

Corporate reputation and the future cost of equity

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Abstract Corporate reputation is an important management objective, bearing the potential to create sustainable competitive advantage, and many scholars have studied its impact on firm performance. However, its effect on the cost of equity has only recently begun to attract the attention of academic research. Empirical evidence is scarce, and the results are inconclusive. Applying a validated measure of reputation, we scrutinize its impact for a set of German blue-chip companies between 2005 and 2011. We show that higher levels of reputation are associated with a lower future cost of equity. While reputation improvements are not followed by a measurable short-term effect, reputational damages lead to a significant increase in the future cost of equity within 6 months. We interpret our findings against the backdrop of the previous studies, offering several explanations for diverging results.

Keywords Corporate reputation · Corporate risk · Cost of equity · Information asymmetry · Reputational damages · Intangible assets

JEL Classification G32 · M14 · D83

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1 Motivation

In the past two decades, the exploration of the quantifiable effects of intangible assets on firm performance has become one of the top priorities in marketing and management research (e.g., Marketing Science Institute 2006, 2008). Corporate reputation, defined as the knowledge and emotions held by individuals about a company (Hall 1992), has moved to the center of attention, with numerous studies attempting to assess its impact on measures of financial success, thus justifying companies' efforts to dedicate resources towards systematic reputation management. Today, reputation is considered a key marketing metric for maintaining and enhancing companies' competitiveness in the globalized economy (Hanssens et al. 2009; Raithel and Schwaiger 2015; Sarstedt et al. 2013; Wang et al. 2016). Thus, it is a highly relevant performance indicator for firms' top management, as outlined by Wall Street icon Warren Buffet in his biennial memo directed at *Berkshire Hathaway's* top managers (and picked up avidly by the business press): "We can afford to lose money – even a lot of money. But we can't afford to lose reputation – even a shred of reputation" (The Wall Street Journal 2014).

While there is ample research on the effects of reputation on stakeholder behavior (for an overview see, e.g., Schwaiger and Raithel 2014; Yoon et al. 1993) as well as on net income and share price (e.g., Raithel and Schwaiger 2015; Tischer and Hildebrandt 2014), little evidence is provided on its "airbag" function. Some authors suggest non-monetary benefits of reputation (e.g., Frieden and Wielenberg 2017), and frequently a reduced risk of litigation is claimed for well-reputed companies (e.g., Chen et al. 2009; Koh et al. 2014; Li et al. 2013). If this was true, we might expect a good reputation being reflected in a lower corporate risk. The cost of equity is a risk proxy we may refer to. It constitutes the basis for investment decisions, thus playing a vital role in the creation and preservation of strategic competitive advantages. Given that cost of equity was said to be "perhaps the single most important number in financial economics" (Welch 2000: 501), we are surprised that this potential consequence of a good reputation has been widely neglected in academic research to date. We intend to close this gap and define the cost of equity as the required rate of return given the market's perception of the firm's riskiness, thus reflecting investors' expectations about future returns (Daske et al. 2006; El Ghoul et al. 2011).

In this paper, we build on three studies that have to date addressed the link between corporate reputation and the cost of equity and that have produced inconclusive results. Smith et al. (2010) provide initial evidence of a negative association between the two variables. However, their methodological approach falls short of adequately controlling for the influence of firm performance, which threatens the validity of their results due to the endogeneity effect between firm performance and reputation (Raithel and Schwaiger 2015). Cao et al. (2015) report a negative effect of corporate reputation on the cost of equity, whereas Himme and Fischer (2014) do not find statistically significant evidence for the hypothesized relationship. While we support these authors' main arguments and adopt some of their hypotheses, our aim is to advance the emerging stream of research by tackling

potential weaknesses and shortcomings of prior publications to clarify the role of corporate reputation in explaining the cost of equity. In particular, we provide an alternative to their use of *Fortune*'s reputation ranking of *America's Most Admired Companies* (AMAC), a jury vote that has been heavily criticized not only for its financial halo (e.g., Brown and Perry 1994; Fryxell and Wang 1994) but also for its narrow focus in terms of both the reputation construct itself and the surveyed subjects. In our study, we introduce a validated reputation measure based on stakeholder surveys (Raithel and Schwaiger 2015). Furthermore, we highlight the need to allow for a time lag between measuring the focal variables, as opposed to the simultaneous assessment in prior studies. This seems the more advisable as (external) stakeholders may take some time to factor in changes in a firm's reputation.

Finally, we extend prior findings using data from outside the U.S., which not only adds a European perspective to extant knowledge, but also reduces the risk that observed effects of corporate reputation have to be attributed to particularities of the US stock market (in terms of regulation, securitization, or specific incidents such as the *ENRON* scandal).

2 Theoretical background

2.1 State of research

First of all, we acknowledge that there is a long list of academic studies dealing with the relationship between corporate reputation and finance (e.g., Diamond 1989; Siegel 2005; El Ghouli et al. 2011; Luo et al. 2014, just to name a few). The big difference we see comparing this to our paper is that in the studies mentioned reputation helps to explain expected or derived effects, but either reputation is not measured in accordance with more recent conceptualizations (e.g., Siegel 2005 proxies reputation using a firm's age) or it is not quantified at all as in Diamond's work (Diamond 1989). In our view, those papers take over the microeconomics-based understanding of reputation concentrating on firm's past behavior, neglecting that reputation as conceptualized in the present study is built on the perception of facts rather than the facts themselves. Other papers look at reputation-related constructs such as Corporate Social Responsibility (e.g., El Ghouli et al. 2011; Luo et al. 2014) and evaluate CSR's impact on key performance indicators and corporate risk. Knowing that corporate reputation is not only driven by CSR, but also by constructs such as quality, performance, and attractiveness (Schwaiger 2004), we think that the isolated scrutiny of CSR may be responsible for the heterogeneous findings (see Surroca et al. 2010 or Preston and O'Bannon 1997). Therefore, we focus our literature review on studies using common reputation measures and linking them to risk metrics.

Smith et al. (2010) suggest that reputable firms enjoy a market value premium associated with better financial performance and a lower cost of capital. They conduct *t* tests to compare firms listed in the AMAC ranking between 2002 and 2004 with a sample of non-AMAC firms matched with regard to risk metrics (e.g.,

market beta and stock price volatility). The AMAC list is published annually by *Fortune* magazine and ranks about 300 mainly U.S.-based companies from the *Fortune 1000* according to the ratings of nine attributes¹ administered to industry experts. Smith et al. (2010) demonstrate that AMAC list firms outperform non-list firms in terms of systematic risk.² While this finding provides initial evidence of a relationship between reputation and the cost of equity, thus offering a valuable starting point for further research, the suitability of the methodological approach is questionable. Specifically, the pooling of data represents a potential source of econometric problems such as serial correlation between observations of the same firm, and the influence of other drivers of the cost of equity is only inadequately controlled for by the matching procedure.

Himme and Fischer (2014) raise the issue of interdependencies between three different non-financial metrics and test their influence on capital costs. They hypothesize direct effects of customer satisfaction, corporate reputation, and brand value on firms' cost of equity and cost of debt, as well as moderating roles of reputation and brand value in the relationship between customer satisfaction and both components of the cost of capital. The authors' principal argument is that non-financial metrics contain information about a firm's past and future performance going beyond that conveyed by primary information sources (e.g., financial indicators disclosed by the company or analyst recommendations). Therefore, they should be value-relevant to investors. Hence, high levels of and improvements in these metrics are deemed to possess the potential to lower firms' financing costs. The authors expect that customer satisfaction is the strongest driver of the cost of capital, because it represents the closest link between customers (thus, revenues) and the firm. Consequently, next to the direct effects of all three market-based assets, they hypothesize amplifying effects of a high reputation and brand value on the relationship between customer satisfaction and the cost of equity and debt, respectively, proxied by market beta and yield spreads. Himme and Fischer's (2014) rationale is that corporate reputation provides a signal for sound future performance to investors that adds to the value of information about the past transactions with the firm, mirrored by customer satisfaction. However, their empirical findings about AMAC list firms between 1991 and 2006 only partially support these expectations. While the authors report a strong association between customer satisfaction and the cost of debt along with significant main and interaction effects of reputation and brand value, they observe that only customer satisfaction is significantly and negatively related to the cost of equity.

In contrast to Himme and Fischer's (2014) framework of three interrelated market-based assets, Cao et al. (2015) analyze the single impact of corporate reputation on the cost of equity. They argue that reputation, alternatively measured by the mere inclusion in the AMAC list and the mean AMAC score, represents an

¹ Currently, these attributes are: (1) management quality, (2) quality of products or services offered, (3) innovativeness, (4) value as a long-term investment, (5) soundness of financial position, (6) ability to attract, develop, and retain talent, (7) community responsibility, (8) wise use of corporate assets, and (9) effectiveness in conducting a global business (Fortune 2015). Each item is rated on a ten-point scale. The reputation score is the average of the nine indicators.

² We will use the terms 'systematic risk' and 'market beta' interchangeably throughout this study.

information surrogate which helps investors to reduce uncertainty. Consequently, the latter should require a lower risk compensation for their investment, which is reflected in a lower cost of equity. Accordingly, they hypothesize that high levels of (changes in) reputation are (inversely) associated with low levels of (changes in) the cost of equity. This relationship is believed to be stronger with increasing information asymmetry. By analyzing an extensive sample of firms over a 25 year period (1987–2011), Cao et al. (2015) provide empirical evidence for their claim that reputation affects the cost of equity, especially in situations of high uncertainty.

These three studies have in common that they employ *Fortune's* AMAC ranking to measure reputation; yet, this is where the consensus ends. Discussing the focal variables, the setting of this paper and conceptual as well as methodological aspects, we will next motivate our study and lay out how we add to the body of knowledge in the reputation cost of equity interface.

