality in the management report has not.

Richardson and Welker (2001) analyze the incremental cost of equity capital effects of voluntary social disclosures and find a positive relationship, even though financially successful firms seem to be penalized less for social disclosures. Dhaliwal et al. (2011), on the other hand, establish a negative association between corporate social responsibility (CSR) disclosure and cost of equity capital. They also find that firms tend to exploit this effect by raising equity capital after initiating CSR activities.

Gu and Li (2007) analyze the association of voluntary innovation strategy disclosure by high-tech firms and find on average positive stock price reactions following disclosure. Due to their specific focus, their results not only refer to the amount of disclosure given, but also to innovation strategy as specifically disclosed information. Finally, Knauer et al. (2012) provide evidence that voluntary forecast disclosures have an impact on share price, which increases with growing forecast reliability.

Overall, our literature review shows that the existing empirical studies on the association of voluntary disclosure with cost of equity capital have generated mixed results, regardless of whether disclosure has been measured by either archival or hand-collected data. One reason might be that sometimes voluntary disclosure represents non-verifiable and non-binding information thus constituting 'cheap talk' (Crawford and Sobel 1982; Farrell and Gibbons 1989; Korn et al. 2002). Glaum and Friedrich (2006: 166) cite analysts doubting the information value of the management report "*…because most companies would always display their situation as positive*". Gu and Li (2007) find that the association of voluntary disclosure on innovation strategy provided by high-tech firms with cost of equity capital is higher if this information is given credibility by preceding insider trading as a confirmatory signal, i.e., if cheap talk is less relevant. Dobler (2008) relates cheap talk in financial reporting information to unverified risk reporting issues. Finally, Bozzolan et al. (2009) provide evidence that verifiable information has a higher impact on analysts' forecasts, in comparison to non-verifiable information.

In our paper, we address the issue of cheap talk by focusing on strategy disclosures provided in the German management report as a mandatory part of the

annual financial reporting package. Even though the management report under German regulation does not mandate strategy reporting (for details, see "Appendix 1"), its principles still require any information included in the management report to be complete, reliable, clear, and transparent, as well as conveying management's perspective. Moreover, any information provided in the management report—albeit on a voluntary basis—is subject to the compulsory audit of the annual financial statements. Within the scope of the legal mandate, an auditor examines whether the management report is consistent with the financial statements as well as the findings of the audit, and whether, as a whole, it provides a realistic view of the firm's position and also appropriately presents opportunities and risks associated with future development [par. 317 (2) HGB]. Such third-party validation tends to increase the credibility of strategy disclosures (Healy and Palepu 2001), simultaneously reducing potential for cheap talk.

3 Hypothesis development

Disclosure theory presupposes that investors benefit from voluntary information that is provided above and beyond mandatory disclosure (Leuz and Verrecchia 2000; Hail 2002). In order to study the effect of voluntary strategy disclosure on cost of equity capital, our research is building on three related strands of literature.

First, revolving around the seminal analysis of Barry and Brown (1985), literature drawing on portfolio choice and equilibrium asset pricing theory suggests that increased disclosure reduces estimation risk arising from investor estimates of key parameters of an asset's payoff distribution ('estimation-risk approach'). Since there is greater uncertainty regarding 'true' parameters when information provided is low, investors require compensation for this additional risk (Barry and Brown 1985; Coles and Loewenstein 1988; Coles et al. 1995 or Clarkson et al. 1996). If strategy disclosure is informative to investors with respect to an asset's payoff function, increased levels of strategy disclosure for a given firm should then be associated with lower cost of equity capital. A more recent analysis by Lambert et al. (2007) extends this literature stream by using a model that allows explicitly for multiple firms whose cash flows are correlated. They show that increased disclosure also reduces the covariance between firms' cash flow estimates as part of non-diversifiable risk. Thus, in addition to lowering a firm's beta, increased disclosure also reduces the market premium and therefore creates a positive externality.

A second stream of related research builds on the seminal work of Merton (1987) and O'Hara (1995), dealing with the impact of information asymmetry amongst investors on the cost of capital ('market-microstructure approach'). As uninformed investors bear an increased risk of misconstructing their portfolios compared to informed investors, they require compensation for this risk (Easley and O'Hara 2004). Empirical results supporting a positive association between information asymmetry amongst investors and the cost of equity capital are provide, for instance, by Easley et al. (2002), Copeland et al. (2009), or Bhattacharya et al. (2012). Thus, with regard to strategy disclosures, the expected duration of information dissipation amongst investors may be considerably longer if firms do

not use the management report as a standard information channel, but rather an unsystematic and broad multitude of—sometimes not well monitored—information channels (Merton 1987), like analyst conferences, newspaper interviews, websites and/or firm brochures.

Both the estimation-risk approach and the market-microstructure approach suggest a direct link between increased disclosure levels in the management report and a decreased cost of equity capital. This should hold particularly true for strategy information provided in a management report.

A third stream of literature puts the focus on enhanced market liquidity resulting from more comprehensive firm disclosures, either through decreased transaction costs or an increased demand for a firm's shares ('market-liquidity approach', e.g., Demsetz 1968; Glosten and Milgrom 1985; Diamond and Verrecchia 1991 or Baiman and Verrecchia 1996). As Verrecchia (1999: 282) points out, "*in the absence of compelling reasons to the contrary, the conventional wisdom is that more disclosure results in more liquid markets.*" Higher market liquidity can be associated with decreased cost of equity capital for two reasons. First, investors are less subject to implied transaction cost (Botosan 2000; Leuz and Wysocki 2008). Second, as investors may buy or sell on liquid markets with less risk of future order imbalances, they take larger current positions (Diamond and Verrecchia 1991; Baiman and Verrecchia 1996). In both cases, stock prices increase with higher market liquidity, thus implying a decreased cost of equity capital.

Based on these deliberations, we formulate hypothesis H1, which reflects the main thrust of our analysis, as follows:

H1: There is a negative association between a firm's strategy disclosure level in the management report and the cost of equity capital.

In addition to analyzing the direct association between the levels of voluntary strategy disclosure in the management report and the cost of equity capital, we also study its relationship with firms' bid–ask spreads and trading volume of shares (e.g., Glosten and Milgrom 1985; Leuz and Verrecchia 2000; Grüning 2011). Both variables tend to react to increased levels of voluntary strategy disclosures (Wagenhofer and Ewert 2007: 408).

First, the above-mentioned literature suggests that lower information asymmetry between investors is associated with decreased bid–ask spreads. This notion is supported, for instance, by a model developed by Kim and Verrecchia (1994), in which uninformed market makers increase bid–ask spreads to compensate for losses resulting from trading with more informed investors. Empirical support for this notion is provided by Glosten and Harris (1988), Welker (1995), Coller and Yohn (1997), Healy et al. (1999) or Leuz and Verrecchia (2000). Second, it follows from the literature that less information asymmetry induced by increased disclosure is also associated with increased trading volumes (Frankel et al. 1999; Healy et al. 1999; Leuz and Verrecchia 2000; Grüning 2011).

Given that the literature indicates that both bid–ask spreads and trading volumes are related to the level of information provided to investors, we therefore assume that if investors use voluntary strategy disclosures for decision-making, disclosure levels should also be associated with bid–ask spreads and trading volumes. Our

second hypothesis H2 may be interpreted as a robustness check, following the advice on method triangulation of Denzin (1978) and Downward and Mearman (2007):

H2: There is a negative (positive) association between a firm's strategy disclosure level in the management report and bid–ask spreads for the firm's shares (trading volume of shares).

4 Sample selection and characteristics

Our study focuses on companies publicly listed on German capital market in one of four main indices of the stock exchange provider Deutsche Börse AG. These indices, Dax, MDax, TecDax, SDax, comprise 160 firms. From the firms listed in these indices at the end of June 2009, a sample of 100 companies was selected. First, to limit the analysis to firms in non-financial industries, 26 from the so-called super-sector FIRE (banks, insurance and real estate companies) were excluded. Another 29 firms were dropped because they were not listed throughout the entire investigation period 2002 to 2008. Finally, five firms had to be excluded, as they were not registered under German law and chose not to publish a management report according to German GAAP. The selection procedure yielded a sample of 100 firms listed on the German Stock Exchange end of June 2009 (Table 1).

We set the analysis period from 2002 to 2008, in order to capture a multi-year perspective for the investigation of voluntary strategy disclosures. We did not expand the analysis period beyond 2008 because management reports for the period 2009 to 2010 are neither appropriate for analysis nor comparable to management reports for the years from 2002 to 2008 due to the global economic and financial crisis. Our cross-sectional design thus resulted in 700 firm-year observations. We collected all management reports either by downloading official versions from corporate websites or by requesting hard copies from investor relations managers.

Having restricted our sample to index-listed firms, our analysis is not representative of all listed firms or even more so of all firms publishing a management report as it is

Table 1 Sample selection procedure

Sampling procedure steps		Absolute number	Percent
Firms listed in four key selection indices as of June 30, 2009			
Dax	30		
MDax	+50		
TecDax	+30		
SDax	+50	160	100
Firms in financial, insurance, and real estate industries		–26	−16
Other firms excluded from sample			
Not listed during 2002 to 2008	–29		
Registered under non-German law	–5	–34	−21
Number of sample firms		100	63

Table 2 Descriptive statistics of research sample

	Mean	Extremes		Percentile			SD	*n*
		Min	Max	25 %	50 %	75 %		
Descriptive statistics of sample firms								
MV	6.13	0.01	100.1	0.32	0.94	4.32	13.33	700
REV	10.47	0.00	151.61	0.50	1.63	7.51	21.98	700
EMPL	41.62	0.02	536.33	2.40	8.04	36.83	85.88	700
ASSETS	14.13	0.00	262.22	0.38	1.38	7.85	35.45	700

MV is the market value of firm's equity at the end of each calendar year. REV is total revenue, EMPL is the number of employees reported for each fiscal year and ASSETS is the book value of totals assets at the end of each fiscal year

All numbers are stated in EUR bn., except for EMPL ('000). For a detailed explanation of variables and data sources, see Appendix 2

not randomly drawn from these populations. However, the analyzed firms cover about 66 % of the market value of all listed firms at this time which was approximately 797 bn € at the end of 2008. Table 2 shows the heterogeneity of our sample with respect to market value (MV), total revenues (REV), number of employees (EMPL) and book value of total assets (ASSETS).

We also use these parameters to ensure the representativeness of our sample by comparing the 100 firms selected with the population of all firms listed in the four indices ($N = 160$). Additionally, we verified that the qualitative structure of our sample represents the structure of all 160 firms, to ensure that the omission of 34 firms not belonging to the super-sector FIRE does not distort our final sample (refer to "Appendix 3" for details).

5 Research model and variable measurement

5.1 Empirical model

We expect strategy-relevant disclosures to diffuse gradually and subtly over time rather than as an 'event' that can be scheduled precisely. We therefore opt for cross-sectional regression analysis, following the major body of literature represented, amongst others, by Botosan (1997), Leuz and Verrecchia (2000), Hail (2002), Daske (2006), Glaum et al. (2011), or Dhaliwal et al. (2011). "Appendix 2" provides a detailed overview of all variables surveyed with respect to our sample and lists the relevant data sources. A careful inspection of data included in our model did not reveal any immediate need to eliminate outliers. However, variables with skewed distributions were transformed into logarithmic data, in order to make our data set more robust.

To test our hypotheses, we use linear OLS regression analysis, that is, regressing the cost of equity capital (CC) as well as bid–ask spreads (BAS) and trading volumes (TV) on voluntary strategy disclosure scores (SDS) and several controls identified from prior literature. Thus, the generic specification of our three models is as follows:

$$\text{CC}\ (\text{BAS, TV}) = \alpha + \beta_{\text{SDS}} \times \text{SDS} + \sum_{i=1}^{n} \beta_i \times \text{Control}_i + \varepsilon. \quad (1)$$

Our empirical model implies that within data analysis, we have to ensure formal compliance with key prerequisites of linear regressions. We also need to address major critical issues regarding our research design, such as potential endogeneity of the key variable SDS. We also show that the SDS have an incremental effect beyond overall disclosure quantity in the financial reporting package. Results of these further analyses are discussed in Sect. 7.

