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ORIGINAL PAPER

The determinants of compensation report transparency: manager incentives and firm characteristics

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Abstract

This paper analyses the determinants of disclosure in compensation reports. Using a hand-collected dataset of 429 observations we assess which compensation, governance and ownership variables influence the quality of disclosure in compensation reports from 2006 to 2014 in a German setting. Managers have incentives to conceal compensation disclosure leading to a conflict of interest with shareholders. The overall findings suggest that opportunistic reporting incentives, as proposed by the managerial power theory, cannot explain a lack of more detailed disclosure. Managers rather avoid these disclosures because they would require additional effort. The empirical analyses reveal four major disclosure determinants: company size, age, family members in the boards and verticality. Other variables such as proprietary costs, governance variables and performance show no or no stable influence. The absence of disclosure is therefore a confluence of company resources (company size and forecasts increase disclosure), owner interests (family members in the board decreases disclosure), and concerns about social equity infringement (higher pay inequity leads to lower disclosure).

Keywords Executive compensation · Excessive compensation · Compensation disclosure · Corporate governance

JEL Classification G30 · J33 · M12 · M52

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1 Introduction

Executive compensation has been the subject of intense debate, both in public and scholarly literature (i.e., Beck et al. 2020; Core et al. 2003, 2008). Transparency in compensation reporting is critical to this ongoing discussion, as it provides a standardized measure for benchmarking and evaluating compensation components. Therefore, transparency must be considered as a fundamental prerequisite for any meaningful discourse on executive compensation. We address this issue by developing a measure for transparency and applying it to the analysis of German companies' compensation reports between 2006 and 2014. Within our 429 observations we find that transparency varies widely among firms. Thus, we investigate what firm variables—compensation level, governance, ownership, industry and company variables—determine the level of disclosure of executive pay.

The majority of studies on executive compensation draws on US data (Edmans et al. 2017; Elston and Goldberg 2003). Yet, calls are strong for more research in other countries as corporate governance systems (Conyon and Schwalbach 2000) as well as control mechanisms and reporting standards (Beck et al. 2020) differ. Germany, being Europe's largest and one of the most influential economies worldwide, provides a unique research setting, owing to its distinctive features, such as a two-tier board system, a strong employee representation, less developed stock markets with an influential stakeholder culture, a strongly bank-oriented financial system, a prominent family tradition, and often times highly concentrated ownership structures even among publicly traded companies (list builds on Ampenberger et al. 2013; Arnold and Grasser 2018). With regards to excessive compensation, the German public seems especially sensitive. A study by the German foundations Bertelsmann Stiftung, Heinz Nixdorf Stiftung and Ludwig-Erhard-Stiftung in 2007 concluded that only 15% of Germans believe the distribution of both income and wealth to be fair. 66% were in favor of increased governmental activity to increase social equity (Vehrkamp and Kleinsteuber 2007). Thus, public calls for regulation and alongside a strong incentive for reporting transparency are characteristic for the Germany executive compensation setting.

Theory mainly draws on two strains explaining the purpose and balance of executive compensation—the optimal contracting theory and the managerial power theory, both not being mutually exclusive (Murphy 2013). Neither of them addresses the basis of observation, namely the underlying transparency. The managerial power theory (Bebchuk et al. 2001) challenged the idea of incentive pay as a panacea for mitigating agency problems as suggested by the optimal contracting theory. Instead of assuming that the information asymmetry between agent and principal can be cured by providing the agent enough incentives to act in the best interest of shareholders, the managerial power theory interprets compensation as a problem of the agency conflict itself. The authors believe that managers use their knowledge, privileges and the resulting power in extracting rents above the optimal level (Bebchuk et al. 2001). Despite the power an executive may exert on the supervisory board to not oppose his excessive compensation, Bebchuk et al.

(2001) believe in an upper limit on rent extraction defined by the so-called "outrage constraint". The outrage constraint is crossed when the costs associated with negative reactions of observers are significant enough to "deter the adoption of arrangements that managers would otherwise favor" (Bebchuk and Fried 2004, p. 5). Costs are mainly caused by harmed reputation within social networks and the job market, which limits future career options.