2.2 Contributions

The AMAC list and score are by far the most popular proxies for corporate reputation, as they are publicly available, cover a broad number of firms and industries over a significant time span, and are well published in academic literature (Cao et al. 2015). However, a growing number of authors acknowledge the AMAC's weaknesses. For example, it has been criticized for lacking an exact definition as well as a sound theoretical foundation (Sobol et al. 1992). The single-item measurement of the nine dimensions of reputation has been questioned from a scale development point of view, and it has been shown that the aggregate reputation score exhibits low validity (Sarstedt et al. 2013). Furthermore, the AMAC is solely based on ratings collected from industry experts, neglecting the perceptions of other relevant stakeholders, in particular the general public (e.g., Fryxell and Wang 1994). Even worse, it is strongly performance-driven (e.g., Brown and Perry 1994). Consequently, researchers regularly plead for a replication of their findings with other reputation measures (e.g., Himme and Fischer 2014). We answer this call by applying an alternative operationalization introduced by Schwaiger (2004) that has already been used to analyze the impact of reputation on shareholder value (Raitel and Schwaiger 2015). Its most distinctive difference from the AMAC is that reputation is conceptualized as a two-dimensional construct comprising both a cognitive and an affective component, thus distinguishing between a firm's competence and its likeability.³ The measurement model was validated with large-scale pre-tests conducted in three countries with ratings from

³ We observe a high correlation (about 0.7) between the levels of competence and likeability in our data. Yet, it is easy to think of examples where the two might substantially differ, for instance, when considering the three *Most Admired Companies* in 2014, *Apple*, *Amazon.com* and *Google* (Fortune 2014). It is undisputed that all three belong to the most capable companies with regard to their core operations. At the same time, the media regularly report on issues like exploitation of the workforce or the threat of questionable data handling, and these companies are not seen as the most likeable ones by a large portion of the general public in the U.S. (e.g., Great Business Schools 2013; Street Authority 2013).

the general public.⁴ In a comparative study, Sarstedt et al. (2013) demonstrate the superiority of the operationalization over other reputation measures—particularly the AMAC—in terms of validity. Even though it is not as performance-based as the AMAC, we acknowledge the need to control for potential endogeneity effects with regard to firm performance (see Sect. 3.1).

Following Cao et al. (2015), we employ corporate reputation as single-independent variable. While we share Himme and Fischer's (2014: 227) view that "reputation expand[s] the information set of investors with additional signals regarding the future earnings potential of firms," we emphasize that its perception is primarily based on past actions of and, more importantly, past transactions with the firm (e.g., Fombrun and Van Riel 1997; Weigelt and Camerer 1988). Therefore, we believe that customer satisfaction is inextricably linked to reputation. Sarstedt et al. (2013) show that the shared variance between the reputation construct used in this study and customer satisfaction is 73%, while the latter only explains 42% of the AMAC score.

Apart from the conceptual difference from the *Fortune* measure, our data are collected from the general public rather than experts. As the former population encompasses all relevant stakeholder groups of the firm (e.g., potential and current customers, employees, investors, and competitors), we argue that its perception is a better indicator of desirable outcomes of reputation than that of the informed public alone. In addition, our data are not publicly available, which addresses a limitation of the previous studies using the AMAC, as it not merely reflects a firm's reputation, but also influences the latter's further social construction (Lange et al. 2011; Rindova et al. 2005). We are fortunate to have access to data that cover the outbreak and course of the global financial crisis, as it is in times of turbulent markets that the competitive advantage created by a good reputation becomes even more value-relevant (e.g., Bonini et al. 2009; Raithel et al. 2010). Furthermore, we add to the predominantly U.S.-focused literature by shedding light on a less explored geographical market. On a more practical note, our reputation data were collected in semi-annual waves, which allow us to capture more dynamic effects between and within the focal variables than prior studies using the annually published AMAC list.

In line with Cao et al. (2015), we employ four accounting-based valuation models to estimate the implied (ex ante) cost of equity. This approach has become a standard in accounting and finance research (Larocque 2013), as realized (ex post) returns, on which the estimation of systematic risk is based, have proven to be poor proxies for the cost of equity (e.g., Botosan and Plumlee 2005; Fama and French 2004). Moreover, estimating the implied cost of equity explicitly attempts to separate growth and cash flow effects from cost of capital effects (Hail and Leuz 2009).

Conceptually, we support the view that it takes some time for the effects of intangible assets to become observable in financial metrics (e.g., Sabate and Puente 2003). For example, next to the stock price, the main input parameters for the cost of equity estimation are median consensus earnings and dividend forecasts provided by

⁴ For reliability and validity measures, please refer to Raithel et al. (2010).

financial analysts. The average stock in our sample is followed by 29 analysts, and it is extremely unlikely that every one (or even a majority) of them updates his or her forecasts on a monthly basis. This makes a visible reaction to reputation news in this aggregate measure inevitably sluggish compared to real-time data, such as stock prices (e.g., Guay et al. 2011; Hail and Leuz 2009). Therefore, unlike the papers presented above, we follow a growing number of studies (e.g., Dhaliwal et al. 2011; Luo and Bhattacharya 2009) and lag the independent variable by one period (in our case, 6 months) rather than testing the simultaneous association between reputation and the cost of equity. Evidently, this approach does not imply a causal effect. However, next to allowing for analysts and their forecasts to react to reputation news with a delay, we hope to reduce the probability of endogeneity and reverse causality (Luo and Bhattacharya 2009). Table 1 summarizes the current state of the literature and illustrates differences from and similarities to our study.

Summarizing, we contribute to the body of knowledge using a superior measure of reputation (based on stakeholder surveys), winnowing out all of the financial halo (to uncover the effects resulting from financial reputation vs. non-financial or “true” reputation) and using data from the German stock market between 2005 and 2011 to assess reputation’s impact on corporate risk.

2.3 Hypotheses and research question

Schwaiger’s (2004) model of corporate reputation as a latent variable originating from four formative drivers—quality, performance, attractiveness, and corporate social responsibility—encompasses several antecedents, whose impact on the cost of equity has already been thoroughly examined. For example, there is empirical evidence that advertising, considered an investment creating intangible assets (e.g., Huang and Wei 2012; McAlister et al. 2007; Singh et al. 2005), management quality (e.g., Agarwal et al. 2011), customer satisfaction (e.g., Fornell et al. 2006; Gruca and Rego 2005; Tuli and Bharadwaj 2009), and various facets of corporate social and environmental performance (e.g., Chava 2014; Dhaliwal et al. 2011; El Ghouli et al. 2011; Sharfman and Fernando 2008) are negatively associated with the cost of equity. We acknowledge that all these studies provide valuable insights and implications for managers in stressing the importance of their respective focal construct. Yet, we believe that our findings are relevant for a broader audience, because they shed light on the financial outcomes of reputation, not merely on those of its single drivers. To illustrate this, consider business-to-business firms operating in industries, where advertising has little relevance compared to consumer markets, but environmental responsibility may play a vital role in creating competitive advantage (e.g., Homburg et al. 2013). Reputation is a key marketing metric for all firms, regardless of their business environment, and we thus emphasize its importance as a global management objective that needs to be steered and tracked. A good reputation is associated with many desirable outcomes, such as a broad and loyal customer base (e.g., Walsh et al. 2009) and the potential to charge premium prices (e.g., Fombrun and Van Riel 1997), which leads to enhanced cash flows exhibiting less volatility and vulnerability, and higher residual value (e.g., Srivastava et al. 1998). One way of translating this competitive advantage into

Table 1 State of literature and contributions

Study	Smith et al. (2010)	Himme and Fischer (2014)	Cao et al. (2015)	This study
Setting	U.S. 2002–2004	U.S. 1991–2006	U.S. 1987–2011	Germany 2005–2011
Measures	AMAC	AMAC	AMAC	Schwaiger (2004)
Reputation				
Control for financial halo	✗	✓	✓	✓
Implied cost of equity	✗	✗	✓	✓
Future cost of equity	✗	✗	✗	✓
Hypothesized effects				
Level of reputation	✓	✓	✓	✓ (H ₁)
Interaction with Information Asymmetry	✗	✗	✓	✗ (H ₂)
Changes in reputation	✗	✓	✓	✓ (H ₃)
Asymmetric effects	✗	✗	✗	✓ (RQ)

Table 1 continued

Study	Smith et al. (2010)	Himme and Fischer (2014)	Cao et al. (2015)	This study
Findings				
Main findings	Negative relationship (level of reputation)	No significant relationship	Negative relationship (level of reputation), amplified by information asymmetry Negative relationship (changes in reputation)	
Additional Findings	Positive relationship between reputation and market value premium/financial performance	Negative relationship between customer satisfaction and cost of equity Negative relationships between reputation/brand value and cost of debt Negative relationship between customer satisfaction and cost of debt, amplified by reputation/brand value	Positive relationship between reputation and investor recognition	

H, hypothesis; RQ, research question

financial indicators is by observing the company's future cost of equity. Therefore, we hypothesize:

Hypothesis 1 A high (low) level of reputation is associated with a low (high) level of future cost of equity.

As laid out by Cao et al. (2015), the information value of reputation is deemed to gain relevance for investors in situations of high uncertainty regarding future firm performance. We follow their argumentation and formulate our second hypothesis:

Hypothesis 2 The association between reputation and the future cost of equity is stronger (weaker) when information asymmetry is higher (lower).

Prior research has shown that the level of a firm's reputation is considerably driven by its industrial environment (e.g., Brammer and Pavelin 2006; Cable and Graham 2000; Shamsie 2003). This observation raises the question whether the potential of exploiting the benefits of a high reputation is to a large extent externally determined. We, therefore, turn towards changes in reputation instead of its level, which allows us to assess whether the outcomes of reputation management (or, alternatively, corporate crises) can predict the future cost of equity. In line with Himme and Fischer (2014) and Cao et al. (2015), we hypothesize:

Hypothesis 3 Positive (negative) changes in reputation are associated with a lower (higher) future cost of equity.

In marketing–finance literature, several authors suggest that the market reacts differently to changes in non-financial metrics, depending on their direction (e.g., Ngobo et al. 2012). We have three reasons to assume an asymmetric effect of reputation changes, and they lead to diverging inferences. On one hand, corporate reputation is believed to take a long time to build, but can be destroyed overnight (Hall 1993). We would, therefore, expect the consequences of reputational damages to manifest more quickly than those of improvements. Moreover, prospect theory predicts that investors are loss-averse (e.g., Coval and Shumway 2005; Kahneman and Tversky 1979) and should thus respond to a decline in reputation with an immediate demand for higher risk compensation. On the other hand, it has been shown that stock prices react faster to good news than to bad ones (Ngobo et al. 2012). By definition, a short-term increase in this parameter leads to a lower cost of equity, all else being equal (see Appendix A). In sum, these arguments and their conflicting implications render the potentially asymmetric effect of reputation on the future cost of equity an empirical question. Hence, we make no prediction about the direction of the association and address the issue with a research question:

RQ1: Do positive and negative changes in reputation have different associations with the future cost of equity?

3 Empirical study

3.1 Measures and sample

3.1.1 Corporate reputation

Corporate reputation is conceptualized as a two-dimensional construct, consisting of the judgments of a firm's competence as well as its likeability, operationalized by three reflective indicators each⁵ (Schwaiger 2004). Data were collected by a major German market research agency in computer-assisted telephone interviews in 13 semi-annual survey waves between November 2005 and November 2011. Sample sizes ranged between 1251 and 2465 respondents, selected according to demographic criteria to be representative of the general public in Germany. Each respondent was asked to rate the six reputation items with regard to four randomly chosen companies that he or she at least knew by name on a seven-point Likert scale. For each sample firm, we required at least 100 ratings. Factor scores for the two dimensions of reputation are produced by means of principal component analysis. The reputation score is a linear combination of these factor scores, and is normalized to a range between zero and 100%.