5.2 Independent variable: strategy disclosure scores

Literature provides several empirical approaches to measuring disclosure level. Some papers use available archival metrics on disclosure rankings, e.g., AIMR data (e.g., Lang and Lundholm 1993; Healy et al. 1999; Lang and Lundholm 2000 or Botosan and Plumlee 2002). Others use self-constructed scores that are based on a normative understanding of 'comprehensive' disclosures (e.g., Hossain et al. 1995; Gray et al. 1995; Botosan 1997; Hail 2002; Jones 2007; Grüning 2011).

As there is no appropriate archival data for the strategy disclosure levels of German firms we had to follow the second research avenue by developing and validating self-constructed strategy disclosure scores (SDS), as a thorough composite index for measuring voluntary strategy disclosure scores. In a nutshell, the SDS are derived by applying a scorecard on comprehensive strategy reporting to management reports of our sample firms thus following a well-established hand-collecting procedure in the disclosure quality literature (e.g., Botosan 1997; Hail 2002). This allows for an in-depth analysis of the quantitative, as well as the qualitative level of strategy reporting, by using elaborate metric of firm individual levels of strategy disclosures. Any value $\text{SDS}_{i,t}$ represents the individual amount of voluntary strategy information disclosed by a firm i in its annual management report covering period t.

Healy and Palepu (2001) draw attention to increased noise especially in self-constructed measures, so that careful validation of the SDS is necessary. An additional, more recently discussed issue in this context is whether a given measure of disclosure level assessing disclosure quantity also captures disclosure quality. Beretta and Bozzolan (2008) show that measures of disclosure quantity inadequately reflect disclosure quality and therefore postulate the need for multi-dimensional measurement frameworks for this purpose. We heed both concerns by using an elaborate framework for strategy reporting based on the seminal literature in this field, and explicitly testing the reliability as well as the validity of the measured scores.

To develop the scorecard underlying the measurement of SDS, we use a normative catalogue of disclosure items based on prior research on voluntary disclosure practice, as well as on recommendations to use value reporting disclosure scorecards (e.g., Meek et al. 1995). We thus build a catalogue of reporting items reflecting a broad and comprehensive set of strategic aspects enabling addressees of

Table 3 Scorecard for strategy disclosure scores

Strategy disclosure items			No. of items	
Category	Sub-category		Sub-category	Category
Strategic analysis				
Corporate environment				
I	1	Political/social/legal environment	2	6 (15 % of 40 items)
	2	Macro-economic environment	2	
	3	Strategic position of corporation	2	
Business environment				
II	1	Market environment	5	14 (35 %)
	2	Competitive environment	5	
	3	Strategic position of business	4	
Strategy definition and detailing				
Corporate strategy				
III	1	Overall strategic orientation	2	5 (12.5 %)
	2	Strategic objectives of corporation	3	
Business strategy				
IV	1	Strategic objectives of business	3	10 (25 %)
	2	Details on business strategy	7	
Strategy implementation				
V	1	Communication to, motivation of staff	2	5 (12.5 %)
	2	Realization of strategy	3	
Sum				40 (100 %)

management reports to obtain an exhaustive and consistent picture of firm strategy (Beretta and Bozzolan 2008).

Overall, the SDS reflect the three generic phases of a strategy process, i.e., *strategic analysis*, *strategy definition or formulation* as well as the *implementation* of strategic programs (Grant 1991; Collis and Montgomery 1997; Rowe et al. 1994; Thompson and Strickland 2003; Robbins and Coulter 2007). In addition, the SDS identify information provided on overall corporate level of strategy, i.e., portfolio strategy, from strategy disclosures at the business level. As a result, we group a total of 40 reporting items into five categories of strategic information (I–V, Table 3), creating a multi-dimensional framework, with a total of 12 sub-categories covering the breadth of strategy disclosure. Up to five items in each sub-category capture its depth by successively detailing reporting requirements. Whilst Table 3 shows a condensed version of our measurement, "Appendix 4" provides information on the 40 items, as well as on the specific strategic content per item in detail.

The measurement of the SDS reflects the relative importance of generic phases of strategy processes through the relative number of reporting items per phase. As the results of strategic analysis are critical for sophisticated and thorough strategic management, 50 % of 40 items (or 20 items, respectively) deal with strategy

disclosures in this respect. Another 50 % or 20 items cover the strategy definition and strategy implementation phases. All 40 items are weighted equally as proposed by Spero (1979) or Meek et al. (1995), which is also in line with most of the empirical disclosure literature (for details as well as a robustness check on using equal weights in SDS assessment, see "Appendix 5").

To measure SDS, we conduct content analyses of 700 management reports published by German listed entities during 2002 and 2008 and score one single point for each of the items identified (as in Meek et al. 1995; Botosan 1997; Jones 2007). Content analyses of the 700 annual reports resulting from our sample were conducted by hand-collection. More specifically, a single coder performed the content analyses within approximately 3 months, by analyzing all 700 management reports in randomized order to minimize subjectivity bias (Healy and Palepu 2001), completing specific questionnaires covering our research measure (SDS). Individual firm scores are calculated by dividing the number of items disclosed (i.e., points awarded) by the maximum of 40 items. Thus, the standardized disclosure scores range between zero and one. The measurement results for all 700 firm-years are provided in "Appendix 6".

As large firms could achieve higher scores because of greater disclosure opportunities due to the complexity of their organizational structures and the number of businesses they manage, we took several steps to circumvent this problem. First, we reduced the total number of items in the scorecard (maximum number of points awarded) to 35 instead of 40, if a firm was active in only one single business segment. Second, multi-segment firms were only awarded a point for a specific item if the respective disclosure was provided for all relevant businesses managed. Third, we limited SDS to those reporting items which all firms are able to disclose independent of firm size. Finally, we did not award multiple points for multiple references to the same item.

Descriptive statistics on SDS are given in Table 4 and reveal an overall average disclosure level of 34 %, ranging from 3 % (minimum) to 83 % (maximum). Regarding SDS sub-scores, we find that on average, firms emphasize disclosures regarding strategic analysis, rather than on defined strategies and even less so on strategy implementation (the measurement database of SDS is provided in "Appendix 6").

To examine the measurement reliability of the SDS, we first test for internal consistency. As one can assume that firms coordinate their reporting strategy across various reporting avenues (Lang and Lundholm 1993), each component in the SDS should proxy for all other components. Thus, all components of our disclosure index should exhibit a positive correlation with one another (Table 5). Even though each coefficient is positive and highly significant, correlation between the SDS components is considerably lower than the correlation between the SDS components and the overall disclosure scores. We therefore conclude that the SDS components capture different aspects of disclosure, but are still well proxied by the overall SDS.

As a further test of internal consistency, following Lapointe-Antunes et al. (2006), we calculate a global Cronbach's Alpha (Cronbach 1951) for the pooled sample of 700 observations as well as annual Alphas for each of the 7 years from

Table 4 Descriptive statistics of strategy disclosure scores

Score	Mean	Extremes		Percentiles			SD
		Min	Max	25 %	50 %	75 %	
SDS total	0.34	0.03	0.83	0.25	0.33	0.40	0.12
SDS sub-scores							
Analysis	0.38	0.06	0.85	0.30	0.39	0.45	0.13
Strategy	0.36	0.00	0.87	0.20	0.33	0.47	0.18
Implementation	0.09	0.00	0.80	0.00	0.00	0.20	0.15

SDS total is the overall strategy disclosure score representing disclosure on strategic aspects. SDS sub-score 'Analysis' is the partial company disclosure score for disclosure on information gathered through strategic analysis both on corporate and business level. SDS sub-score 'Strategy' is the partial company disclosure score for disclosure on defined strategy and its detailing. SDS sub-score 'Implementation' is the partial company disclosure score for disclosure on information about the realization of strategic programs as well as the integration in firm-wide communication and incentive systems

All numbers are standardized with a minimum value of zero and a maximum of one (sub-scores standardized based on maximum items included per category). A score of e.g., 0.4 signals a reflection of 40 % of our items. All data are based on $n = 700$ observations

Table 5 Reliability of strategy disclosure scores

Correlation analysis of strategy disclosure scores and related sub-scores

		1	2	3	4
1	SDS total		0.824*** (0.000)	0.851*** (0.000)	0.480*** (0.000)
2	SDS sub-score 'analysis'	0.857*** (0.000)		0.458*** (0.000)	0.306*** (0.000)
3	SDS sub-score 'strategy'	0.852*** (0.000)	0.493*** (0.000)		0.339*** (0.000)
4	SDS sub-score 'implementation'	0.552*** (0.000)	0.378*** (0.000)	0.361*** (0.000)	

SDS total is the overall company disclosure score, representing disclosure on strategic aspects. The SDS sub-score 'analysis' is the partial company disclosure score on information gathered through strategic analysis, both at the corporate and business levels. The SDS sub-score 'strategy' is the partial company disclosure score for defined strategy and its detailing. The SDS sub-score 'implementation' is the partial company disclosure score for information about the realization of strategic programs, as well as integration within firm-wide communication and incentive systems. All data are based on $n = 700$ observations

The numbers below the diagonal represent Pearson's correlation coefficients and those above the diagonal, Spearman's rank correlation coefficients

The p values (F values) noted (in parentheses) are for a two-tail test of statistical significance; * (**; ***) indicate statistical significance at the $p < 0.10$ (0.05; 0.01) level

2002 to 2008. Cronbach's Alpha is a coefficient which takes on a maximum value of one when the correlation between each pair of components in the SDS is perfect. The global Alpha for the components of the SDS is 0.713; annual Alphas range between 0.600 and 0.757 (not tabulated). Even though there is no standard test of significance for Cronbach's Alpha statistics, prior research accepts indices with an

Table 6 Validity of strategy disclosure scores

		MV	LIST	LEV	BIG4
Correlation analysis of strategy disclosure scores and firm characteristics					
SDS	($n = 700$)	0.487*** (0.000)	0.225*** (0.000)	0.139*** (0.001)	0.187*** (0.000)

MV is the natural logarithm of a firm's market value of equity. LIST a categorical variable taking a value of one if a firm is cross-listed on the NYSE. LEV is a factor representing a firm's leverage. BIG4 is a categorical variable taking a value of one if a firm is audited by a Big-Four auditor. YEAR controls for potential time-dependent influences. The numbers shown are Spearman correlation coefficients. For more details, see Appendix 2

The p values (F values) noted (in parentheses) are for a two-tail test of statistical significance; * (**; ***) indicate statistical significance at the $p < 0.10$ (0.05; 0.01) level

Alpha of less than 0.700 (e.g., Botosan 1997). We therefore assume that the SDS are a reliable measure of strategy disclosure.

To capture measurement validity of the SDS, we draw on previous literature (e.g., Ahmed 1995) that finds strong associations between overall disclosure scores and firm characteristics. We therefore analyze the relationships between the disclosure scores with typical determinants of disclosure policy. These are the market value of equity (MV), foreign listing status (LIST), financial leverage (LEV), or whether a firm is audited by a Big-Four company (BIG4). The results in Table 6 thus confirm the validity of SDS by showing significantly high and positive coefficients, using correlation analysis as a robustness check.

As a final robustness check, we also validated the SDS by correlating them with alternative disclosure scores derived from the German competition 'Best Annual Report' (Baetge 1992), which also relate to strategy information, but much more approximately (for details refer to "Appendix 7"). These results also support our notion that the SDS are highly suitable for measuring the level of voluntary strategy disclosure.

5.3 Dependent variables: cost of equity capital, bid–ask spreads and trading volumes

To measure the effect of voluntary strategy disclosures, we use implied cost of equity capital, as well as bid–ask spreads and trading volume as additional measures. If voluntary strategy disclosure indeed affects investor decision-making regarding the risk-component of cost of equity capital (H1), it should also be associated with trading volumes and bid–ask spreads which are also susceptible to increased disclosure levels (H2).

With respect to the measurement of the cost of equity capital, we adhere to suggestions made by Gebhardt et al. (2001), as well as Hail (2002), to compute the ex-ante cost rate via the 'residual income model', in which firm value is represented as a function of forecasted accounting data subject only to the 'clean surplus relation'. In this model, firm value equals reported book value plus an infinite sum of discounted residual income and is expressed as a function of accounting numbers, namely future earnings and expected book values. The so-called implied cost of

equity capital rate is then computed as the internal rate of return that equates a firm's intrinsic value to the current stock price.