As the crucial factor for outrage is the visibility of rent extraction to a critical group "about whose views the executives and directors care" (Bebchuk et al. 2001, p. 33–34), disclosure and availability of compensation information play an important role. Bebchuk et al. (2001) accordingly believe that managers engage in practices to disguise or camouflage compensation by disclosing less transparent compensation reports or choosing components with less visibility such as pensions. The greater the complexity of a compensation scheme, the less likely the public is to notice and get outraged.

The few results in this field of research so far are inconclusive. The probably most obvious argument for non-transparent disclosure is excessive or high CEO compensation (Coulton et al. 2001; Robinson et al. 2011). Yet, general governance characteristics as well as ownership structures already provide mixed results depending on the country and time of observation. Using data on large German firms for the years 2002 through 2005, the study of Chizema (2008) shows that institutional ownership, dispersed ownership and state ownership are positively and significantly associated with the disclosure of individual executive compensation. However, Coulton et al.'s (2001) study of Australian listed firms from 1998 to 2000 showed no impact of governance and ownership characteristics on compensation disclosure. Transparency could also be driven by monitoring and thus be influenced through board independency. Laksmana (2008) as well as Ben-Amar and Zeghal (2011) find that board independence has a positive impact on transparency. Yet, Muslu's (2010) results, based on European data, support the contracting theory. Companies with more executives in the board and CEOs as board chairs provide more disclosure. He finds this effect is more durable for companies with strong investor protection. Overall, the small number of results leaves space for additional research that covers a broader set of variables to provide a fuller picture of disclosure. Furthermore, Germany as country of observation with distinct compensation, governance and legislation characteristics, enables us to gain valuable insights on the disclosure decision within a context of a two-tier board system in a country of medium discretion in comparison to the US (Crossland and Hambrick 2007). Also, Germany is stakeholder driven (Fiss and Zajac 2004) and social equity concerns play a decisive role in the public discussion about management compensation.

Contrary to common assumption, there is a considerable variation in executive compensation disclosure regulations among different countries. Alas, disclosure requirements depend highly on the country and chosen point in time. The first mover in regulating disclosure were the US where the Securities Exchange Commission (SEC) demanded disclosure of the three highest-paid executives' names and all compensation received as early as 1934. Many amendments and regulations in other countries followed with Germany and its *Executive Compensation Disclosure Act* ("Gesetz zur Offenlegung der Vorstandsvergütung", VorstOG) in 2006 being one of

the late-adopters. Nonetheless, enforcement of disclosure seems to be rather weak and the requirements leave considerable discretion how to actually disclose the requested information and thus on the transparency for the addressed stakeholder groups.

Looking closer at German compensation reports, one can easily observe different approaches. While some companies explain their compensation system very well, other reports are difficult to understand and present redundant or even contradictory information or decide against publication of certain information entirely. Surely one of the reasons why regulation has become ever more demanding. The *German Corporate Governance Code* ("Deutscher Corporate Governance Kodex", DCGK; a code of conduct), which is a binding regulation for German publicly listed firms, for example advanced its disclosure requirements further in 2014, supplying the companies with model tables in order to make compensation more comparable among the company's peers. Recently, these tables were withdrawn arguing that the *Stock Corporation Act* ("Aktiengesetz", §162) provides sufficient guidance (DCGK 2020). But even existing disclosure requirements are no guarantee for strict compliance nor transparent reporting. A study on US firms shows many disclosure defects when examining listed companies' reports in detail (Robinson et al. 2011). Drawing on the above-mentioned differences in the German reporting, this seems even more true in a German context. Thus, we aim to investigate the way compensation is ultimately reported and whether we can draw conclusions of what is driving (non-)disclosure.

To quantify the extent of compensation-related information given in the companies' annual reports, we construct a detailed disclosure index that encompasses three major information categories: (1) information on compensation components, (2) readability and (3) information about the pay-setting process and adequacy of pay. The index data was hand collected for more than 80 companies over 9 years yielding 752 observations. After excluding companies with missing control variables 429 observations remain. The index itself is the first index that allows for examining voluntary disclosure and can be applied independent of the country's requirements. Altogether, we analyze the extent to which companies disguise or camouflage their financial remuneration by disclosing opaque compensation reports. Our findings imply that especially the additional effort keeps companies from a more detailed disclosure. Four main determinants of disclosure are supported through the empirical analyses: company size, age, family members in the boards and verticality, which is the ratio between average employee compensation and average executive compensation. Variables such as proprietary costs, governance variables and performance show no or no stable influence. Altogether, camouflaging as proposed by the managerial power theory, cannot be supported. Thus, our paper extends the literature stream on disclosure in general and compensation transparency in specific.