In corporate reputation literature, there is a broad consensus that the public perception is partially driven by indicators of past and present performance (e.g., Brown and Perry 1994; Fryxell and Wang 1994), as well as the firm's competitive surroundings (e.g., Brammer and Pavelin 2006; Cable and Graham 2000; Shamsie 2003). Furthermore, we suspect that temporal events may have influenced the respondents' answering behavior.⁶ Ignoring these determinants can result in endogeneity between our focal construct and the performance-based drivers of the cost of equity. To remove halo effects from our data, we adopt the approach introduced by Brown and Perry (1994) which has become a standard procedure in reputation research (e.g., Servaes and Tamayo 2013). Following Raitzel and Schwaiger (2015), we regress the raw reputation scores against factors known to affect the general public's perceptions (i.e., market value, market value growth, market-to-book ratio, systematic risk, and return on assets), as well as industry and time dummies.⁷ We save the residuals of this regression and label them 'non-financial reputation'. They are interpreted as the part of variance in the ratings that is not driven by indicators of current (i.e., size, value characteristics, risk, and management efficiency) or past (i.e., growth) firm performance (Raitzel and Schwaiger 2015), industry-specific factors and time-related effects. The

⁵ Competence items: (1) '[The company] is a top competitor in its market,' (2) 'As far as I know, [the company] is respected worldwide,' and (3) 'I believe that [the company] performs at a premium level.' Likeability items: (1) '[The company] is a company that I can better identify with than with other companies,' (2) '[The company] is a company that I would miss more than other companies if it did not exist anymore,' and (3) 'I regard [the company] as a likeable company' (Raitzel and Schwaiger 2015).

⁶ For example, ratings noticeably rose in the May 2006 wave, when public sentiment was charged by the forthcoming FIFA soccer world cup hosted by Germany.

⁷ A detailed description and calculation methods of all variables employed in this paper can be found in Appendix D.

performance variables and time dummies explain roughly 10% of the variance in the general public's reputation judgments; adding industry dummies increases the R^2 by almost 70% points. We back up our analyses presented below with models employing non-financial reputation as the independent variable. This serves as our primary robustness check of the results derived from the analysis of the raw ratings' association with the future cost of equity.

3.1.2 Implied cost of equity

As there is no consensus in the literature on how to operationalize cost of equity (see, e.g., Sieber et al. 2014; Grüning 2011), we follow the increasingly popular approach (e.g., Barth et al. 2013; Cao et al. 2015; Dhaliwal et al. 2006; Hail and Leuz 2009; Lau, Ng, and Zhang 2012) of estimating four models that have been most commonly used in recent literature (Larocque 2013): the residual income model developed by Claus and Thomas (2001), the industry method introduced by Gebhardt, Lee, and Swaminathan (2001), the Ohlson and Juettner-Nauroth (2005) economy-wide growth model, and a modification of the latter proposed by Easton (2004), based on the modified price-earnings-growth ratio (MPEG). To adapt them to our requirement of estimating the cost of equity twice during a financial year, we apply the method suggested by Daske et al. (2006). The four models are based on varying assumptions and forecast horizons (see Table 2), and their merits and drawbacks have been vividly discussed in accounting and finance literature (e.g., Botosan and Plumlee 2005). As there is no consensus on the models' evaluation or

Table 2 Implied cost of equity models

Estimate	Assumptions	Long-term forecast horizon
r_{CT} (Claus and Thomas 2001)	Firm value = sum of present book value and discounted future residual income Constant economy-wide long-term earnings growth Clean-surplus relation	5 years
r_{GLS} (Gebhardt et al. 2001)	Firm value = sum of present book value and discounted future residual income Constant industry-specific long-term earnings growth Clean-surplus relation	12 years
r_{OJN} (Gode and Mohanram 2003; Ohlson and Juettner-Nauroth 2005)	Constant economy-wide long-term earnings growth Not reliant on clean-surplus relation	Not required
r_{MPEG} (Easton 2004)	Zero long-term earnings growth Not reliant on clean-surplus relation	Not required

Cao et al. (2015) use r_{PEG} , an approach that is marginally different from, but more restrictive than r_{MPEG} because zero dividend is assumed (Easton 2004). For a detailed description of the implied cost of equity estimation models, please refer to Appendix A

superiority, we obtain our primary dependent variable (r_{AVE}) by averaging over the four different estimates, a procedure assumed to reduce noise and measurement error and to balance out model-specific strengths and weaknesses (Dhaliwal et al. 2011; Hail and Leuz 2009).

The estimation of r_{CT} and r_{GLS} requires earnings per share and dividend per share forecasts⁸ for a 5 year horizon. As *Thomson Reuters Datastream*, from where we obtain all financial variables, does not provide continuous data for some firms, we approximate the missing forecasts with methods commonly employed in the cost of equity literature (see Appendix B). Some estimation procedures and control variable calculations require historic data for up to 5 years prior to the first cost of equity estimation. Therefore, we collected monthly financial data for the period between 2000 and 2012.

By its nature as a discount factor of future cash flows that equates their sum to the current stock price, the implied cost of equity is outlier prone, as some input parameters are volatile and *Datastream* is not free of data entry errors. To extract as much information about undue outliers as possible, we estimate the implied cost of equity on a monthly basis between 2005 and 2012. As expected, descriptive statistics of the raw estimates reveal the scattered presence of extremely high values. Accordingly, we winsorize each model's estimates at their 99th percentile (e.g., Chen et al. 2011; Daske et al. 2006). Furthermore, by definition, r_{MPEG} cannot take negative values. To ensure that our estimates are comparable, we discard all negative values derived from the other three models.⁹

3.1.3 Information asymmetry

Our measure of information asymmetry (IA) is analysts' forecast dispersion, operationalized as the coefficient of variation of the median 1 year ahead earnings per share forecast (e.g., Huang and Wei 2012; Mohanram and Gode 2013). As hypothesized above, if there is little consensus concerning a firm's future performance, indicated by a higher forecast dispersion, the additional information inherent in corporate reputation should be more valuable to investors than in situations with low information asymmetry. Forecast dispersion also controls for uncertainty in the models assessing the main effect of reputation; we expect its influence on the implied cost of equity to be positive.

3.1.4 Control variables

We limit our set of control variables to those most commonly found in the cost of equity literature (e.g., Campbell et al. 2012; Cao et al. 2015; Dhaliwal et al. 2006; El Ghoul et al. 2011) to avoid over-fitting our regression models. The inclusion of firm-fixed effects should mitigate concerns about an omitted variable bias. Specifically, next to information asymmetry, we control for firm size, market-to-book ratio,

⁸ Following convention, we employ median consensus forecasts (e.g., Daske et al. 2006; Larocque 2013).

⁹ Appendix C provides frequencies describing the approximation of missing values and the outlier correction. It shows that neither procedure unduly affects our final analysis sample.

leverage, systematic risk, and expected growth. Firm size, proxied by the market value, is associated with high visibility and scrutiny by stakeholders. Companies with a high market-to-book ratio possess a good deal of intangible assets that are believed to be already reflected in the stock price. We, therefore, expect the coefficients of both variables to be negative. A high leverage and consensus long-term earnings growth forecast signal high future stock returns to investors. Market beta is a proxy for the stock's volatility. We expect positive coefficients with regard to these three control variables. To prevent the undue influence of outliers, we follow convention by computing the natural logarithm of the market value, $[1 + \text{market-to-book ratio}]$ and $[1 + \text{information asymmetry}]$ (e.g., Dhaliwal et al. 2006; Larocque 2013).

3.1.5 Sample

Our analysis sample consists of 35 firms that were listed in the DAX30, the most important German stock market index, between 2005 and 2011. The index comprises the 30 biggest firms in terms of market capitalization and stock market turnover listed on the Frankfurt stock exchange. 24 companies in our dataset were part of the DAX30 for the whole observation window, while the others entered or left the index during this period.

The analyses described below require each DAX30 company's implied cost of equity as well as the industry medians. Hence, we estimate our cost of equity proxies using a comprehensive sample that includes the STOXX600 Europe, an index comprising 600 firms which is constructed to provide a broad representation of the European market. The total sample employed for the cost of equity estimation contains 605 firms.¹⁰

3.2 Methodology

To assess the relationship between the level of corporate reputation and the future cost of equity (Hypothesis 1), we specify Model 1:

$$\begin{aligned} r_{\text{AVE}}^{\text{adj}}_{i,t} = & \beta_0 + \beta_1 \cdot \text{Reputation}_{i,t-6} + \beta_2 \cdot \text{Market value}_{i,t} \\ & + \beta_3 \cdot \text{Market-to-book ratio}_{i,t} + \beta_4 \cdot \text{Leverage}_{i,t} \\ & + \beta_5 \cdot \text{Market beta}_{i,t} + \beta_6 \cdot \text{Long-term growth}_{i,t} \\ & + \beta_7 \cdot \text{Information asymmetry}_{i,t} + \mu_i + \varepsilon_{i,t}. \end{aligned}$$

$\text{Reputation}_{i,t-6}$ is the general public's reputation assessment of firm i 6 months prior to the cost of equity estimation date t (June 1st and December 1st of each year). All control variables represent the most current publicly available information 1 day prior to t . We account for serial correlation of the residuals within firms and survey waves by clustering the standard errors by both, firm and survey wave (e.g.,

¹⁰ $[35 \text{ DAX30 firms}] + [600 \text{ STOXX600 firms}] - [\text{duplicates}]$. As *Datastream* does not provide the historical STOXX600 composition, we use the index firms as of January 2014. Descriptive statistics of the industry-specific cost of equity can be obtained from the authors upon request.

El Ghouli et al. 2011; Luo et al. 2014; Thompson 2011). To control for unobserved heterogeneity across firms, we include a firm-fixed effect (μ_i), because we suspect that both corporate reputation and the cost of equity may be partially determined by variables not included in our models (e.g., Huang and Wei 2012). On statistical grounds, the presence of a firm-fixed effect in our data is indicated by the method proposed by Petersen (2009).¹¹

The inclusion of firm dummies is a methodological choice that differentiates this paper from most studies on the relationship between market-based assets and the cost of equity, which predominantly control for industry-wide heterogeneity using industry-fixed effects (e.g., Cao et al. 2015; Dhaliwal et al. 2011; Himme and Fischer 2014; Singh et al. 2005). This approach is not applicable in our setting for two reasons. First, due to the availability of reputation ratings for a limited number of firms and time span, the sample at hand ($n = 314$) is considerably smaller than those analyzed in comparable studies using AMAC data in terms of firm-(half-) year observations (Cao et al. 2015: 9276; Himme and Fischer 2014: 1184; Smith et al. 2010: 582). This means that industry clusters would comprise mostly one to three (at most, five) companies, reducing the accuracy with which we can interpret regression coefficients.¹² Second, as stated above, we find statistical evidence for the presence of firm-fixed effects in our data that should not be neglected in order to avoid an omitted variable bias (Gormley and Matsa 2014). We resolve the issue of controlling for industry idiosyncrasies by subtracting the industry median cost of equity in month t (obtained from the comprehensive sample described above, split by *FTSE Industry Classification Benchmark* Supersectors) from each DAX30 firm's estimate ($r_{AVEi,t}$) and label it 'industry-adjusted cost of equity' ($r_{AVEi,t}^{adj}$). We are aware that this method is not undisputed (Gormley and Matsa 2014). To ensure that our inferences are not flawed by this choice, we report the findings of an alternative model specification in the robustness section. Owing to the monthly adjustment of the dependent variable, we can refrain from including time-fixed effects which are frequently found in comparable studies.¹³

Hypothesis 2 is tested by adding an interaction term between reputation and information asymmetry to the specification developed above (Model 2):

¹¹ Petersen (2009) shows that by comparing standard errors clustered by firm with White standard errors, the presence of firm-fixed effects is revealed if the former are substantially higher. Alternatively, we applied the redundant fixed effect test implemented by the statistical software package Eviews, and obtained similar results.