In spite of the limitations inherent to accounting-based approximations of cost of equity capital, Daske et al. (2010) support this measurement design, arguing that such approximations for cost of equity capital are robust and even more reliable than models based on abnormal earnings growth. However, in practical valuation analysis accounting data should only be forecasted over finite horizons. Therefore, following Hail (2002), we set the forecast horizon of our residual income model to 12 periods and adopt a three-stage approach to calculating firm value. First, we use earnings forecasts of analysts for the next 3 years. Second, we compute future earnings by linearly fading down year $t + 3$ return on book value of equity to a mean average market return by $t + T$. Finally, terminal value is derived by perpetuating $t = 12$ income:

$$P_t = BV_t + \sum_{\tau=1}^{n} \frac{(X_{t+\tau} - r_e \times BV_{t+\tau-1})}{(1 + r_e)^{\tau}} + \ldots \\ \ldots \sum_{\tau=n+1}^{T} \frac{(X_{t+\tau} - r_e \times BV_{t+\tau-1})}{(1 + r_e)^{\tau}} + \frac{(X_{t+T+1} - r_e \times BV_{t+T})}{r_e \times (1 + r_e)^{T}} \tag{2}$$

where

P_t	Average stock price of a firm's shares at t
$X_{t+\tau}$	Future accounting earnings expected in period $(t + \tau - 1, t + \tau)$; either forecasted explicitly or generated by a linear fading rate or constant as terminal income
r_e	Estimate of ex-ante cost of equity capital as internal rate of return
$BV_{t+\tau}$	Future accounting book value of equity at $t + \tau$, based on the clean surplus relation with future dividends, estimated using a constant (historic) pay-out ratio

Following Eq. (2), estimates of future book values and future dividends are required in order to calculate future residual income. To compute future book values, we also need to make some assumptions about dividend pay-out. Due to a lack of more accurate data, we assume net dividends to constitute a constant ratio of expected earnings over the forecast horizon, with dividend pay-out ratio derived as a historical mean adjusted for unusual observations. The terminal value is computed on the assumption that the net dividend equals $t + \tau$ earnings. Thus, we expect no further growth in later periods (e.g., Hail 2002). We calculate the target accounting return on equity of 8 %, based on the long-term historic average rate of return of the German stock market over 30 years (Table 7).

In addition, on the left side of the residual income model, we also need stock price data, as it is set equal to the intrinsic value. We use average price per year to minimize potential bias which could be induced by focusing on a single day or month. This procedure also accounts for the sequential release of reports and heterogeneous horizons of processing management reports by investors and the subsequent reflection in market values. Stock price and book value data were provided by Datastream, other data were collected from I/B/E/S (for details, see "Appendix 2").

Table 7 Validity of cost of equity capital measures

	MV	BETA	LEV
Panel A: correlation analysis of cost of equity capital (CC) and firm characteristics			
CC—cost of equity capital	−0.088** (0.023)	0.093** (0.020)	0.198*** (0.000)

		MV (−)	BETA (+)	LEV (+)	YEAR
Panel B: OLS regression of cost of equity capital on firm characteristics					
Coefficient		−0.150*** (0.000)	0.117*** (0.005)	0.178*** (0.000)	−0.243*** (0.000)
R^2 adj.	0.108*** (0.000)				

CC is the natural logarithm of an implied ex-ante cost of equity capital rate. MV is the natural logarithm of a firm's market value of equity. BETA indicates market beta. LEV is a factor representing a firm's leverage. YEAR controls for potential time-dependent influences. Numbers shown in panel A represent Pearson correlation coefficients. All data are based on 661 observations. For more details, see Appendix 2

Regression coefficients are standardized. The p values (F values) noted (in parentheses) are for a two-tail test of statistical significance; * (**; ***) indicate statistical significance at the $p < 0.10$ (0.05; 0.01) level

Table 8 Descriptive statistics of dependent variables

Parameter	Period	Mean	Extremes		Percentile			SD	*n*
			Min	Max	25 %	50 %	75 %		
Panel A: descriptive statistics of cost of equity capital estimates									
CC—cost of equity capital	$(t + 1)$	6.782	1.270	13.52	5.685	6.610	7.790	1.868	661
Panel B: descriptive statistics of proxies of cost of equity capital									
BAS—bid–ask spread	$(t + 1)$	0.0106	0.0009	0.0794	0.0045	0.0085	0.0139	0.0085	700
TV—trading volume [Ln]	$(t + 1)$	20.64	13.30	26.40	18.90	20.20	22.40	2.381	700

Symbol $(t + 1)$ indicates the availability of data: data marked with (t) collected for 2002 to 2008, data marked with $(t + 1)$ for 2003 until the end of 2009 (maximum 700 observations). However, some data marked $(t + 1)$ are only partly available for the entire time period, with less than 700 observations. For more details, see Appendix 2

In order to validate our cost of equity capital estimates, we set up a test model for CC based on the literature (e.g., Botosan 1997; Botosan and Plumlee 2002; Hail 2002; Hail and Leuz 2006). Following the economic theory, a valid measure of cost of equity capital should increase with risk, as reflected in market beta (BETA) and leverage (LEV) and should decrease with rising market value of equity (MV). We therefore perform a simple correlation analysis and an OLS regression with these parameters in Table 8 in order to test the validity of CC. The results support our assumption that the residual income model provides valid estimates for firm individual cost of equity capital.

Beyond CC, we complement our investigation by analyzing two other metrics, i.e., bid–ask spreads (BAS) and trading volume (TV) in firm shares. All raw data were provided by Datastream. We compute BAS as relative spreads, that is, absolute spreads scaled by bid price on the basis of daily closing data at the Frankfurt Stock Exchange (FSE). With around 255 trading days annually for each of the 7 years in question, we calculate the annual mean relative bid–ask spreads. For robustness checks however, we also keep absolute spreads.

To operationalize trading volume TV, we cumulate daily monetary trading volume at the most liquid German stock exchanges, the FSE and the Xetra, for each trading day. To reduce skewness, we use the natural logarithm and additionally calculate stock turnover data, i.e., daily trading volume divided by the respective market capitalization. Table 8 provides descriptive statistics on all independent variables.

5.4 Control variables

To capture firm heterogeneity, as well as other variables that are likely to determine reporting decisions, we use a broad set of metric control variables for firm characteristics and capital market data.

In order to test H1, we follow the generic specification of our research model and include a broad set of control variables. First, we control for a firm's market value of equity (MV) to account for the richness of its information environment. Market value (MV) is computed as the natural logarithm of market value of total equity at the end of each calendar year.

Furthermore, we use market beta (BETA) and firm leverage (LEV) to control for a firm's systematic or financial risk (Botosan 1997; Gietzmann and Ireland 2005). Leverage (LEV) is a control variable extracted as a factor by means of principal component analysis, using four ratios reflecting a firm's debt, i.e., overall debt, long-term debt, net debt, and debt over equity. Another metric control variable included is the annual share price volatility (VOLA), which is the average annual price movement to a high and low from a mean for each year.

We control for firm profitability by using PROF, which is extracted as a factor via principal component analysis, from the three core margin figures EBITDA, EBIT and net income margin, thus capturing their common variance. As an additional control, we also include the annual share price return (RET). We control for market liquidity using the annual share trading volume (TV) and the inverse free float (IFF), which is the ratio of firm's share capital not actively traded or held by major stakeholders.

With respect to H1, in accordance with the literature we expect the coefficients of MV, PROF, TV and IFF to have negative signs and the coefficients of BETA, LEV, VOLA and RET to have positive signs.

In addition, we include non-metric controls that might influence the cost of equity capital. For example, the index in which a firm is listed might influence investors' risk perceptions. We therefore employ index dummies capturing the respective share index in which firms are included, i.e., Dax, MDax, TecDax or SDax, using 'no index' as a reference category. Another qualitative control consists of several industry dummies following the sector logic of Deutsche Börse AG, with the sector "Telecommunications" as a reference category. Furthermore, we use dummies representing the industry in which a firm operates and three other categorical variables, one of which is firm age to proxy for corporate culture (e.g., Gibbins et al. 1990). More precisely, we employ age dummies as a qualitative control representing the first three quartiles of sample firms ranked by age, with the fourth quartile chosen as the reference category. Other dummy variables capture the nature of firms' accounting practices, namely the standard followed (German-GAAP vs. IFRS or US-GAAP) and the impact of Big-Four audits.

To test H2, we also use several additional control variables, for which previous research finds associations with both bid–ask spreads and trading volumes. For example, bid–ask spreads (BAS) are assumed to be negatively associated with trading volumes (TV), the annual average mean number of analysts following a firm (NAF) or the annual share price return (RET). On the other hand, bid–ask spreads are supposed to be positively related to annual share price volatility (VOLA) and also to the inverse free float (IFF), as small free floats indicate that shareholders with large closely held stakes might have superior access to corporate information (Glosten and Harris 1988; Welker 1995; Healy et al. 1999). In addition, we include firm's market value of equity (MV) to capture firm size and four index dummies,

assuming bid–ask spreads to be negatively associated with both firm size and listing status (Leuz and Verrecchia 2000). We also use YEAR as a dummy variable to control for potential time-dependent influence.

In testing for H2, we also regress trading volumes (TV) on several controls besides SDS. For example, prior studies have identified significant associations with market value and volatility, as well as listing status and ownership structure (Bessembinder et al. 1996). We therefore include the market value of equity (MV), annual share price volatility (VOLA) and four index dummies in our model, for which we predict positive coefficients. Further, we include the inverse free float (IFF), predicting a negative coefficient, as TV may decrease with a higher number of closely held shares. We put additional controls into the final model, in order to substantiate our analysis, namely market beta (BETA), annual share price return (RET) and firm profitability (PROF), for which we assume positive coefficients. In addition, we apply listing status and year as non-metric controls via dummy variables. Finally, we also control for potential time-dependent influence by using YEAR as a dummy variable.

Table 9 provides descriptive statistics on metric control variables. "Appendix 2" contains an explanation of the variables and data sources.

6 Results

6.1 Bivariate analysis

In this section, we examine the association between strategy disclosure scores (SDS) and the cost of equity capital (CC), bid–ask spreads (BAS) and trading volume (TV). As hypothesized above, we expect our key variable SDS to be negatively associated with CC and BAS and positively associated with TV. To reduce (limited) skewness of distributions, we use the natural logarithm of CC, TV and BAS for our analysis.

As Table 10 exhibits, all relevant correlation coefficients have the expected sign and are highly significant at a level <1 %. Specifically, the correlation between CC and SDS is $r_{\text{Pearson}} = -0.198$ as well as $r_{\text{Spearman}} = -0.216$, being significant at a 1 % level.

6.2 Multivariate analysis

6.2.1 H1: association of voluntary strategy disclosure with cost of equity capital

In order to test H1, we conform to the generic specification of our research model and include a broad set of control variables.