2 Theoretical background and empirical predictions

In the following, we develop predictions regarding the influence of compensation, governance and ownership on compensation report disclosure (Crossland and Hambrick 2007).

So far, the greater part of disclosure research has focused on the determinants of a company's financial disclosure such as earnings forecasts. Only recently disclosure of management compensation has gained more attention. The disclosure decision reflects a possible conflict of interest between inside managers and outside shareholders (Coulton et al. 2001). It also offers the opportunity to examine aspects of governance as the information to be disclosed (i.e., executive compensation) is itself related to the effectiveness of corporate governance. Also, it is relatively easy to determine which part of the disclosure is voluntary.

While even within the established literature branch of financial disclosure no unifying explanatory theory has been found yet (Core 2001; Verrecchia 2001), a theory for the specific context of managerial compensation disclosure is offered by Bebchuk et al.'s (2001) managerial power theory.

2.1 Executive compensation

In line with the assumptions of the managerial power theory, disclosure should be less forthcoming in companies with excessive compensation. Accordingly, prior research from Robinson et al. (2011) finds that excessive CEO compensation is positively associated with disclosure defects identified by the SEC. However, Germany might be a different setting. Due to a more collectivistic and risk averse society, stakeholder orientation and powerful board governance, Crossland and Hambrick (2007) describe Germany as a medium discretion context. This may imply that German executives have less possibility to extract rents to the same extent as CEOs in the US. This would consequently reduce the need for camouflage.

The managerial power theory also believes public outrage to be the only means of limiting excessive pay if the existing governance is not capable to do so. Especially in a more stakeholder-oriented country such as Germany, intrusion from parties other than the shareholders can be assumed to be likely. In order to prevent "an undue intrusion into the internal affairs of the company" (SEC 1992, p. 1980) companies might withhold compensation information even though the compensation itself might not be excessive. Yet, in this study, we cannot measure outrage. Thus, we can only draw from the German setting, that there could be a link between the level of compensation and transparency. And on the other hand, one can expect that disclosure rises with the level of compensation as larger companies tend to pay higher executive compensation (Rosen 1982) while they also face higher public attention (Core et al. 2008). This public attention might exert additional pressure to increase disclosure. Furthermore, larger companies have more resources available to the disclosure process.

To shed more light onto the aspect of social equity concerns, we are furthermore interested in the explanatory power of income distribution within the company. Empirical work shows that individual and organizational performance (Pfeffer and Langton 1993), cooperative behavior (Harder 1992; Pfeffer and Langton 1993) and group cohesion (Levine 1991) as well as product quality (Cowherd and Levine 1992) suffer when pay is widely dispersed across the company's hierarchy. High inequality between low-income employees and executives results in higher absence

(Dittrich and Carrell 1979), turnover rate (Wade et al. 2006) as well as theft within the organization (Greenberg 1993).

Prediction 1: Altogether, in terms of executive compensation, we would assume an association of the level of compensation and transparency. This should be especially pronounced in settings of a high verticality of pay.

2.2 Governance

Another important assumption of the managerial power theory is that the Board of Directors is not capable of limiting managerial excesses. The weaker the governance, the more compensation the manager can extract. At the same time reputation is vital to directors as serving at companies experiencing accounting restatements (Srinivasan 2005), financial distress (Gilson 1990) or a financial fraud lawsuit (Fich and Shivdasani 2007) harms their future career options. Weak directors might therefore have an incentive to engage in camouflage in order to prevent a public discussion about compensation and to hide their weakness. Yet, measurement is a difficult task. Common variables such as CEO and board chair duality as well as independence of directors are guaranteed by law as executive board ("Vorstand") and supervisory board ("Aufsichtsrat") in Germany are strictly separated.