¹² The aim of our halo removal model described above is not to quantify the impacts of the factors driving corporate reputation, but merely to decompose the latter's variance. Therefore, the use of industry dummies in this specific setting is unproblematic, as we do not strive to interpret the regression coefficients themselves. We have more to say on this matter in the robustness section.

¹³ Adding time dummies to our models does not considerably increase the adjusted R^2 , but reduces degrees of freedom. Similar tests as the ones described in Footnote 11 confirm that time-fixed effects are redundant in all models in which the dependent variable is industry-adjusted.

$$\begin{aligned}
 r_{\text{AVE}}^{\text{adj}}_{i,t} = & \beta_0 + \beta_1 \cdot \text{Reputation}_{i,t-6} + \beta_2 \cdot \left(\text{Reputation}_{i,t-6} \times \text{Information asymmetry}_{i,t} \right) \\
 & + \beta_3 \cdot \text{Market value}_{i,t} + \beta_4 \cdot \text{Market-to-book ratio}_{i,t} + \beta_5 \cdot \text{Leverage}_{i,t} \\
 & + \beta_6 \cdot \text{Market beta}_{i,t} + \beta_7 \cdot \text{Long-term growth}_{i,t} \\
 & + \beta_8 \cdot \text{Information asymmetry}_{i,t} + \mu_i + \varepsilon_{i,t}.
 \end{aligned}$$

Next, we analyze the effect of changes in reputation on the future cost of equity (Hypothesis 3). Following the approach of Ngobo et al. (2012), we replace our focal independent variable with changes in reputation between the previous (i.e., $t-12$) and the respective survey wave ($\Delta\text{Reputation}_{i,t-6}$), as shown in Model 3¹⁴:

$$\begin{aligned}
 r_{\text{AVE}}^{\text{adj}}_{i,t} = & \beta_0 + \beta_1 \cdot \Delta\text{Reputation}_{i,t-6} + \beta_2 \cdot \text{Market value}_{i,t} + \beta_3 \cdot \text{Market-to-book ratio}_{i,t} \\
 & + \beta_4 \cdot \text{Leverage}_{i,t} + \beta_5 \cdot \text{Market beta}_{i,t} + \beta_6 \cdot \text{Long-term growth}_{i,t} \\
 & + \beta_7 \cdot \text{Information asymmetry}_{i,t} + \mu_i + \varepsilon_{i,t}.
 \end{aligned}$$

Finally, we address RQ₁ by introducing the dummy variables $\Delta\text{Reputation}_{i,t-6}^{\text{Gain}}$ (indicating a positive change in reputation perception) and $\Delta\text{Reputation}_{i,t-6}^{\text{Loss}}$ (denoting a loss in reputation during the last 6 months) as suggested by Ngobo et al. (2012) in the following specification (Model 4):

$$\begin{aligned}
 r_{\text{AVE}}^{\text{adj}}_{i,t} = & \beta_0 + \beta_1 \cdot (\Delta\text{Reputation}_{i,t-6}^{\text{Gain}}) + \beta_2 \cdot (\Delta\text{Reputation}_{i,t-6}^{\text{Loss}}) \\
 & + \beta_3 \cdot \text{Market value}_{i,t} + \beta_4 \cdot \text{Market-to-book ratio}_{i,t} + \beta_5 \cdot \text{Leverage}_{i,t} \\
 & + \beta_6 \cdot \text{Market beta}_{i,t} + \beta_7 \cdot \text{Long-term growth}_{i,t} \\
 & + \beta_8 \cdot \text{Information asymmetry}_{i,t} + \mu_i + \varepsilon_{i,t}.
 \end{aligned}$$

4 Results

4.1 Corporate reputation and the future cost of equity

Table 3 displays summary statistics (Panel A) and the correlation matrix (Panel B) of all variables analyzed in Models 1 and 2 as well as the unadjusted cost of equity (r_{AVE}) for comparison purposes. The average firm in our sample exhibits an implied cost of equity of 11.5% (median = 11.1%), which is slightly above industry level, and a reputation score of 59.0% (median = 59.7%). We observe that as opposed to the raw cost of equity ($r = -0.16$, $p < 0.01$), the correlation between the industry-adjusted estimate and lagged reputation is negative, though not significant. All control variables except for the long-term growth forecast are significantly correlated with the adjusted cost of equity and show the expected signs.

Panel A of Table 4 shows the results of the regressions testing the relationship between the level of reputation and the future cost of equity (Hypothesis 1). The baseline model with only control variables and firm dummies, explaining 68.5% of the dependent variable's variance, is displayed in Column I. As predicted, firm size

¹⁴ The results of a pure differences model are discussed in the robustness section.

Table 3 Summary statistics: models 1 and 2

Variables	Mean	Median	SD	Min.	Max.	Predicted sign			
Panel A. Descriptive statistics									
1 r_{AVEr}	0.115	0.111	0.028	0.064	0.239				
2 r_{AVEr}^{adj}	0.008	0.004	0.022	- 0.036	0.097				
3 Reputation $_{t-6}$	0.590	0.597	0.073	0.409	0.772	-			
4 Non-financial reputation $_{t-6}$	0.000	0.000	0.035	- 0.097	0.095	-			
5 Market value, (log)	16.764	16.691	0.789	14.395	18.288	-			
6 Market-to-book ratio, (log)	1.092	1.056	0.381	0.082	2.386	-			
7 Leverage,	0.159	0.168	0.099	0.000	0.392	+			
8 Market beta,	1.182	1.161	0.357	0.523	1.962	+			
9 Long-term growth,	0.103	0.091	0.113	- 0.191	0.859	+			
10 Information asymmetry, (log)	2.443	2.380	0.736	0.926	6.356	+			
Variables	1	2	3	4	5	6	7	8	9
Panel B. Correlations									
2 r_{AVEr}^{adj}	0.744***	1.000							
3 Reputation $_{t-6}$	- 0.161***	- 0.047	1.000						
4 Non-financial rep $_{t-6}$	- 0.104*	- 0.122**	0.461***	1.000					
5 MV $_t$ (log)	- 0.247***	- 0.392***	0.049	0.050	1.000				
6 MTB $_t$ (log)	- 0.699***	- 0.442***	0.092	0.040	0.097*	1.000			
7 LEV $_t$	0.024	0.115**	0.194***	0.070	0.007	- 0.244***	1.000		
8 BETA $_t$	0.148***	0.144**	- 0.015	0.004	0.003	0.000	- 0.165***	1.000	
9 LTC $_t$	- 0.055	0.051	0.109*	- 0.011	- 0.090	0.259***	0.141**	0.087	1.000
10 IA $_t$ (log)	0.492***	0.380***	0.066	0.008	- 0.206***	- 0.495***	0.111**	0.260***	- 0.024

$N = 314$ firm-half year observations

* $p < 0.10$

** $p < 0.05$

*** $p < 0.01$

Table 4 Regression results: models 1 and 2

Variables	I	II	III	IV	V
Panel A. Model 1 (dependent variable: r_{AVEt}^{adj})					
Reputation _{<i>t-6</i>}		- 0.219** (0.076)	- 0.396*** (0.062)		
Non-financial reputation _{<i>t-6</i>}				- 0.140** (0.049)	- 0.168*** (0.042)
MV _{<i>t</i>}	- 0.501* (0.236)	- 0.492* (0.232)		- 0.554** (0.236)	
MTB _{<i>t</i>}	- 0.296* (0.150)	- 0.274* (0.151)		- 0.252 (0.152)	
LEV _{<i>t</i>}	- 0.013 (0.085)	- 0.021 (0.087)		0.003 (0.091)	
BETA _{<i>t</i>}	0.026 (0.087)	0.038 (0.086)		0.053 (0.083)	
LTG _{<i>t</i>}	0.153** (0.055)	0.151** (0.050)		0.147** (0.053)	
IA _{<i>t</i>}	0.080 (0.096)	0.066 (0.093)		0.072 (0.092)	
Constant	- 0.093 (0.310)	0.174 (0.317)	0.786*** (0.069)	0.016 (0.304)	0.517*** (0.063)
Firm-half year observations	314	314	314	314	314
R^2	0.725	0.732	0.644	0.734	0.633
Adjusted R^2	0.685	0.691	0.599	0.694	0.587

Table 4 continued

Variables	I	II	III	IV	V
Panel B. Model 2 (dependent variable: r_{AVEt}^{adj})					
Reputation _{t-6}		- 0.217** (0.081)	- 0.300*** (0.078)		
Reputation _{t-6} × IA _t		- 0.093 (0.079)	- 0.116 (0.083)		
Non-financial reputation _{t-6}				- 0.145** (0.051)	- 0.154*** (0.043)
Non-financial reputation _{t-6} × IA _t				- 0.081 (0.061)	- 0.051 (0.066)
MV _t	- 0.501* (0.236)	- 0.460* (0.236)		- 0.552** (0.230)	
MTB _t	- 0.296* (0.150)	- 0.280* (0.151)		- 0.272* (0.149)	
LEV _t	- 0.013 (0.085)	- 0.010 (0.085)		0.000 (0.087)	
BETA _t	0.026 (0.087)	0.051 (0.082)		0.070 (0.087)	
LTG _t	0.153** (0.055)	0.159*** (0.052)		0.151** (0.050)	
IA _t	0.080 (0.096)	0.101 (0.101)	0.269** (0.096)	0.076 (0.093)	0.261** (0.092)
Constant	- 0.093 (0.310)	0.132 (0.321)	0.744*** (0.108)	- 0.051 (0.303)	0.628*** (0.053)
Firm-half year observations	314	314	314	314	314
R ²	0.725	0.736	0.679	0.738	0.670
Adjusted R ²	0.685	0.695	0.635	0.697	0.626

Standardized coefficients and standard errors clustered by firm and survey wave (in parentheses) are displayed. Firm dummies are included in all models

* $p < 0.10$

** $p < 0.05$

*** $p < 0.01$

and the market-to-book ratio are significantly and negatively associated with the industry-adjusted cost of equity, whereas the long-term growth forecast exhibits a positive impact. Information asymmetry has a positive but insignificant coefficient, while leverage and market beta seem to be unrelated to the cost of equity in our sample.¹⁵ Adding reputation to the model, we observe that it is significantly and negatively related to the future cost of equity ($\beta = - 0.22, p < 0.05$, Column II), all else being equal. The association remains when we discard all control variables

¹⁵ Similarly, Cao et al. (2015) find no significant relationship between market beta and the cost of equity (see discussion).