The results obtained from estimating regressions using OLS are provided in Table 11, which presents the model in four different specifications, to account for a stepwise broadening of our perspective on the cost of capital effects of strategy disclosure. Referring to our final model, we achieve an adjusted R^2 of 37 %. The standardized coefficients of our metric controls MV, LEV, PROF, TV, RET, and

Table 9 Descriptive statistics of metric control variables

Parameter	Period	Mean	Extremes		Percentile			SD	*n*
			Min	Max	25 %	50 %	75 %		
Firm characteristics									
PROF—profitability [F]	(t)	0.000	−12.66	1.799	−0.1673	0.0501	0.3149	1.000	700
LEV—leverage [F]	(*t*)	0.000	−1.827	4.792	−0.7922	−0.0952	0.6699	1.000	700
IFF—inverse freefloat	(*t* + *1*)	33.84	0.000	93.13	10.10	31.34	54.23	25.39	600
Capital market data									
NAF—analysts following	(*t* + *1*)	16.99	0.000	46.42	7.938	14.75	25.23	10.99	700
MV—market value [Ln]	(*t*)	20.91	14.30	25.33	19.57	20.66	22.18	1.853	700
MV—market value [Ln]	(*t* + *1*)	20.97	6.910	25.33	19.73	20.79	22.33	2.077	700
RET—share price return	(*t* + *1*)	25.66	−94.50	638.1	−8.375	17.50	44.90	70.95	700
BETA—market beta	(*t* + *1*)	0.8969	0.256	2.094	0.6696	0.8559	1.104	0.3426	651
VOLA—volatility	(*t* + *1*)	30.45	14.73	59.15	24.68	28.90	35.06	8.313	662

Symbols (*t*) and (*t* + *1*) indicate the availability of data: data marked with (*t*) were collected from 2002 to 2008, data marked with (*t* + *1*) from 2003 until the end of 2009 (maximum 700 observations). However, some data marked (*t* + *1*) were only partly available for the entire time period, thus resulting in less than 700 observations. For more details, see Appendix 2

Table 10 Correlation analysis of key metric variables

		1	2	3	4	5	6	7	8	9
1	SDS (t)		−0.216*** (0.000)	−0.448*** (0.000)	0.504*** (0.000)	0.469*** (0.000)	0.446*** (0.000)	0.089** (0.023)	−0.194*** (0.000)	−112*** (0.006)
2	CC ($t + 1$)	−0.198*** (0.000)		0.055 (0.161)	−0.167*** (0.000)	−0.238*** (0.000)	−0.167*** (0.000)	0.125*** (0.002)	0.196*** (0.000)	−0.180*** (0.000)
3	BAS ($t + 1$)	−0.402*** (0.000)	0.033 (0.395)		−0.734*** (0.000)	−0.745*** (0.000)	−0.780*** (0.000)	−0.055 (0.161)	0.051 (0.176)	0.323*** (0.000)
4	TV ($t + 1$)	0.515*** (0.000)	−0.093** (0.016)	−0.571*** (0.000)		0.779*** (0.000)	0.692*** (0.000)	0.188*** (0.000)	−0.105*** (0.006)	−0.328*** (0.000)
5	NAF ($t + 1$)	0.441*** (0.000)	−0.154*** (0.000)	−0.590*** (0.000)	0.792*** (0.000)		0.809*** (0.000)	0.022 (0.583)	−0.125*** (0.001)	−0.198*** (0.000)
6	MV ($t + 1$)	0.421*** (0.000)	−0.088** (0.023)	−0.556*** (0.000)	0.629*** (0.000)	0.740*** (0.000)		−0.052 (0.189)	0.068* (0.073)	−0.010 (0.809)
7	BETA ($t + 1$)	0.062 (0.114)	0.093** (0.020)	−0.044 (0.265)	0.178*** (0.000)	−0.003 (0.945)	−0.059 (0.136)		0.052 (0.181)	−0.260*** (0.000)
8	RET ($t + 1$)	−0.177*** (0.000)	0.172*** (0.000)	0.191*** (0.000)	−0.082** (0.031)	−0.178** (0.000)	−0.037 (0.327)	0.108*** (0.006)		−0.044 (0.278)
9	IFF ($t + 1$)	−0.125*** (0.002)	−0.187*** (0.000)	0.206*** (0.000)	−0.351*** (0.000)	−0.217*** (0.000)	−0.048 (0.237)	−0.254*** (0.000)	−0.049 (0.228)	

SDS is the annual strategy disclosure score. CC is the natural logarithm of an implied ex-ante cost of equity capital rate. BAS is the natural logarithm of the annual mean average relative bid–ask spread. TV is the natural logarithm of the aggregated annual monetary trading volume of a firm's shares. NAF is the annual mean average number of analysts following a particular firm. MV is the natural logarithm of a firm's market value of equity. BETA indicates market beta. RET is the annual share price return. IFF is the inverse free float. For more details, see Appendix 2

The numbers below the diagonal represent Pearson's correlation coefficients, those above the diagonal, Spearman's rank correlation coefficients

The p values noted (in parentheses) are for a two-tail test of statistical significance; * (**; ***) indicate statistical significance at the $p < 0.10$ (0.05; 0.01) level. Sample sizes are not shown explicitly. However, all calculations are based on $n \geq 600$ observations

Table 11 Regression analysis of cost of equity capital

	Basic model		Enhanced basic model		Enhanced model w/index dummies		Final Model	
	Coefficient	*p*	Coefficient	*p*	Coefficient	*p*	Coefficient	*p*
OLS regression analysis of CC_{t+1} on SDS_t and controls								
Strategy disclosure								
SDS (−) (*t*)	−0.112**	(0.015)	−0.117**	(0.013)	−0.121***	(0.009)	−0.135***	(0.004)
Metric controls								
MV [Ln] (−) (*t* + *1*)	−0.128***	(0.000)	−0.228***	(0.000)	−0.266***	(0.006)	−0.201**	(0.010)
VOLA (+) (*t* + *1*)	−0.103**	(0.040)	−0.074	(0.158)	−0.059	(0.299)	−0.002	(0.969)
BETA (+) (*t* + *1*)	0.155***	(0.000)	0.088*	(0.050)	0.121**	(0.012)	0.037	(0.437)
LEV [F] (+) (*t*)	0.206***	(0.000)	0.249***	(0.000)	0.230***	(0.000)	0.299***	(0.000)
PROF [F] (−) (*t*)	−0.040	(0.341)	−0.143***	(0.001)	−0.109**	(0.012)	−0.100**	(0.017)
TV [Ln] (−) (*t* + *1*)	−0.017*	(0.089)	−0.172**	(0.023)	−0.263***	(0.001)	−0.257***	(0.003)
RET (+) (*t* + *1*)			0.149***	(0.001)	0.189***	(0.000)	0.185***	(0.000)
IFF (−) (*t* + *1*)			−0.279***	(0.000)	−0.214***	(0.000)	−0.166***	(0.000)
YEAR	−0.143***	(0.001)	−0.071	(0.130)	−0.028	(0.556)	0.012	(0.802)
Non-metric controls								
Index dummies								
Dax (*t* + *1*)					−0.383**	(0.012)	−0.269*	(0.065)
MDax (*t* + *1*)					−0.110	(0.384)	−0.073	(0.542)
TecDax (*t* + *1*)					−0.032	(0.762)	−0.026	(0.794)
SDax (*t* + *1*)					−0.020	(0.832)	−0.016	(0.855)
Industry dummies								
Inf. technology (*t* + *1*)							0.039	(0.604)
Consumer goods (*t* + *1*)							0.006	(0.948)
Consumer Svcs. (*t* + *1*)							−0.164**	(0.023)

Table 11 continued

	Basic model		Enhanced basic model		Enhanced model w/index dummies		Final Model	
	Coefficient	*p*	Coefficient	*p*	Coefficient	*p*	Coefficient	*p*
Industrials ($t + 1$)							0.114	(0.301)
Pharma ($t + 1$)							0.032	(0.672)
Basic materials ($t + 1$)							−0.118*	(0.096)
Utilities ($t + 1$)							0.012	(0.804)
Firm age dummies								
Age cluster 1 ($t + 1$)							−0.129**	(0.027)
Age cluster 2 ($t + 1$)							−0.159***	(0.003)
Age cluster 3 ($t + 1$)							−0.064	(0.170)
Accounting dummies								
Standard (t)							0.069*	(0.082)
BIG4 (t)							−0.106***	(0.009)
R^2	0.131		0.269		0.294		0.403	
R^2 adj.	0.120***	(0.000)	0.255***	(0.000)	0.274***	(0.000)	0.371 ***	(0.000)
n	604		508		508		508	

CC is the natural logarithm of an implied ex-ante cost of equity capital rate. SDS is the annual strategy disclosure score. MV is the natural logarithm of a firm's market value of equity. VOLA indicates annual share price volatility. BETA indicates market beta. LEV is a factor representing a firm's leverage. PROF reflects profitability. TV is the natural logarithm of the aggregated annual monetary trading volume of a firm's shares. RET is the annual return of share prices. IFF is the inverse free float. Industry dummies follow the sector logic of Deutsche Börse AG with 'Telecommunications' as a benchmark category. Age dummies represent first three quartiles of sample firms ranked by age. The accounting standard dummy takes a value of one if a firm applies either US-GAAP or IFRS. The Big-Four dummy (BIG4) takes a value of one if a firm is audited by a Big-Four auditor. Index dummies represent selection indices of Deutsche Börse AG, using 'no index' as a reference category. YEAR controls for potential time-dependent influences. For more details, see Appendix 2

Regression coefficients are standardized. The *p* values (*F* values) noted (in parentheses) are for a two-tail test of statistical significance; * (**; ***) indicate statistical significance at the $p < 0.10$ (0.05; 0.01) level. The number of cases is lower than the sample size due to missing data for some variables

IFF all behave as predicted and are significant at the 10 % level or better. The only exception is VOLA, which shows a contradictory, albeit weak, coefficient in the basic model. Thus, we can show that CC decreases with a higher MV, higher levels of PROF, and higher TV. CC also increases with a higher firm beta, higher firm leverage and higher share price return, which is reasonable as the share price represents the left side of the equation, and the more the share price increases, the higher IRR needs to become in order to solve the equation.

Our analysis supports H1, i.e., increasing levels of voluntary strategy disclosure (SDS) are negatively associated with cost of equity capital (CC) even after controlling for variation in a broad set of other variables. The magnitude of this effect ranges from $\beta_{SDS} = -0.112$ in the basic model to $\beta_{SDS} = -0.135$ in the final model, thus indicating that firms with most forthcoming strategy disclosure behavior may benefit from a reduction in cost of equity capital compared to less talkative firms.

In addition, some non-metric controls in Table 11 yield significant coefficients and thus indicate that such factors may influence cost of equity capital. For example, our results indicate that the accounting practices of firms seem to have a systematic influence. Moreover, older firms seemingly derive cost of equity capital benefits compared to younger firms, as investors are likely to perceive fewer risks when a firm has proven its stability over a period of several years. Index dummies on the other hand mostly fail to show a significant influence on cost of equity capital.

Comparing the standardized regression coefficients of SDS to the metric and non-metric controls, we find that several controls have larger coefficients and therefore indicate a stronger economic impact. Still, this does not impair our analysis, as our results relate to strategy disclosure as one of several factors influencing the cost of equity capital. In other words, under a given strategy, it is better to provide more than less information with respect to cost of equity capital.

6.2.2 *H2: association of voluntary strategy disclosures with bid–ask spreads and trading volume*

To test H2, we regress bid–ask spreads (BAS), as well as trading volumes (TV), together with several control variables on disclosure scores (SDS). Our final analysis is shown in Table 12. For both panels A and B, we find significant regression coefficients for the association of voluntary strategy disclosure with signs as predicted, i.e., SDS being negatively associated with BAS and positively associated with TV. We therefore cannot refute H2. Together with our results for H1, this supports our theory that voluntary strategy disclosure is indeed associated with investor decision-making. Firms with high levels of voluntary strategy disclosure benefit from a lower cost of equity capital, their bid–ask spreads are smaller and their trading volumes are higher than those of firms with low disclosure levels.

Furthermore, panel A of Table 12 indicates that SDS, together with other control variables, explain up to 78 % of the variation in BAS, which is similar to results obtained in comparable studies (e.g., Leuz and Verrecchia 2000). This supports the theoretical notion that higher levels of strategy disclosure generally signal a richer information environment of a given firm or less information asymmetry, making

Table 12 Regression analysis of bid–ask spreads and trading volumes

OLS regression analysis of BAS_{t+1} or TV_{t+1} on SDS_t and controls

	Panel A: analysis of BAS_{t+1}				Panel B: analysis of TV_{t+1}			
	Basic model		Final model		Basic model		Final model	
	Coefficient	*p*	Coefficient	*p*	Coefficient	*p*	Coefficient	*p*
Strategy disclosure								
SDS (−) (*t*)	−0.112***	(0.000)	−0.047**	(0.046)				
SDS (+) (*t*)					0.133***	(0.000)	0.077***	(0.000)
Metric controls								
MV [Ln] (− | +) (*t* + *1*)	−0.788***	(0.000)	−0.567***	(0.000)	0.832**	(0.000)	0.457***	(0.000)
VOLA (+ | +) (*t* + *1*)	−0.059**	(0.025)	−0.039	(0.161)	0.302**	(0.000)	0.225***	(0.000)
RET (− | +) (*t* + *1*)	0.069***	(0.005)	0.008	(0.742)	−0.125**	(0.000)	−0.056***	(0.006)
IFF (+ | −) (*t* + *1*)			0.208***	(0.000)	−0.232**	(0.000)	−0.114***	(0.000)
TV [Ln] (−) (*t* + *1*)			−0.078*	(0.072)				
NAF (−) (*t*)			0.110**	(0.032)				
PROF [F] (+) (*t*)							−0.086***	(0.000)
BETA (+) (*t* + *1*)							0.064***	(0.003)
Qualitative controls								
Index dummies								
Dax (*t* + *1*)			−0.283***	(0.000)			0.581***	(0.000)
MDax (*t* + *1*)			−0.149***	(0.003)			0.281***	(0.000)
TecDax (*t* + *1*)			−0.101***	(0.003)			0.189***	(0.000)
SDax (*t* + *1*)			0.058*	(0.095)			0.020	(0.644)
YEAR	0.021	(0.396)	−0.107***	(0.000)	0.021	(0.334)	0.094***	(0.000)

Table 12 continued

OLS regression analysis of BAS_{t+1} or TV_{t+1} on SDS_t and controls

	Panel A: analysis of BAS_{t+1}				Panel B: analysis of TV_{t+1}			
	Basic model		Final model		Basic model		Final model	
	Coefficient	p	Coefficient	p	Coefficient	p	Coefficient	p
R^2	0.672		0.784		0.804		0.849	
R^2 adj.	0.670***	(0.000)	0.779***	(0.000)	0.802***	(0.000)	0.846***	(0.000)
n ($n_{max} = 700$)	662		568		564		524	

SDS is the annual strategy disclosure score. BAS is the natural logarithm of annual mean average relative bid–ask spreads. TV is the natural logarithm of the aggregated annual monetary trading volume of a firm's shares. SDS is the annual strategy disclosure score. MV is the natural logarithm of a firm's market value of equity; VOLA indicates annual share price volatility. BETA indicates market beta and PROF is a factor representing a firm's profitability. RET is the annual return of share prices, IFF is the inverse free float. NAF indicates the annual mean number of analysts following a particular firm. Index dummies represent the selection indices of Deutsche Börse AG, using 'no index' as a reference category. YEAR controls for potential time-dependent influences. For more details, see Appendix 2

Regression coefficients are standardized. The p values (F values) noted (in parentheses) are for a two-tail test of statistical significance; * (**; ***) indicate statistical significance at the $p < 0.10$ (0.05; 0.10) level. The number of cases is lower than the sample size due to missing data for some variables

shares more attractive to outside investors. However, the magnitude of β_{SDS} which indicates the impact of increased strategy disclosure is relatively low, so one should not necessarily regard SDS as the only workable lever for narrowing bid–ask spreads.

Furthermore, referring to the final model in panel A, several of our control variables (MV, IFF as well as the index dummies) are significant and show the predicted signs, which indicates that characteristics of a firm's information environment are relevant for the width of bid–ask spreads. Especially all firm size-related controls (MV, index dummies) reveal the expected dominant influence on bid–ask spreads. To conclude, even in such a strictly controlled model, SDS is still able to show a significant association with BAS.

Contrary to our prediction that an increasing number of analysts following a firm reduces information asymmetry and therefore BAS, the number of analysts following a firm (NAF) shows a positive and significant coefficient. In related studies, using the number of analysts used as a control variable has also resulted in counter-intuitive regression coefficients. Richardson and Welker (2001), for example, fail to identify the hypothesized cost of capital effect of this variable. We thus argue that a large number of analysts even increase information asymmetries, as they typically release diverging estimates, producing a somewhat mixed picture on the future of a firm, thus suggesting that not all analysts have the same level of information. However, this issue calls for additional and deeper research.

Panel B of Table 12 shows that our final model for TV is also highly significant and explains more than 80 % of the variation in TV. The standardized regression coefficient for SDS is significant and has a positive sign as predicted. In line with our results regarding BAS, the magnitude of β_{SDS} is considerably lower with $\beta_{SDS} = 0.077$, but significant at virtually all levels of statistical significance, even in a fairly controlled setting of our final model. In addition, most of the controls achieve high levels of significance, with market value (MV) and listing status yielding the highest coefficients. Thus, the firm size-related controls again confirm their undisputable importance for disclosure research. All of our controls in the final model have the predicted signs, except for RET and PROF, for which we would have expected positive rather than negative coefficients. Nonetheless, it is not uncommon in the disclosure literature to have unexpected signs and/or insignificant results for the control variables, especially in settings with many control variables (see, e.g., Lang and Lundholm 1993; Gu and Li 2007, or the overview in Wagenhofer and Ewert 2007: 402–403). Especially in our case, we assume extraordinary share price returns and above-average profit margins of smaller firms that have lower trading volumes, compared to blue-chip companies as potential causes for these unexpected signs.

7 Further analyses and robustness checks

In order to exclude possible sources of error regarding the impact of voluntary strategy disclosure, we perform further analyses and robustness checks (see Table 13) beyond ensuring the formal compliance of our models with the

Table 13 Results of further analyses and robustness checks

Model	Criterion	Symbol	CC	BAS	TV
Panel A: overview on original results					
Basis: linear model (OLS)	Determination	R^2 adj.	0.371	0.779	0.846
		F value	(0.000)	(0.000)	(0.000)
	SDS (scores)	Coefficient β	−0.135***	−0.047**	0.077***
		p value	(0.004)	(0.046)	(0.000)
Panel B: additional analyses and robustness checks					
(1a) Incremental effect of SDS #1 (SDS regressed jointly with page count indicator)	Determination	R^2 adj.	0.378***	0.781***	0.861***
		F value	(0.000)	(0.000)	(0.000)
	SDS (scores)	Coefficient β	−0.174***	−0.072***	0.076***
		p value	(0.001)	(0.005)	(0.000)
	MR page (Mgmt. report page count)	Coefficient β	0.085*	−0.016	0.000
		p value	(0.064)	(0.510)	(0.995)
(1b) Incremental effect of SDS #2 (SDS regressed jointly with another disclosure variable)	Determination	R^2 adj.	0.374***	0.779***	0.845***
		F value	(0.000)	(0.000)	(0.000)
	SDS (scores)	Coefficient β	−0.161**	−0.071**	0.077***
		p value	(0.001)	(0.006)	(0.000)
	BAR Net (disclosure metric w/o strategic content	Coefficient β	0.142***	0.039	0.004
		p value	(0.003)	(0.126)	(0.857)
(2) Functional relationship: rank regression (OLS)	Determination	R^2 adj.	0.411***	0.707***	0.829***
		F value	(0.000)	(0.000)	(0.000)
	SDS (ranks)	Coefficient β	−0.155***	−0.074***	0.084***
		p value	(0.000)	(0.004)	(0.000)

Table 13 continued

Model	Criterion	Symbol	CC	BAS	TV
(3) Panel data: fixed effects model (within transformation)	Determination	R^2 adj.	0.192***	0.459***	0.566***
		F value	(0.000)	(0.000)	(0.000)
	SDS (scores)	Coefficient β	−0.144***	−0.113**	0.120***
		p value	(0.004)	(0.014)	(0.002)
(4) Panel data: clustering of sample firms (GLM)	Determination	R^2	0.403***	0.784***	0.849***
		F value	(0.000)	(0.000)	(0.000)
	SDS (scores)	Coefficient B	−0.110***	−0.104	0.436**
		p value	(0.004)	(0.114)	(0.015)
(5) Endogeneity: residual test (Hausman)	Determination	R^2 adj.	0.360***	0.720***	0.846***
		F value	(0.000)	(0.000)	(0.000)
	Residual term	Coefficient β	0.059	0.044	−0.230
		p value	(0.606)	(0.478)	(0.358)

SDS (scores) is the annual disclosure strategy disclosure score; SDS (ranks) represents the fractional rank transformation of SDS (scores). (1a, 1b) CC is the natural logarithm of an implied ex-ante cost of equity capital rate. BAS is the natural logarithm of annual mean average relative bid–ask spreads. TV is the natural logarithm of the aggregated annual monetary trading volume of a firm's shares; MR Page is an indicator of the reporting behavior of a firm, representing the number of pages of annual management reports. BAR Net is an indicator of the overall level of disclosure of firms in the management report. It is based on a total of ∼270 reporting items, excluding information on strategy, covered in the annual report contest "Best Annual Report". For more details, see Appendix 2

(2) Alternative rank regressions compiled after transformation of all variables into fractional ranks in order to stress the hypothesized linear relationships of variables

(3) Fixed effect regressions compiled after transformation of all variables according to the 'within procedure', that is, adjustment of all observations by the mean average of all observations per object over time

(4) Regressions with clustered firms run as general linear models with firms clustered in 100 clusters, each weighted equally

(5) Residual test as proposed by Hausman (1978)

Regression coefficients are standardized. The p values (F values) noted (in parentheses) are for a two-tail test of statistical significance; * (**; ***) indicate statistical significance at the $p < 0.10$ (0.05; 0.01) level

prerequisites of OLS regressions, i.e., absence of multicollinearity, heteroscedasticity and autocorrelation. Applying the relevant test procedures does not indicate any violation of these premises.

As a first robustness check, we analyze the incremental effect of strategy disclosure beyond sheer disclosure quantity, proxied either by the page count of management reports or by a disclosure metric comprising all non-strategic disclosures. In a second analysis, we depart from the hypothesized linear relationship in our model. In a third model, we also explicitly consider the de facto panel structure of our data. Fourthly and finally, we investigate any potential endogeneity of our key variable SDS.

(1) *Incremental effect of SDS*: From our perspective, a major issue is that of assessing the incremental effect of SDS on the cost of equity capital, bid–ask spreads and trading volume. More precisely, we have to rule out our results being simply driven by overall disclosure quantity and/or quality within the other parts of the financial reporting package, which might be correlated with SDS, as firms have been shown to coordinate their reporting avenues (Lang and Lundholm 1993).

We address this issue by first introducing the variable MR Page as a control variable. MR Page represents the total number of pages of management reports, thus indicating a purely quantitative dimension of reporting as a robustness check (Table 13, panel B/model 1a). Second, we proxy overall disclosure quality in the annual report by using the database of the German competition 'Best Annual Report' (Baetge 1992). More specifically, we compile BAR Net as a control variable measuring overall disclosure in the annual report, but excluding all items related to strategy disclosures in the management report (for more details, see "Appendix 7"). BAR Net thus comprises approximately 270 of 300 items surveyed in the 'Best Annual Report' database, representing both broadness, as well as the quality of information provided in a firm's financial reporting package, apart from strategy disclosures (Table 13, panel B/model 1b). The results of both models (1a) and (1b) indicate that even in settings where SDS is regressed jointly with either BAR Net or MR Page to isolate the incremental effect of SDS, the association of strategy disclosure with cost of equity capital (CC), bid–ask spreads (BAS) and trading volumes (TV) holds true. In the case of CC and BAS, it even becomes more pronounced.

However, it is noticeable that both control variables BAR Net and MR Page show unexpected positive signs. Several specific factors may be responsible for these results. The literature generally criticizes MR Page as a measure that does not adequately capture disclosure quality (Beretta and Bozzolan 2008). With respect to BAR Net, the measurement method underlying this score is not stable over time, as items are changed, added or eliminated. Additionally, the BAR Net items not only cover information content in the annual report, but also the way information is presented, e.g.,

with graphical and other layout techniques. Therefore, both control variables are invariably noisy, which may then result in unexpected signs and/or insignificant results with respect to bid–ask spreads and trading volumes.

(2) *Functional relationship:* Panel B (model 2) of Table 13 also provides results of a robustness check regarding the hypothesized linear functional relationship between independent and dependent variables, to ensure that we have not mis-specified our models. As we generally assume linear relations as reflected in panel A, our findings differ from several prior studies which argue that disclosure indices merely produce scores on an ordinal scale and therefore favor rank regressions (Iman and Conover 1979) in order to circumvent the assumption of linear relationships (Lang and Lundholm 1996). However, as explanatory power would inevitably decline when computing ranks for all variables, we conduct rank regressions only as robustness checks (Cooke 1998).

We find that rank regressions support our initial findings, as ranks of SDS consistently turn out to have significant coefficients, retaining the predicted signs after inverting all data in order to make the results comparable. Additionally, the rank regressions achieve determination coefficients similar to original models.

(3) *Panel structure of data*: Beyond stressing the hypothesized linear relationships, we need to explicitly consider the panel structure in our data set resulting from pooling seven data points from 2002 to 2008 for each of the 100 firms into a cross-sectional design. Thus, our results may be subject to dependence of observations in the two dimensions of time and firm heterogeneity. While controlling for time is obviously necessary in a multi-year setting, we consistently control for firm heterogeneity by using individual firm-control variables such as profitability, leverage or firm size, with the latter having proved to be the most relevant (Wagenhofer and Ewert 2007: 399–403).