($\beta = -0.40$, $p < 0.01$, Column III), which assures us that it is not caused by collinearity between the latter. We conclude that a high level of reputation indeed signals cheaper future access to the capital market in terms of cost of equity, relative to a firm's industry peers. To ensure that this finding is not driven by the firm's business environment and past performance inherent in the reputation ratings, we repeat the analysis with non-financial reputation instead of the raw score. Even though the effect's size is, unsurprisingly, noticeably smaller, we still find a significantly negative association ($\beta = -0.14$ with controls, $p < 0.05$, $\beta = -0.17$ without controls, $p < 0.01$, Columns IV and V) between non-financial reputation and the future industry-adjusted cost of equity. In conclusion, we find sound empirical evidence in favor of Hypothesis 1.

We next assess the nature of our main effect in the light of different levels of information asymmetry (Hypothesis 2) by adding the interaction term (Model 2). We cannot infer from Panel B that the negative relationship between the level of reputation and the future cost of equity is in fact stronger if information asymmetry ranges above average. Based on these results, we reject Hypothesis 2. Furthermore, information asymmetry becomes a major driver of the future cost of equity in models without control variables (Column III and V). However, it has to be considered that information asymmetry is significantly correlated with four of the five other control variables, which suggests a commingling of effects in the multivariate setting (Table 3, Panel B).

Meanwhile, the main effect remains robust across all specifications. While this is good news (and probably not surprising) to managers, the question that arises is: How can firms exploit this potential advantage? Put differently: Is the level of reputation, being to a large extent determined by the firm's industry affiliation and factors the firm can hardly change—at least in the short term—the only way to achieve a lower cost of equity, or can firms actively benefit from the said relationship by means of reputation-enhancing activities? To answer this question, we next consider the effect of short-term changes in reputation perceptions on the future cost of equity (Hypothesis 3).

Panel A of Table 6 displays the regressions with reputation changes serving as the independent variable (Model 3). In short, we note that neither changes in raw (Columns II and III) nor in non-financial reputation (Columns IV and V) significantly affect the level of the future cost of equity. Based on these results, we reject Hypothesis 3. However, the insignificant main effect hints at a potentially asymmetric relationship, which we address in the last analysis step (Research Question).

The coefficients in Column II of Panel B indicate that positive and negative changes in raw reputation indeed predict the cost of equity differently. While a reputation gain is not significantly associated with the future cost of equity, a loss is followed by an increase in the dependent variable ($\beta = -0.15$, $p < 0.10$). To back up this finding, we partition our sample and estimate Model 3 separately for reputation winners and losers. This approach sacrifices statistical power, as it drastically reduces the dataset and, consequently, degrees of freedom. However, it bears the benefit of flexibility that allows the influence of other predictors on the cost of equity to also vary in accordance with gains and losses in the public

Table 5 Summary statistics: models 3 and 4

Variables	Mean	Median	SD	Min.	Max.	Predicted sign
Panel A.1. Descriptive statistics: full sample^a						
1	r_{AVEt}	0.116	0.112	0.029	0.060	0.240
2	r_{AVEt}^{adj}	0.008	0.005	0.022	- 0.030	0.100
3	$\Delta Reputation_{t-6}$	- 0.002	- 0.001	0.037	- 0.120	0.120
4	Δ Non-financial reputation _{t-6}	- 0.001	- 0.002	0.031	- 0.110	0.090
5	MV_t (log)	16.781	16.718	0.778	14.400	18.290
6	MTB_t (log)	1.081	1.044	0.379	0.080	2.390
7	LEV_t	0.162	0.174	0.099	0.000	0.390
8	$BETA_t$	1.181	1.161	0.355	0.520	1.960
9	LTG_t	0.103	0.090	0.118	- 0.191	0.859
10	IA_t (log)	2.463	2.392	0.741	0.926	6.356
Panel A.2. Descriptive statistics: reputation winners^b						
1	r_{AVEt}	0.113	0.107	0.027	0.060	0.240
2	r_{AVEt}^{adj}	0.007	0.004	0.021	- 0.030	0.100
3	$\Delta Reputation_{t-6}$	0.027	0.022	0.021	0.000	0.120
4	Δ Non-financial reputation _t	0.018	0.016	0.025	- 0.030	0.090
5	MV_t (log)	16.792	16.705	0.738	14.400	18.290
6	MTB_t (log)	1.116	1.122	0.362	0.170	2.390
7	LEV_t	0.164	0.177	0.095	0.000	0.390
8	$BETA_t$	1.148	1.118	0.341	0.520	1.920
9	LTG_t	0.106	0.086	0.124	- 0.083	0.839
10	IA_t (log)	2.409	2.373	0.653	0.926	4.739

Table 5 continued

Variables	Mean	Median	SD	Min.	Max.	Predicted sign			
Panel A.3. Descriptive statistics: reputation losers^c									
1	r_{AVEr}	0.119	0.030	0.070	0.220				
2	r_{AVEr}^{adj}	0.008	0.023	- 0.030	0.100				
3	$\Delta Reputation_{t-6}$	- 0.031	0.025	- 0.120	0.000	-			
4	$\Delta Non-financial reputation_{t-6}$	- 0.019	0.026	- 0.110	0.040	-			
5	MV_t (log)	16.770	0.817	14.690	18.230	-			
6	MTB_t (log)	1.048	0.392	0.080	2.230	-			
7	LEV_t	0.161	0.103	0.000	0.390	+			
8	$BETA_t$	1.213	0.367	0.580	1.960	+			
9	LTC_t	0.099	0.112	- 0.191	0.859	+			
10	IA_t (log)	2.516	0.817	1.119	6.356	+			
Variables	1	2	3	4	5	6	7	8	9

Panel B.1. Correlations: full sample^d

2	r_{AVEr}^{adj}	1.000							
3	$\Delta Reputation_{t-6}$	0.003	1.000						
4	$\Delta Non-financial reputation_{t-6}$	0.019	0.050	0.765***	1.000				
5	MV_t (log)	- 0.247***	- 0.389***	- 0.008	- 0.017	1.000			
6	MTB_t (log)	- 0.698***	- 0.432***	0.010	- 0.007	0.106*	1.000		
7	LEV_t	- 0.021	0.093	- 0.008	0.007	- 0.007	- 0.212***	1.000	
8	$BETA_t$	0.186***	0.176***	- 0.021	0.028	- 0.025	- 0.034	- 0.150**	1.000
9	LTC_t	- 0.069	0.040	0.067	0.025	- 0.100*	0.269***	0.131**	0.098
10	IA_t (log)	0.492***	0.387***	0.002	- 0.008	- 0.210***	- 0.506***	0.094	0.277***

Table 5 continued

Variables	1	2	3	4	5	6	7	8	9
Panel B.2. Correlations: reputation winners^e									
2 r_{AVEr}^{adj}	0.779***	1.000							
3 $\Delta Reputation_{t-6}$	0.001	0.040	1.000						
4 $\Delta Non\text{-}financial\ reputation_{t-6}$	0.076	0.051	0.732***	1.000					
5 MV_t (log)	-0.148*	-0.309***	0.049	0.055	1.000				
6 MTB_t (log)	-0.680***	-0.502***	-0.021	-0.052	0.023	1.000			
7 LEV_t	-0.124	-0.001	0.035	-0.008	0.159*	-0.158*	1.000		
8 $BETA_t$	0.137	0.092	0.027	0.019	-0.021	0.028	-0.228***	1.000	
9 LTG_t	-0.050	0.028	0.008	0.038	-0.149*	0.271***	0.140*	0.178***	1.000
10 IA_t (log)	0.462***	0.359***	0.032	0.028	-0.077	-0.486***	-0.062	0.384***	-0.095

Table 5 continued

Variables	1	2	3	4	5	6	7	8	9
Panel B.3. Correlations: reputation losers^f									
2 r_{AVEt}^{adj}	0.705***	1.000							
3 $\Delta Reputation_{t-6}$	0.208**	0.090	1.000						
4 $\Delta Non\text{-}financial\ reputation_{t-6}$	0.107	0.103	0.516***	1.000					
5 MV_t (log)	-0.322***	-0.451***	-0.086	-0.105	1.000				
6 MTB_t (log)	-0.708***	-0.375***	-0.152*	-0.093	0.173**	1.000			
7 LEV_t	0.062	0.168**	-0.075	0.005	-0.141*	-0.260***	1.000		
8 $BETA_t$	0.211**	0.241***	0.121	0.174**	-0.026	-0.070	-0.085	1.000	
9 LTG_t	-0.083	0.054	0.129	-0.017	-0.055	0.267***	0.123	0.025	1.000
10 IA_t (log)	0.508***	0.406***	0.132	0.054	-0.302***	-0.518***	0.207**	0.193**	0.013

* $p < 0.10$

** $p < 0.05$

*** $p < 0.01$

^a $N = 283$ firm-half year observations

^b $N = 139$ firm-half year observations

^c $N = 144$ firm-half year observations

^d $N = 283$ firm-half year observations

^e $N = 139$ firm-half year observations

^f $N = 144$ firm-half year observations

Table 6 Regression results: models 3 and 4

Variables	I	II	III	IV	V
Panel A. Model 3 (full sample, dependent variable: r_{AVEt}^{adj})					
$\Delta Reputation_{t-6}$		- 0.039 (0.066)	- 0.004 (0.060)		
$\Delta Non\text{-}financial\ rep_{t-6}$				- 0.014 (0.054)	0.015 (0.054)
MV_t	- 0.466 (0.275)	- 0.474 (0.275)		- 0.472 (0.275)	
MTB_t	- 0.305* (0.162)	- 0.307* (0.161)		- 0.304* (0.163)	
LEV_t	- 0.032 (0.096)	- 0.037 (0.090)		- 0.032 (0.097)	
$BETA_t$	0.030 (0.095)	0.029 (0.095)		0.031 (0.095)	
LTG_t	0.155** (0.065)	0.161** (0.064)		0.157** (0.065)	
IA_t	0.089 (0.102)	0.089 (0.101)		0.088 (0.103)	
Constant	- 0.057 (0.363)	- 0.070 (0.374)	0.299*** (0.066)	- 0.068 (0.369)	0.301*** (0.067)
Firm-half year observations	283	283	283	283	283
R^2	0.706	0.707	0.602	0.706	0.602
Adjusted R^2	0.657	0.657	0.546	0.656	0.546