To capture potential panel effects, we run our models as fixed effects models, additionally using the within transformation of all variables. We assume that firm heterogeneity is constant over time and correlated with the independent variables, so that a fixed effects model is appropriate. The results are presented in Table 13, panel B (model 3) demonstrate that non-observable firm-fixed effects do not influence our original results. Additionally, we run general linear (GLM) regressions while clustering the firms in our sample into 100 clusters, with each cluster containing seven firm-years and again controlling for time effects (Table 13, panel B/model 4). With this procedure, we explicitly refrain from our initial cross-sectional design, but find that the results generally hold true, with the exception that SDS fails to be indisputably significant in the BAS model.

(4) *Potential endogeneity*: As firms may choose their reporting strategy on the basis of given costs and benefits of enhanced reporting, our analysis could also suffer from endogeneity due to self-selection bias (Heckman 1978) which

would yield spurious coefficients (e.g., Fields et al. 2001; Nikolaev and van Lent 2005; van Lent 2007). Although some studies recommend estimating two-equation models using 2SLS, this approach often fails to deliver convincing results (Larcker and Rusticus 2007; or Baetge et al. 2010).
We therefore take some preventive action to avoid endogeneity. Besides using controls that are likely to determine firms' reporting decisions, we made a temporal distinction between the exogenous voluntary strategy disclosure (SDS) in period t and the endogenous capital market reactions CC, BAS and TV in period $t + 1$. Additionally, we apply a version of the Hausman (1978) test to ensure that SDS is an exogenous parameter of our regression models. For each model, we run a regression of SDS on all remaining parameters and include residuals of these routines as an additional variable in the models. If residuals yield coefficients significantly different from zero, then endogeneity would be an issue. However, the results in Table 13 (panel B/model 5) reveal the residual terms not being significant. Thus, we conclude that SDS should be interpreted as exogenous. Additional 2SLS regressions compiled after having regressed SDS on a broad set of variables potentially determining disclosure behavior (Leuz and Verrecchia 2000) confirm the outcome of the Hausman test.

Based on these additional analyses and tests, presented comprehensively in Table 13, we are confident that the results of our models are robust and constitute a solid platform for discussing our findings and drawing key implications in the final section of our paper.

8 Discussion and conclusion

The relationship between firms' voluntary strategy disclosures and the cost of equity capital is a field of considerable interest both in economic theory and in managerial practice. However, due to the qualitative and subjective nature of strategy information, it is not obvious that increased disclosure levels enhance investor decision-making and are therefore associated with a reduced cost of equity capital or other variables, namely bid–ask spreads and trading volumes. Our research sheds light on this matter, revealing that investors do not simply dismiss voluntary strategy disclosures embedded in the management report as a mandatory part of firms' financial reporting package as cheap talk. Instead, we find that, on average, higher levels of voluntary strategy disclosure are associated with a lower cost of equity capital, lower bid–ask spreads and higher trading volumes. Our results thus support the theoretical notion that external investors face a reduced estimation risk in valuing firms and therefore accept lower returns o their investment when provided with useful information on a firm's strategy.

Our results remain stable throughout a number of robustness checks. We ensure the compliance of our models with premises of linear regressions and find no indication that could materially change our results. We are also able to provide

evidence that the cost of capital effect of voluntary strategy disclosure is incremental and not just a spurious correlation without economic substance, e.g., simply resulting from overall disclosure quality.

Even so, some limitations have to be taken into account. First, our study is limited to 700 firm-year observations collected from 2002 to 2008 from German listed firms. In order to increase the generalizability of our results, further avenues of research are suggested. For example, an extended timeline (especially including the crisis years of 2009 and beyond) could yield additional insights into the relevance of strategy disclosures for investor decision-making under different economic conditions. Future research could also address a sample chosen from a broader population of firms, e.g., from all listed firms or even all those preparing a management report, or covering other countries with similar accounting traditions, such as Austria. Another extension of our research could, for example, include the potential (in)stability of levels of voluntary strategy disclosures (Depoers and Jeanjean 2012).

In spite of all our efforts to validate the SDS, our self-constructed measure is still subject to the inherent flaws and drawbacks of such an instrument. Additional insights can also be expected from studying changes in strategy disclosure levels over time and their association with the cost of equity capital. Also, our analysis focuses purely on the impact of information on strategy itself, but did not survey the specific content of information disclosed. Thus, we may expect differences in capital market reactions to strategy disclosures depending on the direction of the particular strategy a given firm discloses.

As a final limitation to our results, we remain cautious in the light of some unexpected signs for some control variables. We can only speculate as to why some relationships turned out to have the opposite signs to what we had expected. Nonetheless, given their nature as controls in highly controlled settings, we strongly believe that their relevance should not be overestimated. However, further research is necessary to enhance our understanding of the overall behavior, as well as the interactions between these control variables.

Nonetheless, a careful reflection of our results yields some useful practical implications. First, the observed association between disclosure levels and cost of equity capital is relevant to managers attempting to increase their firm's market value and/or residual profitability, e.g., before new equity capital is raised (Dhaliwal et al. 2011). Thus, the beneficial cost of equity capital effect might set off potential disadvantages of voluntary strategy disclosures, e.g., proprietary costs resulting from competitors exploiting a firm's strategy disclosures to their own benefit, or simply resulting from the cost of providing a comprehensive strategy report. Voluntary strategy disclosure in the management report can also be considered a means of actively influencing trading volumes or bid–ask spreads as part of an investor relations strategy, e.g., to attract institutional investors (Bushee and Miller 2012). Even though the magnitude of this effect not only depends on the level of strategy disclosure, but also on the revealed nature of a firm's strategy, which has not been addressed in

our analysis, strategy disclosure per se can generally be considered advantageous. This aspect might especially be underestimated in Germany, as the specific institutional setting of a 'code law' country somewhat negatively influences firms' perceptions of the costs and benefits of voluntary strategy disclosure (La Porta et al. 1998, Ball et al. 2000, 2003).

Second, our analysis may also support the future assessment of regulating strategy disclosures in a capital-market oriented framework, which in recent years has already been discussed by standard-setters on various occasions (Gu and Li 2007). One the one hand, both the ASCG, as the German private standard-setter, as well as the IASB, have emphasized the importance of reporting on strategy-related matters in the group management report given the information function of group management reporting and the decision-usefulness of strategy-related reporting elements in the past. On the other hand, until today, neither standard-setters has yet issued any regulations on mandatory strategy reporting. Neither the German GAS 20–Management Report becoming effective in 2013, nor IASB's Practice Statement Management Commentary issued in 2010 provide any regulations on strategy disclosure beyond a concise and non-binding disclosure framework.

Given that our results reveal that strategy disclosures are indeed a relevant source of information for investors, a connection can be made in the literature on voluntary vs. mandatory disclosure. This literature suggests that in some cases not only private benefits, but also positive externalities and thus increasing welfare may result from increased disclosure levels (Dye 1990; Admati and Pfleiderer 2000; Lambert et al. 2007). In the latter case, making such disclosures mandatory should be considered if firms are not motivated otherwise to make voluntary disclosures, e.g., because private costs (in the case of strategy disclosure these would be, for example, proprietary costs from negative competitor interaction or costs of preparing strategy reporting) offset private benefits (e.g., a reduction of the cost of equity capital). Even though our results do neither indicate whether any positive externalities from strategy disclosures exist, nor whether or not they are outweighed by negative consequences, e.g., reducing firms' potential to give separating signals by providing (or not) voluntary information, our analysis at least provides evidence of the relevance of strategy disclosures with respect to investor decision-making. Therefore, further research along these lines can be recommended in order to provide useful arguments for future standard-setting projects addressing the management report/MD&A.

This notion is also supported by the observation that even though the extent of strategy disclosure generally increases over time, the large variation of SDS in our sample between 2002 and 2008 does not indicate that firms in general tend to disclose their strategies comprehensively. In other words, even though firms tend to benefit from high levels of voluntary strategy disclosure, this does not yet lead to an unravelling of strategy information (Grossman 1981; Milgrom 1981)—at least not in our sample of 700 firm-year observations.

Finally, it seems to be relevant that our results were obtained under the specific setting of German accounting regulations, which, in contrast to the IFRS, requires management reports as a mandatory part of the firm's audited financial reporting package. Accordingly, our results also confirm the warnings of Benston et al. (2006) with regard to a single global set of accounting standards which would leave no discretionary freedom for standard-setters and thus, no playing-field for diverging and competing accounting solutions as a rich source of innovation in financial accounting and reporting.

9 Executive summary

Why should firms share information on business strategy with investors? Even though strategy information is per se supposed to be relevant for investor decision-making, it is usually not verifiable. Therefore, such information might be dubbed as mere 'cheap talk' and consequently be ignored by investors. Additionally, firms might refrain from voluntarily disclosing strategy information in order to keep competitors sufficiently in the dark on any aspired course of action.

It is therefore debatable whether voluntary strategy disclosures really have a beneficial impact on the cost of equity capital. To shed light on this issue, our paper empirically investigates a sample of German listed firms from 2002 to 2008. We first identify the level of voluntary strategy disclosure in firms' management reports as a part of the mandatory financial reporting package. We use a hand-collected index to measure firm-specific strategy disclosure scores (SDS) and then relate these scores to the implied cost of equity capital, using OLS regression analysis.

Our findings indicate that higher levels of voluntary strategy disclosure are on average associated with a lower cost of equity capital, higher trading volumes and lower bid–ask spreads, even after controlling for overall disclosure quality. There are two major contributions from our results. First, firms seem to be better off considering the cost of equity capital, trading volumes and bid–ask spreads, when they provide rather more than less information on their strategy. Therefore, firms should carefully assess their decisions on the level of voluntary strategy disclosures in the context of investor relations. Second, our analysis contributes to the standard-setting debate insofar as—beyond the above-mentioned private benefits—our results can be regarded as a first step towards identifying social welfare effects which may result, for instance, if voluntary disclosure not only reduce a firm's individual CAPM beta, but also the market-risk premium itself.

Acknowledgments The authors have benefited substantially from comments by Nina Franzen, Martin Glaum, Thorsten Sellhorn, two anonymous reviewers, and participants of the VHB Annual Conference 2012 at the Free University of Bozen, especially Wolfgang Ballwieser, Jürgen Ernstberger, Roland Königsgruber, and Christoph Kuhner.

Appendix 1: Regulation on management reporting/MD&A with respect to strategy disclosure in Germany

According to German GAAP, German firms must complement their financial statements with a management report providing information related to the firm's future prospects which is potentially of great interest to investors (par. 289 and 315 HGB). The HGB (Handelsgesetzbuch) represents the legal core of the German GAAP and contains the requirement for firms to provide a management report in the financial statements. For example, a firm's management report must fairly present the firm's operations, including the operating results and business conditions. Furthermore, it must 'assess and explain the company's probable future development together with all associated material risks and opportunities'. Firms must also provide details of their financial and risk management, as well as with respect to their research and development activities.

Moreover, par. 315a HGB requires that even capital-market-oriented German firms that are subject to the EU Regulation 1606/2002 and consequently prepare their group financial statements according to IFRS, still have to provide a group management report based on the above-mentioned German GAAP.

In addition to the HGB regulations, the ASCG (or DRSC, i.e., Deutsches Rechnungslegungs Standards Committee) has developed recommendations for the application of par. 315 HGB. GAS 15—Management Reporting was issued in 2004 and will be superseded by GAS 20 from 2013 onwards. As our sampling period runs from 2002 to 2008, GAS 15 is the relevant standard for our analysis. Yet, neither par. 315 HGB nor GAS 15 (nor any other regulation in German GAAP, including the new GAS 20) require firms to provide any strategy disclosures. Therefore, German firms that publish strategic information in the management report, do so entirely on a voluntary basis.

Under IFRS, there is also no requirement to provide strategy information. Firms that provide a management report under IFRS may (but are not obliged to do so) adhere to the Practice Statement Management Commentary that was issued only in 2010, after our sampling period.

Appendix 2: Explanation of variables and data sources

See Table 14.

Appendix 3: Qualitative sample structure

See Table 15.