Table 6 continued

Variables	I	II	III	IV	V
Panel B. Model 4 (full sample, dependent variable: r_{AVEr}^{adj})					
$\Delta \text{Reputation}_{i,t-6}^{\text{Gain}}$		0.085 (0.105)	0.037 (0.120)		
$\Delta \text{Reputation}_{i,t-6}^{\text{Loss}}$		- 0.148* (0.079)	- 0.039 (0.074)		
$\Delta \text{Non-financial rep}_{i,t-6}^{\text{Gain}}$				0.042 (0.084)	0.075 (0.087)
$\Delta \text{Non-financial rep}_{i,t-6}^{\text{Loss}}$				- 0.073 (0.079)	- 0.048 (0.076)
MV_t	- 0.466 (0.275)	- 0.494* (0.266)		- 0.481 (0.270)	
MTB_t	- 0.305* (0.162)	- 0.311* (0.149)		- 0.298* (0.159)	
LEV_t	- 0.032 (0.096)	- 0.018 (0.090)		- 0.021 (0.102)	
$BETA_t$	0.030 (0.095)	0.032 (0.094)		0.028 (0.093)	
LTG_t	0.155** (0.065)	0.170** (0.064)		0.157** (0.064)	
IA_t	0.089 (0.102)	0.090 (0.101)		0.086 (0.102)	
Constant	- 0.057 (0.363)	- 0.200 (0.362)	0.267** (0.110)	- 0.124 (0.358)	0.262*** (0.063)
Firm-year observations	283	283	283	283	283
R^2	0.706	0.712	0.603	0.707	0.604
Adjusted R^2	0.657	0.661	0.545	0.656	0.546

Table 6 continued

Variables	I	II	III	IV	V	VI
Panel C. Model 3 (reputation winners, dependent variable: r_{AVEt}^{adj})						
$\Delta Reputation_{t-6}$		0.089 (0.133)	0.104 (0.127)			
$\Delta Non\text{-}financial\ rep_{t-6}$					- 0.098 (0.114)	- 0.055 (0.094)
MV_t	- 0.404 (0.467)	- 0.392 (0.468)		- 0.784** (0.345)	- 0.768** (0.345)	
MTB_t	- 0.251 (0.221)	- 0.244 (0.207)		- 0.190 (0.244)	- 0.216 (0.237)	
LEV_t	- 0.066 (0.103)	- 0.039 (0.115)		0.100 (0.092)	- 0.107 (0.093)	
$BETA_t$	- 0.078 (0.175)	- 0.089 (0.171)		- 0.084 (0.127)	- 0.071 (0.129)	
LTG_t	0.170* (0.085)	0.163* (0.090)		0.227** (0.100)	0.229** (0.095)	
IA_t	0.229 (0.149)	0.242 (0.156)		- 0.004 (0.146)	- 0.000 (0.142)	
Constant	- 0.023 (0.681)	- 0.088 (0.651)	0.036 (0.155)	- 0.566 (0.528)	- 0.467 (0.511)	0.241**
Firm-half year observations	139	139	139	135	135	135
R^2	0.719	0.721	0.611	0.744	0.746	0.613
Adjusted R^2	0.615	0.615	0.494	0.646	0.646	0.492

Table 6 continued

Variables	I	II	III	IV	V	VI
Panel D. Model 3 (reputation losers, dependent variable: r_{AVEt}^{adj})						
Δ Reputation $_{t-6}$		- 0.167** (0.074)	- 0.000 (0.056)			
Δ Non-financial rep. $_{t-6}$					- 0.191* (0.103)	- 0.125 (0.104)
MV $_t$	- 0.481 (0.362)	- 0.535 (0.338)		- 0.131 (0.335)	- 0.141 (0.312)	
MTB $_t$	- 0.235 (0.221)	- 0.277 (0.190)		- 0.456** (0.187)	- 0.469** (0.170)	
LEV $_t$	0.043 (0.152)	0.068 (0.150)		- 0.007 (0.142)	0.052 (0.157)	
BETA $_t$	0.039 (0.107)	0.051 (0.098)		0.076 (0.112)	0.077 (0.111)	
LTG $_t$	0.048 (0.097)	0.088 (0.087)		0.057 (0.077)	0.066 (0.071)	
IA $_t$	0.049 (0.100)	0.045 (0.100)		0.112 (0.111)	0.111 (0.111)	
Constant	- 0.017 (0.506)	- 0.249 (0.492)	0.482** (0.113)	0.373 (0.445)	0.197 (0.405)	0.291** (0.131)
Firm-half year observations	144	144	144	148	148	148
R^2	0.779	0.787	0.707	0.769	0.779	0.704
Adjusted R^2	0.696	0.704	0.616	0.686	0.696	0.615

Standardized coefficients and standard errors clustered by firm and survey wave (in parentheses) are displayed. Firm dummies are included in all models

The reputation winners' and losers' sample sizes differ slightly between raw and non-financial reputation. This is because in the latter case (Columns V and VI of panels C and D), we consider firms that experienced a gain (loss) in the halo-free reputation component, not the raw score. The divergence shows that reputation perceptions by the general public can in fact rise (fall), even though the underlying performance indicators move in the opposite direction, and highlights the importance of controlling for the halo effect in reputation judgments

* $p < 0.10$

** $p < 0.05$

*** $p < 0.01$

perception of the firm (Dhaliwal et al. 2011). In fact, we observe notable differences between the correlation matrices of the two subsamples (Table 5). While reputation gains do not show any meaningful correlations with the control variables (Panel B.2), losses are followed by reductions in the market-to-book ratio and upward tendencies in market beta, long-term growth, and information asymmetry (Panel B.3).¹⁶ In the multivariate analysis (Table 6), we find that in the case of reputation losses, the long-term growth forecast loses impact on the future cost of equity (Panel D), while it remains a major driver of the future cost of equity for reputation winners (Panel C). We can only speculate whether the public shows a ‘watch and wait’ reaction when firms are improving their reputation and turns its focus towards other, more tangible indicators to see the assumed benefits of a fine reputation properly reflected. In contrast, a drop in reputation may be interpreted as an early indicator of downturn that is likely to become manifest in reductions in market value, stock returns, and other financial outcome variables. Hence, the loss-averse investors react immediately by demanding higher risk premia, which results in a higher cost of equity for the firm. Our suggestions are supported by the fact that reputation losses only exhibit a significant impact on the future cost of equity in the presence of control variables ($\beta = -0.17$, $p < 0.05$, Panel D, Column II). This also holds true for losses in the non-financial component of reputation ($\beta = -0.19$, $p < 0.10$, Panel D, Column V). All in all, those findings imply that the perception changes do not affect the future cost of equity directly, but serve as an early indicator of reactions in other relevant metrics determining the cost of equity.

4.2 Robustness checks

Apart from the regressions with non-financial reputation as the independent variable, we conduct a number of alternative analyses to make sure that our inferences are not driven by our choices regarding the dependent variable, reputation decomposition, sample structure, and model specification.¹⁷

Similar to other studies utilizing a composite cost of equity measure (e.g., Cao et al. 2015; Dhaliwal et al. 2011; Lau et al. 2012), we repeat all analyses with the single models’ estimates. We observe that the focal variables’ coefficient signs are consistent across all regressions, and the hypothesized effects are predominantly significant with regard to the four different costs of equity proxies. At the same time, effect sizes vary considerably.¹⁸ More importantly, we observe persistently higher standard errors, and necessarily, p values than in the analyses presented above, which supports the notion that averaging over different cost of equity models

¹⁶ These correlations are not significant, but exhibit p values marginally above 0.10, which may be attributed to the reduced size of the subsample.

¹⁷ The results of all robustness checks can be obtained from the authors upon request.

¹⁸ We note that main effect’s size with regard to r_{GLS}^{adj} is remarkably smaller than those produced by any other analysis. A plausible explanation for this phenomenon is that due to its conceptualization as industry-specific growth model (see Appendix A), the estimation method—at least to a certain extent – already controls for industry idiosyncrasies in the cost of equity. When we run our regressions with unadjusted r_{GLS} , we obtain a significantly negative coefficient for reputation.

reduces measurement error. In summary, we have no reason to believe that our choice of the aggregate cost of equity proxy drives our results.

The use of industry-fixed effects may raise concerns about the adequacy of our halo removal model for the reasons laid out in the methodology section, even though we do not interpret the coefficients it produces. To exclude confounding effects, we repeat the reputation decomposition with firm-fixed effects. This model's explained variance is even higher, amounting to 91%, which is not surprising as the firm dummies capture unique characteristics such as heritage or relative market position, as well as industry idiosyncrasies. Our inferences, however, remain unchanged compared to those derived from our primary analyses.

Most researchers employ first-difference regressions to study the effects of changes in the variables of interest. Differencing all variables in our models leads to a further reduction of the already limited dataset and sacrifices statistical power. Yet, we find that the differential effects we report to substantiate RQ_1 are robust in first-differences models, even though non-financial reputation and most control variables turn insignificant due to the sample limitation.

The composition of the DAX30 is based on market value and stock market turnover and varies due to changes in these performance indicators, as well as due to mergers and acquisitions. As these entry and exit factors may affect both the firms' cost of equity and their reputation perceptions in the general public, we discard (1) firm-half year observations immediately before (after) firms' exit (entry) from (into) the DAX30 and (2) all firms that were not part of the index during the whole observation period, both in the halo removal model and in all analyses described above. While most significance levels rise due to shrinking sample sizes, we obtain comparable results from the 'temporary' and 'constant' DAX30 subsamples.

Finally, industry-adjusting the dependent variable entails a potential omitted variable bias, as the approach falls short of controlling for the group average of the independent variables (Gormley and Matsa 2014). To ensure that our inferences are not affected by this phenomenon, we estimate alternative specifications with the raw cost of equity estimate as the dependent variable and the monthly industry median cost of equity as an additional regressor (e.g., Huang and Wei 2012). Even though we lose degrees of freedom, because these models require additional time-fixed effects, the results remain stable in all model variants.

5 Discussion

In this study, we assess the relationship between corporate reputation and the future cost of equity. We find a robust negative association between the levels of the two variables, whereas changes in reputation only show a significant short-term impact on the future cost of equity in the case of reputational damages. Drawing parallels to Kahneman and Tversky's (1979) findings, we might suggest different slopes of stakeholders' "reputation value functions" in the gains and loss sections: Knowing that individuals are hurt more by the loss of a certain amount of money than they benefit from a gain of the same amount, these key findings from prospect theory may be transferred to the perceptions of corporate risk. The prior reputation level of

a company seems to serve as reference point, and an increase (gain) in reputation affects our risk proxy considerably less than a decrease (loss) in reputation does. A competing explanation could be that reputation losses are at least implicitly associated with more or less severe scandals (requiring immediate risk premium adjustment) in stakeholders' perceptions, while there is no corresponding construct for reputation gains. However, due to an insufficient amount of corporate scandals in our data set and a lack of research on "reputation value functions", we need to leave this open to speculation.

Comparing our results with prior research in the field, some of our findings mirror prior studies while contradicting others.

With regard to the level of reputation, we are able to substantiate the effect reported by Cao et al. (2015), whereas we find evidence contrary to that published by Himme and Fischer (2014). We offer several explanations for this discrepancy. First and foremost, we use a validated operationalization of reputation that entails both competence and likeability judgments. In contrast, the AMAC is dominated by the first dimension: Himme and Fischer (2014: 229) state that the added value of reputation for investors lies in "provid[ing] information regarding the financial soundness and operational efficiency of a firm [...] and the quality of its management and employees." We believe that the concept of reputation represented by the AMAC falls short of an affective component. Yet, this alone cannot explain the insignificance of the results reported by Himme and Fischer (2014), as Cao et al. (2015) employ the same measure.

A distinct difference between Himme and Fischer's (2014) approach and ours as well as Cao et al.'s (2015) is the dependent variable. Apart from the conceptual concerns expressed by several authors about the usage of systematic risk as a proxy for the cost of equity (e.g., Botosan and Plumlee 2005; Fama and French 2004), both our study and Cao et al.'s (2015) are unable to provide empirical evidence for the positive correlation between market beta and the implied cost of equity that is predicted by theory. In fact, these findings support the argument that realized returns are a poor proxy for return expectations.

In addition, Himme and Fischer's (2014) observation period does not cover the global financial crisis. We argue that the value relevance of corporate reputation gains importance when environments are unstable and external influences affect all (or a majority of) market players. Reputation is sometimes referred to as a 'buffer' in times of crisis (e.g., Bonini et al. 2009; Jones et al. 2000). The implied cost of equity seems to be a risk indicator in which these shielding properties of a good reputation become measurable.

Regarding the interaction between corporate reputation and information asymmetry, we do not detect a significant effect. Hence, we cannot provide empirical support for Cao et al.'s (2015) finding.¹⁹ In this matter, it is crucial to consider the nature of our sample firms. The magnitude (and thus, variance) of information asymmetry is generally limited for those, since they are highly visible top market players under constant scrutiny from various stakeholders and have excessive disclosure programs in place.

¹⁹ Cao et al. (2015) choose a methodology that is different from ours to control for performance halo in reputation ratings; however, they only apply it to assess the robustness of their main effect.

Finally, our results only partly mirror those of Cao et al. (2015) who report that reputation changes are universally inversely related to the cost of equity, whereas our analysis shows that only reputation losses are associated with higher future risk premia. There are several possible explanations for this divergence. First, Cao et al. (2015) measure changes in reputation by comparing subsamples containing (1) firms entering and (2) firms dropping out of the AMAC list with all other observations. Yet, a firm being included in (excluded from) the list does not necessarily imply that it experienced an absolute gain (loss) in reputation. The inclusion (exclusion) may be simply caused by other firms losing (gaining) more in comparison. In addition, unlike our regressions, this categorization does not account for the magnitude of the change in reputation. Our main concern, however, is the timing of the focal variables' measurement. The *Fortune* list is published in March of each year, and Cao et al. (2015) estimate their cost of equity proxies with June data. While it is quite probable that this news affects a stock's price almost immediately, a visible reaction in the median earnings forecast necessarily takes some time. All else being equal, an increase in stock price causes the cost of equity to decrease by definition. Therefore, the short period of time between the AMAC publication and the cost of equity estimation bears the risk of the observed effects being caused by the differential speed of reaction between the stock market and financial analysts' forecasts.

Cao et al. (2015) infer from their analyses that a one-point improvement on the ten-point *Fortune* scale translates into a decrease in the cost of equity of 24 basis points.²⁰ The unstandardized coefficient corresponding to our main effect (Table 4, Panel A, Column II) is -0.07 , which would be equivalent to a reduction in the future cost of equity by 70 basis points going hand in hand with a firm scoring ten percentage points higher on the reputation scale employed in this study. However, a direct comparison is inappropriate. Specifically, we are aware that a reputation change of this magnitude within 6 months is an extremely unlikely event: The average absolute difference between two waves in our sample is about three percentage points (Table 5, Panels A.2 and A.3).²¹ Furthermore, our analyses show that only reputation drops are significantly associated with a higher future cost of equity (Table 6, Panel D, Column II). The corresponding unstandardized coefficient is -0.10 , indicating that the average decrease for DAX30 companies is associated with an economically significant increase in the future cost of equity of 30 basis points.

This finding is of great relevance to managers. It is appealing to know that a higher reputation is associated with a lower future cost of equity relative to a company's industry peers, which, in turn, enhances the firm's competitive advantage, as it lowers the investment threshold of potential projects. Managers, among others, may think about communicating a firm's CSR activities in an appropriate manner to foster reputation (Leppelt et al. 2013). Nonetheless, firms

²⁰ Note that this quantification is based on the coefficient produced by a level model. The authors do not report the results of their differences regression.

²¹ The higher volatility of the AMAC score is also observable when comparing our reputation data's range (40.9–77.2%) and standard deviation (7.3%) to the measures of variation (minimum = 2.63, maximum = 9.04, SD = 0.85) reported by Cao et al. (2015). The authors do not provide standardized regression coefficients.

should regularly track their reputation, as downturns act as early indicators of future economic distress. Moreover, our study provides further evidence that reputation building is a time-consuming effort (e.g., Highhouse et al. 2009) that may not produce measurable outcomes immediately, but is all the same highly important in ensuring a firm's long-term prosperity.

In this study, we have attempted to address the shortcomings of the previous publications. Nevertheless, it is not without limitations. First, our relatively small sample calls for a validation of our findings in a large-scale setting. However, we are confident that if we are able to report a measurable effect by analyzing a set of large and heavily scrutinized firms that should per se be a rather low risk investment, this mechanism is likely to hold in a broader context as well. Second, while our lead–lag approach may reduce the probability of endogeneity, it is prone to obscuring the influence of events occurring between the time of reputation measurement and the cost of equity estimation. Choosing different time lags may also generate further insights into the durability of the short-term effects we report. Moreover, it is possible that the financial crisis has dampened investor optimism, which would offer an alternative explanation for the asymmetric effect of reputation changes. Finally, recent research on the accuracy of analysts' forecasts has revealed that a certain part of their forecast error is predictable (Larocque 2013; Mohanram and Gode 2013), and these authors claim that earnings forecasts could, therefore, be adjusted for the known biases before using them to estimate the cost of equity. It would be interesting to see whether the additional information on future firm performance inherent in reputation judgments adds explanatory power to such an error correction model, as it would allow researchers to gain a better understanding of the causal chain that links intangible assets to the cost of equity capital.

Last not least, for the sake of statistical power, we refrained from using a first-difference regression. Simple correlation analyses between change in reputation and rank of the company in the prior wave range between -0.25 and 0.43 , so we dare to rule out that the significant results in Table 6 (Column II, Panel B) could be owed to the fact that reputation losers were the ones having a rather low reputation before already.

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Appendix

Appendix A: Implied cost of equity models

Claus and Thomas (2001) model Claus and Thomas (2001) propose a model that equates the current stock price (P) to future firm value, defined as the sum of the present book value per share (bvps) and the future residual income (RI) discounted by the implied cost of equity (r_{CT}). Residual income is measured as the difference between forecasted

earnings per share (fe_{ps}) and forecasted book value per share (fbvps), adjusted for a charge for the use of equity capital, i.e., $RI_t = fe_{ps}_t - r_{CT} \cdot fbvps_{t-1}$. Following an explicit 5 year forecast period, the terminal value is calculated based on the assumption of constant economy-wide growth in abnormal earnings (g_{ae}), proxied by the expected inflation rate (i.e., the 10 year risk-free rate minus 3%). Future book values are derived from the clean-surplus relation: $fbvps_t = fbvps_{t-1} + fe_{ps}_t - fdps_t$. The implied cost of equity is estimated as follows:

$$P_t = bvps_0 + \sum_{t=1}^5 \frac{RI_t}{(1+r_{CT})^t} + \frac{RI_5 \cdot (1+g_{ae})}{(r_{CT} - g_{ae}) \cdot (1+r_{CT})^5}$$

Gebhardt et al. (2001) model The GLS model, also known as the industry method, assumes that risk is homogenous within industries. Consequently, the authors propose a model in which a company’s return on equity (ROE) reverts towards the industry median ROE in the long term. Daske et al. (2006) adopt the GLS model, extending the explicit forecast period from 3 to 5 years, followed by a 6 year fading period:

$$P_t = bvps_0 + \sum_{t=2}^5 \frac{RI_t}{(1+r_{GLS})^t} + \sum_{t=6}^{11} \frac{(fROE_t - r_{GLS}) \cdot fbvps_{t-1}}{(1+r_{GLS})^t} + \frac{(fROE_{12} - r_{GLS}) \cdot fbvps_{11}}{r_{GLS} \cdot (1+r_{GLS})^{11}}$$

where $fROE_t$ represents the forecasted ROE, calculated by means of linear intrapolation between years $t = 6$ and $t = 12$. Daske et al. (2006) refine the GLS model to facilitate the estimation of the implied cost of equity at any given date during the financial year by computing a virtual book value per share (fbvps’) and earnings per share forecast (fe_{ps}’) at the time of the intra-year estimation date. The ‘act/365’ convention, a standard procedure in the financial industry, is employed for daily discounting²²:

$$fbvps' = bvps_0 - (1 + fROE_1)^{\frac{\#days to FYE_t}{365}}$$

$$fe_{ps}' = fe_{ps}_1 - (fbvps' - bvps_0)$$

The implied cost of equity is estimated as follows:

$$P_t = fbvps' + \frac{fe_{ps}' - [(1 + r_{GLS})^{\frac{\#daystoFYE_1}{365}} - 1] \cdot bvps'}{(1 + r_{GLS})^{\frac{\#daystoFYE_1}{365}}} + \sum_{t=2}^5 \frac{RI_t}{(1 + r_{GLS})^{\frac{\#daystoFYE_t}{365}}}$$

$$+ \sum_{n=6}^{11} \frac{(fROE_t - r_{GLS}) \cdot fbvps_{t-1}}{(1+r_{GLS})^{\frac{\#daystoFYE_t}{365}}} + \frac{(fROE_{12} - r_{GLS}) \cdot fbvps_{11}}{r_{GLS} \cdot (1+r_{GLS})^{\frac{\#daystoFYE_{11}}{365}}}$$

Ohlson and Juettner-Nauroth (2005) model Residual income models have been criticized because of the assumption of a fixed dividend payout ratio, implying that firms have a constant dividend policy, as well as their reliance on the clean-surplus relation. To overcome these limitations, the OJN model posits that growth in abnormal earnings asymptotically decays towards the long-term economic growth rate

²² We adopt the calculation of virtual intra-year accounting measures for the estimation of the three other models.