Table 14 Explanation of variables and data sources

Variable		Definition	Source
SDS	(2002–08)	Strategy disclosure scores derived applying our strategy disclosure scorecard on the basis of 40 reporting items	Management reports of firms
BAR	(2002–08)	Strategy disclosure scores (SDS) derived from approx. 30 items of the 'Best Annual Report' questionnaire (out of approx. 300 items)	Database 'Best Annual Report'
CC	(2002–09)	Implied cost of equity capital rate, computed using a residual income model	Datastream, I/B/E/S
BAS	(2002–09)	Annual mean average bid–ask spread, computed on the basis of daily relative bid–ask spreads, absolute spreads scaled by bid	Datastream
TV	(2002–09)	Natural logarithm of a firm's aggregated annual monetary trading volume, aggregated volume from FSE and Xetra	Datastream
PROF	(2002–08)	Factor indicating a firm's profitability consisting of three margin figures: EBITDA, EBIT, and net income margin	Worldscope
LEV	(2002–08)	Leverage of a firm, computed as a factor of four elements, relative to a firm's assets: debt, LT debt, net debt, and debt over equity	Worldscope
IFF	(2002–08)	Inverse free float, ratio of firm's share capital not actively traded or held by major stakeholders	Worldscope, German BaFin
NAF	(2002–09)	Annual mean average number of analysts following a firm	I/B/E/S
MV	(2002–08)	External indicator of firm size, natural logarithm of market value of total equity at the end of each calendar year	Datastream
RET	(2002–08)	Annual share price return	Datastream
BETA	(2002–09)	Market beta of a firm, indicator of systematic risk	Datastream
VOLA	(2002–09)	Annual relative volatility of a firm's share price, i.e., average annual price movement to a high and low from a mean for each year	Datastream
INDEX	(2002–08)	Separation into four key indices: Dax, MDax, TecDax, SDax	Dt. Börse
INDUSTRY	(2002–08)	Separation into eight industry clusters	Dt. Börse
FIRM AGE	(2002–08)	Separation into four age classes (quartile based)	Worldscope
STANDARD	(2002–08)	Application of international accounting standards (IFRS, US-GAAP)	Annual reports
BIG4	(2002–08)	Audit of annual reports by Big-Four auditing firm	Annual reports

Table 14 continued

Variable		Definition	Source
LIST	(2002–08)	Cross-listing at NYSE	NYSE
YEAR	(2002–08)	Disclosure period of voluntary strategy reporting	Annual reports
BAR Net	(2002–08)	Disclosure scores for quality of financial reporting, excluding quality of strategy disclosure (approx. 270 items out of 300)	Database 'Best Annual Report'
MR Page	(2002–08)	Page count of management report	Annual reports
REV	(2002–08)	Total revenue for fiscal year	Annual reports
EMPL	(2002–08)	Average number of employees for fiscal year	Annual reports
ASSETS	(2002–08)	Book value of total assets at the end of each fiscal year	Annual reports

Table 15 Qualitative sample structure

Industry sector (According to sector logic of Deutsche Börse AG)	Population (*N*)				Sample (*n*)		
	Incl. FIRE		W/o FIRE		Structure		Vs. *N*
	#	in %	#	in %	#	in %	in %
Panel A: analysis of industry sector structure of population and sample							
1 Basic materials	14	8.8	14	10.4	9	9.0	64
2 Consumer goods	18	11.3	18	13.4	18	18.0	100
3 Consumer services	13	8.1	13	9.7	9	9.0	69
4 Financial, insurance, real estate industries	26	16.3	0	0.0	0	0.0	–
5 Industrials	59	36.9	59	44.0	39	39.0	66
6 Info. technology	10	6.3	10	7.5	9	9.0	90
7 Pharma, healthcare	14	8.8	14	10.4	11	11.0	79
8 Telecommunication	3	1.9	3	2.2	2	2.0	67
9 Utilities	3	1.9	3	2.2	3	3.0	100
Total	160	100	134	100	100	100 %	75
					Chi^2	0.960	

Selection index	Population (*N*)				Sample (*n*)		
Panel B: analysis of index structure of population and sample							
HDax							
Dax	30	18.8	24	17.9	24	24.0	100 %
MDax	50	31.3	44	32.8	30	30.0	68 %
TecDax	30	18.8	30	22.4	19	19.0	63 %
SDax	50	31.3	36	26.9	27	27.0	75 %
Total	160	100 %	134	100 %	100	100 %	75 %
					Chi^2	0.683	

Appendix 4: Criteria catalogue underlying the measurement of SDS

See Table 16.

Table 16 Criteria catalogue underlying the measurement of SDS

Strategy disclosure items				No. of items	
Category		Sub-category		Sub-category	
Strategic analysis					
Corporate environment	I	1	Political/social/legal environment	2	6 (15 % of 40 items)
			Relevant environment of corporation		
			Status and assumptions on future development		
		2	Macro-economic environment	2	
			Relevant macro-economic environment of corporation		
			Status and assumptions on future development		
		3	Strategic position of corporation	2	
			Overall economic situation of corporation		
			Portfolio structure, overview of businesses		
Business environment	II	1	Market environment	5	14 (35 %)
			Relevant market addressed by business		
			Quantification of current market volume/market split		
			Status and assumptions on future development		
			Consolidation of key development trends		
			Quantification of future market development		
		2	Competitive environment	5	
			Relevant competitive environment/key competitors		
			Quantification of competition setup (market shares)		
			Competitive situation in respective market		
			Key success factors		
			Assumption on future development of competition		
		3	Strategic position of business	4	
			Financial position of business		
			Position of business in the market (comp. advantage)		
			Key competencies relevant for market success		
			Key internal resources as a basis for competencies		

Table 16 continued

Strategy disclosure items				No. of items	
Category		Sub-category		Sub-category	
Strategy definition and detailing					
Corporate strategy	III	1	Overall strategic orientation	2	5 (12.5 %)
			Vision of corporation		
			Mission statement		
		2	Strategic goals of corporation	3	
			Overall strategic development objectives		
			Quantification of long-term revenue objectives		
			Quantification of long-term profitability objectives		
Business strategy	IV	1	Strategic goals of business	3	10 (25 %)
			Overall strategic development objectives		
			Quantification of long-term revenue objectives		
			Quantification of long-term profitability objectives		
		2	Details on business strategy	7	
			Strategic position of business/differentiation factors		
			Key strategic markets in status quo		
			Markets for future growth		
			Key strategic products/services in status quo		
			Products/services for future growth		
			Key investment programs to achieve strategic objectives		
			Underlying value creation strategy		
Strategy implementation	V	1	Communication to/motivation of staff	2	5 (12.5 %)
			Availability/description of firm-wide management system		
			Reflection of strategic objectives in incentive systems		
		2	Realization of strategy	3	
			Condensed formulation of strategy for communication		
			Key implementation programs running/setup		
			Status of ongoing strategic programs and update on achievability of objectives		
Sum					40 (100 %)

Appendix 5: Robustness check using weights in SDS

Whether or not the 40 (35) items that we identified as representing a comprehensive and systematic strategy disclosure, should be equally weighted or not, is a key issue. Spero (1979) as well as Meek et al. (1995) recommend equally weighted items so as to avoid subjectivity. This advice is in line with the bulk of the disclosure literature (Gray et al. 1995; Hossain et al. 1995; Botosan 1997; Hail 2002; Vanstraelen et al.

2003; or Lapointe-Antunes et al. 2006). Following this literature, we have therefore decided not to adjust weights for some items for the following reasons:

First, there is no sound theoretical or empirical basis from which we could reliably derive such weights. Second, firms rather seem to choose one 'reporting strategy' and consistently pursue it across all reporting channels and information aspects, so that the specific weight of each individual item is not fundamental. As Lapointe-Antunes et al. (2006: 466) point out, "*… a measure of disclosure level produced by examining any one aspect of corporate reporting could proxy for the general level of disclosure provided by a firm"*. Therefore, we postulate that strategy reporting needs to comprise all categories defined together, as strategy needs to be considered in a holistic fashion in order to satisfy the information requirements of investors. Thus, we assume that our results will not change materially by changing the weights of either individual items or entire categories in SDS. This is already justified by the correlation analysis of the sub-scores of SDS presented in Table 5 in the main body of our paper.

To explore this issue further, we have repeated our main analyses with modified SDS in which the implementation items (i.e., relating to communication, motivation and strategy realization) were weighted double relative to all other items. The results are reported below (with the first two lines giving the results of our three measurement models as reported, whereas the last two lines show the results after using doubly-weighted implementation items). As can be seen, the results do not change materially (Table 17).

Table 17 Comparison of model results

Model	Criterion	Symbol	CC	BAS	TV
Models as reported	Determination	R^2 adj.	0.371	0.779	0.846
		F value	(0.000)	(0.000)	(0.000)
	SDS	Coefficient β	−0.134***	−0.047**	0.077***
		p value	(0.004)	(0.046)	(0.000)
Double-weight implementation items in SDS	Determination	R^2 adj.	0.370	0.672	0.845
		F value	(0.000)	(0.000)	(0.000)
	SDS (double)	Coefficient β	−0.129***	−0.119***	0.075***
		p value	(0.006)	(0.000)	(0.000)

SDS is the annual strategy disclosure score. SDS (double) is the annual strategy disclosure score calculated with double weights on implementation items. CC is the natural logarithm of an implied ex-ante cost of equity capital rate. BAS is the natural logarithm of annual mean average relative bid–ask spreads. TV is the natural logarithm of the aggregated annual monetary trading volume of a firm's shares

Regression coefficients are standardized. The p values (F values) noted (in parentheses) are for a two-tail test of statistical significance; * (**; ***) indicate statistical significance at the $p < 0.10$ (0.05; 0.01) level

Appendix 6: SDS measurement results for our sample of 700 firm-years

See Table 18.

Table 18 *SDS measurement results for our sample of 700 firm-years*

Strategy disclosure scores													
[Standardized, {0;1}]	2002		2003	2004	2005	2006	2007	2008	YoY Change				
Adidas	0.23	0.35	0.28	0.38	0.60	0.65	0.55	+	−	+	+	+	−
Aixtron	0.20	0.20	0.23	0.29	0.34	0.37	0.43	=	+	+	+	+	+
Arcandor	0.45	0.50	0.45	0.45	0.30	0.28	0.18	+	−	=	−	−	−
Aurubis	0.45	0.48	0.48	0.48	0.63	0.45	0.45	+	=	=	+	−	=
Axel Springer	0.30	0.20	0.30	0.25	0.33	0.40	0.58	−	+	−	+	+	+
BASF	0.43	0.48	0.53	0.53	0.55	0.68	0.48	+	+	=	+	+	−
Bayer	0.35	0.48	0.48	0.48	0.55	0.60	0.50	+	=	=	+	+	−
BayWa	0.18	0.15	0.18	0.20	0.20	0.18	0.33	−	+	+	=	−	+
Bechtle	0.15	0.15	0.20	0.25	0.23	0.40	0.33	=	+	+	−	+	−
Beiersdorf	0.28	0.25	0.23	0.30	0.33	0.35	0.35	−	−	+	+	+	=
Bertrandt	0.08	0.18	0.15	0.15	0.23	0.18	0.15	+	−	=	+	−	−
Bilfinger Berger	0.13	0.25	0.30	0.35	0.40	0.43	0.40	+	+	+	+	+	−
Biotest	0.15	0.18	0.23	0.35	0.35	0.43	0.40	+	+	+	=	+	−
BMW	0.18	0.25	0.23	0.28	0.20	0.30	0.23	+	−	+	−	+	−
Carl Zeiss Meditec	0.20	0.23	0.23	0.25	0.33	0.25	0.28	+	=	+	+	−	+
Celesio	0.18	0.15	0.28	0.20	0.30	0.35	0.38	−	+	−	+	+	+
Centrotec Sustainable	0.28	0.38	0.38	0.35	0.58	0.60	0.63	+	=	−	+	+	+
CeWe Color Holding	0.30	0.28	0.23	0.20	0.20	0.30	0.30	−	−	−	=	+	=
Continental	0.25	0.25	0.28	0.58	0.50	0.60	0.55	=	+	+	−	+	−
CTS Eventim	0.23	0.13	0.18	0.18	0.20	0.15	0.15	−	+	=	+	−	=
Curanum	0.31	0.31	0.31	0.34	0.37	0.34	0.34	=	=	+	+	−	=
Daimler	0.63	0.45	0.43	0.55	0.58	0.60	0.55	−	−	+	+	+	−
Deutsche Lufthansa	0.33	0.38	0.28	0.38	0.43	0.73	0.70	+	−	+	+	+	−
Deutsche Post	0.55	0.53	0.55	0.55	0.63	0.75	0.73	−	+	=	+	+	−
Deutsche Telekom	0.43	0.48	0.53	0.55	0.50	0.63	0.63	+	+	+	−	+	=
Deutz	0.25	0.23	0.25	0.28	0.45	0.48	0.43	−	+	+	+	+	−
Douglas Holding	0.18	0.18	0.23	0.30	0.35	0.35	0.33	=	+	+	+	=	−
Drägerwerk	0.28	0.35	0.30	0.33	0.35	0.40	0.33	+	−	+	+	+	−
Dürr	0.25	0.25	0.23	0.20	0.28	0.45	0.43	=	−	−	+	+	−
Dyckerhoff	0.28	0.25	0.25	0.30	0.30	0.28	0.28	−	=	+	=	−	=
E.On	0.38	0.30	0.43	0.53	0.50	0.53	0.53	−	+	+	−	+	=
Elexis	0.25	0.28	0.25	0.28	0.23	0.25	0.25	+	−	+	−	+	=
ElringKlinger	0.25	0.35	0.25	0.30	0.35	0.30	0.28	+	−	+	+	−	−
Escada	0.28	0.20	0.20	0.23	0.38	0.35	0.25	−	=	+	+	−	−
Fielmann	0.37	0.40	0.34	0.37	0.40	0.43	0.34	+	−	+	+	+	−