(Mohanram and Gode 2013). The OJN model defines the cost of equity as a function of short-term earnings and dividend forecasts and short and long-term growth:

$$r_{OJN} = A + \sqrt{A^2 + \frac{feps_1}{P_0} \cdot (STG_{GM} - g_{ae})}$$

$$A = \frac{1}{2} \cdot \left(g_{ae} + \frac{fdps_1}{P_t} \right),$$

where STG_{GM} is the short-term growth rate calculated as the average of the implicit earnings growth derived from all available feps estimates and the median long-term growth forecast as proposed by Gode and Mohanram (2003).

Modified price-earnings-growth model Easton (2004) proposes a simplification of the OJN model, assuming zero growth in abnormal earnings and zero dividends, which reduces the formula above to the square root of the inverse price-earnings growth (PEG) ratio:

$$r_{PEG} = \sqrt{\frac{feps_2 - feps_1}{P_t}}$$

The PEG model requires growth in forecasted earnings between years $t + 1$ and $t + 2$. Loosening the restrictive assumption of no dividend yields an estimate based on the modified PEG ratio:

$$r_{MPEG} = \sqrt{\frac{feps_2 + r_{MPEG} \cdot fdps_1 - feps_1}{P_t}}$$

By definition, the MPEG model can only produce positive estimates.

The calculation of r_{OJN} is possible in closed form. The other three models were estimated in an iterative procedure using the Microsoft Excel add-in Solver.

Appendix B: Approximation of Missing Forecasts

If at least $feps_1$ and $feps_2$ are available, missing $feps_{3-5}$ are calculated as $feps_{t+1} = feps_t \cdot (1 + LTG)$ (Claus and Thomas 2001). If the long-term growth forecast (LTG) is not available from *Datastream*, an implicit short-term growth rate is calculated as the mean annual growth rate of all available feps (Botosan and Plumlee 2005). For example, if only $feps_5$ is missing, the short-term growth rate is

$$STG = \frac{\frac{feps_2 - feps_1}{feps_1} + \frac{feps_3 - feps_2}{feps_2} + \frac{feps_4 - feps_3}{feps_3}}{3}$$

For the calculation of missing dividend forecasts, we derive the dividend payout ratio (PR_0) by dividing the last reported dividend payment dps_0 by the last reported earnings per share (eps_0) (Gode and Mohanram 2003). Missing $fdps$ forecasts are calculated as $fdps_t = feps_t \cdot PR_0$. If reported earnings per share are negative, ‘normal’ earnings are approximated as 6.1% of the firm’s total assets (Gode and Mohanram 2003)²³:

²³ 6.1% is the average return on assets over all observations in the comprehensive cost of equity estimation sample. This figure is comparable to the 6% employed in similar studies to proxy for economy-wide long-term return on assets (e.g., Gebhardt et al. 2001; Gode and Mohanram 2003).

$$eps_{approx_0} = \frac{0.061 \cdot \text{Total Assets}_0}{\# \text{Common Shares Outstanding}_0}$$

To ensure that our estimates are not biased by these choices, all cost of equity measures were also calculated using alternative methods to approximate forecasted growth rates and dividend payout ratios, as well as mean instead of median consensus forecasts. Correlations between these alternative estimates are consistently above 0.9.

Appendix C: Frequencies: approximation of missing forecasts and outlier correction

	CoE estimation sample				Analysis sample			
	Total	Available (DS)	Approx. (LTG)	Approx. (STG)	Total	Available (DS)	Approx. (LTG)	Approx. (STG)
Panel A. Earnings per share approximation								
feps1	53,761	53,761 (100%)	–	–	314	314 (100%)	–	–
feps2	53,949	53,749 (100%)	–	–	314	314 (100%)	–	–
feps3	53,711	53,223 (99.1%)	131 (0.2%)	357 (0.7%)	314	314 (100%)	–	–
feps4	53,535	41,211 (77.0%)	8959 (16.7%)	3365 (6.3%)	314	308 (98.1%)	6 (1.9%)	–
feps5	53,458	30,017 (56.2%)	18,817 (35.2%)	4624 (8.6%)	314	281 (89.5%)	33 (10.5%)	–
	CoE estimation sample			Analysis sample				
	Total	Available (DS)	Approx. (PR)	Total	Available (DS)	Approx. (PR)		
Panel B. Dividend per share approximation								
fdps ₁	53,917	53,905 (100%)	12 (0.0%)	314	314 (100%)	–		
fdps ₂	53,890	53,856 (99.9%)	34 (0.01%)	314	314 (100%)	–		
fdps ₃	53,735	53,318 (99.2%)	417 (0.8%)	314	314 (100%)	–		
fdps ₄	52,662	40,240 (76.4%)	12,422 (23.6%)	314	303 (96.5%)	11 (3.5%)		
fdps ₅	52,012	28,413 (54.6%)	23,610 (45.4%)	314	264 (84.1%)	50 (15.9%)		
	CoE estimation sample			Analysis sample				
	Estimated	Winsorized	Deleted (< 0)	Estimated	Winsorized			
Panel C. Outlier correction								
r _{CT}	51,137	511 (1.0%)	797 (1.6%)	314	1 (0.3%)			
r _{GLS}	50,000	498 (1.0%)	40 (0.1%)	314	4 (1.3%)			
r _{OJN}	50,625	504 (1.0%)	24 (0.0%)	314	2 (0.6%)			

Appendix continued

	CoE estimation sample			Analysis sample	
	Estimated	Winsorized	Deleted (< 0)	Estimated	Winsorized
r_{MPEG}	47,718	477 (1.0%)	–	314	8 (2.5%)

CoE cost of equity, DS datastream, LTG long-term growth, PR payout ratio, STG short-term growth

Appendix D: Variable descriptions and calculation

Variable	Description	Datastream item/variable calculation
BETA _{<i>t</i>}	Market beta (systematic risk) 1 month prior to estimation date <i>t</i>	Covariance between the firm's stock return and the benchmark index return over a rolling 60-month (minimum 36 months of continuous data required) estimation window ending 1 month before estimation date <i>t</i> . European Fama/French factors were obtained from Kenneth French's publicly available data library (French 2014)
bvps _{<i>t</i>}	Book value per share (last reported values 1 month prior to estimation date <i>t</i>)	WC05476 (book value per share) if unavailable: WC03501 (common equity)/WC05301 (common shares outstanding)
fbvps _{<i>t</i>}	Forecasted book value per share	See Appendix A
fbvps'	Virtual (intra-year) book value per share	See Appendix A
fdps _{<i>t</i>}	Median consensus dividend per share forecast for financial year end <i>t</i>	DPS[<i>t</i>]MD (DPS median value FY[<i>t</i>])
feps _{<i>t</i>}	Median consensus earnings per share forecast for financial year end <i>t</i>	EPS[<i>t</i>]MD (EPS median value FY[<i>t</i>])
feps'	Virtual (intra-year) earnings per share forecast	See Appendix A
FYE _{<i>t</i>}	End date of financial year <i>t</i>	EPS[<i>t</i>]YR
g _{ae}	Economy-wide abnormal earnings growth rate at estimation date <i>t</i>	Risk-free rate (obtained from Kenneth French's data library) – 3%
IA _{<i>t</i>}	Information asymmetry (coefficient of variation of f_{eps_1})	Natural logarithm of 1 + EPS1CV (EPS coefficient of variation FY[<i>t</i>])
LEV _{<i>t</i>}	Leverage (debt-to-asset ratio, last reported values 1 month prior to estimation date <i>t</i>)	WC03251 (long-term debt)/WC02999 (total assets)
LTG _{<i>t</i>}	Median consensus long-term (5-year) growth rate at estimation date <i>t</i>	LTMD (median long-term growth estimate)
MTB _{<i>t</i>}	Market-to-book ratio (last reported values 1 month prior to estimation date <i>t</i>)	Natural logarithm of 1 + <i>P</i> /bvps
MV _{<i>t</i>}	Market value (last reported values 1 month prior to estimation date <i>t</i>)	Natural logarithm of 1 + <i>P</i> · WC05301 (common shares outstanding)

Appendix continued

Variable	Description	Datastream item/variable calculation
ΔMV_t	Average annual market value growth rate over the 2 years ending 1 month prior to estimation date t	$\frac{1}{2} \cdot [(MV_t - MV_{t-12})/MV_{t-12} + (MV_{t-12} - MV_{t-24})/MV_{t-24}]$
Non-financial reputation _{t}	Non-financial reputation collected from the general public in survey wave t	Residual of halo removal model (see Sect. 3.1)
Δ Non-financial reputation _{t}	Change in <i>non-financial reputation</i> between two survey waves	Non-financial Reputation _{t} – Non-financial Reputation _{$t-6$}
P_t	Stock price at estimation date t	P (price)
PR ₀	Dividend payout ratio in the last financial year prior to estimation date t	See Appendix B
r_{AVEt}	Average cost of equity estimate	$(r_{CT} + r_{GLS} + r_{MPEG} + r_{OJN})/4$
r_{CTt}	Cost of equity (Claus and Thomas 2001)	See Appendix A
r_{GLSt}	Cost of equity (Gebhardt et al. 2001)	See Appendix A
r_{MPEGt}	Cost of equity (Easton 2004)	See Appendix A
r_{OJNt}	Cost of equity (Ohlson and Juettner-Nauroth 2005)	See Appendix A
r_{IXt}^{adj}	Industry-adjusted cost of equity	See Sect. 3.1
Reputation _{t}	Reputation collected from the general public in survey wave t	See Sect. 3.1
Δ Reputation _{t}	Change in <i>reputation</i> between two survey waves	Reputation _{t} – Reputation _{$t-6$}
RI _{t}	Residual income in financial year t	See Appendix A
ROA _{t}	Return on assets (last reported values at reputation wave t)	WC01551 (net income before preferred dividends)/WC02999 (total assets)
fROE _{t}	Forecasted return on equity	EPS[t]/MD/fbvps _{$t-1$}
STG _{GM}	Short-term growth rate calculated with the Gode and Mohanram (2003) method	See Appendix B
γ_j	Industry-fixed effect (<i>FTSE Industry Classification Benchmark</i> , Supersector level)	Industry (INDC3) dummies
ε_t	Error term	
λ_t	Time-fixed effect	Survey wave dummies
μ_i	Firm-fixed effect	Firm dummies

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