Table 18 continued

Strategy disclosure scores													
[Standardized, {0;1}]	2002		2003	2004	2005	2006	2007	2008	YoY Change				
Fraport	0.28	0.28	0.38	0.48	0.48	0.55	0.55	=	+	+	=	+	=
Fresenius Med. Care	0.53	0.53	0.55	0.58	0.75	0.83	0.83	=	+	+	+	+	=
Fresenius	0.23	0.23	0.20	0.30	0.28	0.35	0.30	=	−	+	−	+	−
Fuchs Petrolub	0.23	0.20	0.14	0.29	0.34	0.34	0.31	−	−	+	+	=	−
GEA Group	0.38	0.35	0.33	0.28	0.28	0.30	0.28	−	−	−	=	+	−
Gerry Weber	0.23	0.23	0.23	0.34	0.29	0.34	0.29	=	=	+	−	+	−
Gesco	0.08	0.13	0.15	0.18	0.18	0.20	0.13	+	+	+	=	+	−
GfK	0.30	0.30	0.38	0.53	0.43	0.43	0.38	=	+	+	−	=	−
Gildemeister	0.30	0.33	0.33	0.35	0.50	0.53	0.45	+	=	+	+	+	−
Grammer	0.20	0.18	0.23	0.15	0.25	0.23	0.18	−	+	−	+	−	−
H & R Wasag	0.15	0.25	0.33	0.35	0.38	0.50	0.45	+	+	+	+	+	−
HeidelbergCement	0.38	0.33	0.25	0.35	0.28	0.28	0.28	−	−	+	−	=	=
Heideldruck	0.35	0.43	0.38	0.50	0.45	0.45	0.45	+	−	+	−	=	=
Henkel	0.33	0.35	0.35	0.40	0.48	0.48	0.48	+	=	+	+	=	=
Hochtief	0.33	0.35	0.45	0.53	0.50	0.50	0.43	+	+	+	−	=	−
Hugo Boss	0.18	0.18	0.20	0.23	0.23	0.25	0.33	=	+	+	=	+	+
IDS Scheer	0.23	0.28	0.23	0.28	0.33	0.38	0.25	+	−	+	+	+	−
Infineon Technologies	0.38	0.38	0.30	0.30	0.35	0.40	0.28	=	−	=	+	+	−
Jenoptik	0.35	0.35	0.38	0.43	0.45	0.50	0.48	=	+	+	+	+	−
Jungheinrich	0.23	0.20	0.17	0.23	0.20	0.29	0.26	−	−	+	−	+	−
K + S	0.38	0.45	0.40	0.53	0.53	0.53	0.50	+	−	+	=	=	−
Koenig & Bauer	0.10	0.18	0.15	0.23	0.23	0.25	0.20	+	−	+	=	+	−
Kontron	0.31	0.26	0.23	0.20	0.23	0.26	0.26	−	−	−	+	+	=
Krones	0.40	0.38	0.38	0.35	0.35	0.40	0.33	−	=	−	=	+	−
Kuka	0.30	0.30	0.33	0.40	0.38	0.58	0.45	=	+	+	−	+	−
KWS Saat	0.15	0.15	0.18	0.18	0.15	0.15	0.20	=	+	=	−	=	+
Leoni	0.23	0.20	0.33	0.35	0.35	0.45	0.40	−	+	+	=	+	−
Linde	0.33	0.35	0.35	0.33	0.33	0.38	0.38	+	=	−	=	+	=
Loewe	0.37	0.37	0.34	0.34	0.31	0.34	0.31	=	−	=	−	+	−
MAN	0.20	0.20	0.25	0.35	0.45	0.43	0.38	=	+	+	+	−	−
MediGene	0.33	0.33	0.30	0.30	0.33	0.30	0.30	=	−	=	+	−	=
Medion	0.30	0.35	0.35	0.30	0.33	0.33	0.33	+	=	−	+	=	=
Merck	0.30	0.35	0.35	0.38	0.43	0.43	0.33	+	=	+	+	=	−
Metro	0.25	0.30	0.30	0.40	0.40	0.38	0.38	+	=	+	=	−	=
MorphoSys	0.33	0.30	0.33	0.43	0.48	0.53	0.53	−	+	+	+	+	=
MVV Energie	0.28	0.30	0.30	0.38	0.38	0.38	0.38	+	=	+	=	=	=
Nordex	0.29	0.26	0.29	0.29	0.31	0.37	0.37	−	+	=	+	+	=
Pfeiffer Vacuum	0.20	0.23	0.20	0.23	0.20	0.29	0.29	+	−	+	−	+	=
Pfleiderer	0.45	0.48	0.48	0.40	0.58	0.50	0.48	+	=	−	+	−	−
ProSiebenSat.1 Media	0.30	0.33	0.35	0.40	0.43	0.45	0.40	+	+	+	+	+	−

Table 18 continued

Strategy disclosure scores													
[Standardized, {0;1}]	2002		2003	2004	2005	2006	2007	2008	YoY Change				
Puma	0.23	0.26	0.29	0.43	0.37	0.34	0.31	+	+	+	−	−	−
QSC	0.26	0.29	0.29	0.34	0.37	0.40	0.40	+	=	+	+	+	=
Rational	0.29	0.34	0.37	0.37	0.40	0.40	0.34	+	+	=	+	=	−
Rheinmetall	0.28	0.28	0.30	0.33	0.35	0.33	0.28	=	+	+	+	−	−
Rhön-Klinikum	0.14	0.14	0.17	0.17	0.23	0.23	0.23	=	+	=	+	=	=
RWE	0.28	0.18	0.33	0.40	0.45	0.55	0.55	−	+	+	+	+	=
Salzgitter	0.20	0.20	0.23	0.25	0.40	0.40	0.38	=	+	+	+	=	−
SAP	0.28	0.35	0.38	0.43	0.45	0.50	0.40	+	+	+	+	+	−
SGL Carbon	0.20	0.23	0.23	0.23	0.33	0.48	0.48	+	=	=	+	+	=
Siemens	0.13	0.15	0.18	0.20	0.28	0.40	0.48	+	+	+	+	+	+
Singulus Tech	0.37	0.43	0.40	0.29	0.26	0.29	0.26	+	−	−	−	+	−
Sixt	0.23	0.25	0.30	0.30	0.38	0.43	0.38	+	+	=	+	+	−
Software	0.20	0.23	0.33	0.33	0.50	0.55	0.50	+	+	=	+	+	−
SolarWorld	0.30	0.28	0.38	0.48	0.58	0.68	0.65	−	+	+	+	+	−
Solon	0.23	0.23	0.23	0.26	0.30	0.35	0.28	=	=	+	+	+	−
Stada Arzneimittel	0.35	0.35	0.35	0.38	0.38	0.40	0.38	=	=	+	=	+	−
Südzucker	0.13	0.15	0.20	0.23	0.25	0.28	0.23	+	+	+	+	+	−
Takkt	0.18	0.20	0.20	0.20	0.28	0.30	0.25	+	=	=	+	+	−
ThyssenKrupp	0.30	0.30	0.35	0.35	0.48	0.53	0.48	=	+	=	+	+	−
TUI	0.25	0.28	0.25	0.43	0.43	0.40	0.33	+	−	+	=	−	−
United Internet	0.35	0.45	0.43	0.43	0.40	0.40	0.40	+	−	=	−	=	=
VBH Holding	0.11	0.11	0.14	0.14	0.14	0.20	0.17	=	+	=	=	+	−
Volkswagen	0.30	0.33	0.33	0.30	0.40	0.45	0.45	+	=	−	+	+	=
Vossloh	0.35	0.35	0.28	0.33	0.33	0.40	0.40	=	−	+	=	+	=
Wirecard	0.03	0.06	0.11	0.14	0.26	0.43	0.43	+	+	+	+	+	=

Appendix 7: Validation of SDS with BAR scores

One way in which we validate our measures SDS is by computing the correlation with another measure of strategy disclosure. If both measures are valid, we should observe a positive correlation between the two scores. As there are no viable archival data on strategy disclosure for our sample of firm-years in Germany, we construct such an alternative measure by using data collected from the yearly German annual report competition 'Best Annual Report' (BAR).

In this competition, annual reports of listed firms are subject to a comprehensive content analysis based on more than 300 items referring to the overall annual financial reporting package of German listed firms (Baetge 1992). The checklist used in the annual report competition has been compiled and continuously developed since the middle of the 1990s, on the basis of several empirical surveys

Table 19 Validity of strategy disclosure scores

Correlation analysis of strategy disclosure and validation scores (Best Annual Report)						
			1	2	3	4
1	SDS (scores)	($n = 700$)		−0.911*** (0.000)	0.560*** (0.000)	−0.542*** (0.000)
2	SDS (ranks)	($n = 700$)	−0.877*** (0.000)		−0.549*** (0.000)	0.565*** (0.000)
3	BAR (scores)	($n = 625$)	0.586*** (0.000)	−0.548*** (0.000)		−0.983*** (0.000)
4	BAR (ranks)	($n = 625$)	−0.547*** (0.000)	0.560*** (0.000)	−0.943*** (0.000)	

SDS is the annual strategy disclosure score. BAR is the overall company disclosure score representing disclosure on strategic aspects surveyed during the German annual report contest. SDS (BAR) ranks represent fractional ranks computed on the basis of SDS (BAR)

The numbers below the diagonal represent Pearson's correlation coefficients and those above the diagonal, Spearman's rank correlation coefficients

The p values (F values) noted (in parentheses) are for a two-tail test of statistical significance; * (**; ***) indicate statistical significance at the $p < 0.10$ (0.05; 0.01) level

involving fund managers and financial analysts and is thus based on empirical data (e.g., Prigge 2006).

As there is no sub-score for strategy disclosure in the original 'Best Annual Report' database, we identified 30 items generally related to strategy disclosure in the management report in order to calculate alternative strategy disclosure scores which we refer to as 'BAR scores'. As these BAR scores generally reflect the same information as the SDS, both should yield strong statistical associations (Table 19).

This notion is supported by the table above, for both correlating scores and ranks, the latter again as a robustness check. For example, Spearman's rank correlation coefficient of SDS and BAR scores is 0.560 at a 1 percent level of significance (two-tailed).

Even though the BAR scores are appropriate as a validation instrument, we regard them as too noisy and therefore unsuitable for our original analysis in the main body of our paper, for several reasons. First, the 'Best Annual Report' database measures issues of strategy disclosure only indirectly and therefore not systematically and comprehensively. Second, the underlying construction methodology of BAR has been subject to several changes in measurement over time and scores awarded at different points in time may thus not indicate the same information content. Third, BAR scores are not available for all firm-year observations in our sample.

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