Thus, board size might be an indicator. Core et al. (2008) find that complex firms actually increase in value with larger boards. Larger boards have more possibility to be diverse and split up into committees (Klein 2002). Meanwhile, there is also evidence that firm performance is weakened through large boards (Mak and Kusnadi 2005; Rapp and Wolf 2010). However, due to the German *Codetermination Act* of 1976 ("Gesetz über die Mitbestimmung der Arbeitnehmer", MitbestG) boards in smaller companies act more likely in shareholders' interests than larger ones: Companies with more than 500 employees are obliged to assign one third of the supervisory board seats to employee representatives, in companies with more than 2000 employees the number even rises to half of the seats. This affects companies of the sample employed in this paper as the number of employees varies roughly between 500 and 600,000 employees. Larger boards' decisions are therefore more complicated to predict as the employee representative directors' votes might not necessarily be in favor of shareholders. Kim et al. (2018) as well as Lin et al. (2018) find that the German employee representation indeed leads to a shift in focus. And codetermination has been shown to impact executive compensation (Rapp and Wolf 2010).

Meanwhile, the number of meetings mirrors the time the directors invest to monitor the management. In accordance, Andreas et al. (2012) find that German companies link director compensation to meeting frequency. Unsurprisingly, research further shows that board meeting frequency rises with delicate corporate events such as share price drops (Vafeas 1999), acquisitions or earnings restatements (Brick and Chidambaran 2010). The increased board activity leads to improved operating performance (Vafeas 1999) and increased firm value (Brick and Chidambaran 2010). Concerning disclosure, Liu et al. (2016) show that high levels of board activity have a significant positive effect on disclosure quality.

Multiple surveys find that a high share of outside directors in US boards serve as CEOs in other companies (Spencer Stuart Board Index 2016). Furthermore, CEOs are regularly those with the greatest number of external directorships (Ferris et al. 2003). In Germany, where the company is led by two strictly separate boards, former executives often join the supervisory board after leaving the executive board (Andres et al. 2014). If these directors sympathize with the executives, it might be expected that they have higher chances of extracting rents. Consistent with that assumption Andres et al. (2014) observe higher executive pay in companies with former CEOs in the supervisory board and Li and Qian (2011) find higher excessive compensation for companies with more outside CEOs in the compensation committee. Additionally, German evidence shows that busy supervisory directors are found in companies with higher executive compensation (Rapp and Wolf 2010).

On the other hand, executives can enhance shareholder value with their knowledge gained in leading a company (Fahlenbrach et al. 2010) and the network which comes along with working for multiple companies (Carpenter and Westphal 2001). Former executives of the same company accumulate firm and industry expertise and can therefore provide the management with valuable advice (Andres et al. 2014). Not surprisingly, shareholders react positively to the announcement of a CEO joining the supervisory board (Andres et al. 2014). Fich (2005), who finds similar results for the appointment of CEOs as outside directors, draws the conclusion that CEOs are believed to enhance firm value. Finally, Fahlenbrach et al. (2010) do not find support for the hypothesis that CEO compensation increases with CEO directors.

Prediction 2: Altogether, the role of board size and meeting frequency, as well as the appointment of (former) executives remains unclear. Especially the role of former CEOs on the supervisory board seems to indicate that the benefits of former executives in the board sometimes come at the cost of higher executive compensation which in turn could lead to a tendency for camouflaging.

2.3 Ownership

As research has shown, the ownership structure is an important determinant of a company's governance and institutional investors and holders of large share blocks increasingly engage in successful shareholder activism (Hartzell and Starks 2003; Wu 2004). According to Baums and Scott (2005), the level of discretion exerted by executives, highly depends on whether the company is a publicly listed company with a dispersed free float or a corporation with just one or more dominant shareholders. Companies with a widely dispersed free float are more likely to suffer from reciprocal 'back scratching' between members of the management and supervisory boards. Research by Elston and Goldberg (2003) finds that total compensation is lower in firms with high ownership concentration while Kaserer and Wagner (2004) confirm that also in Germany, companies with dispersed ownership exhibit higher executive compensation, even after adjusting for size, performance and other firm and industry effects. The findings suggest that companies with dispersed ownership have weaker governance of its activities. Andreas et al. (2012) confirm this

impression as German supervisory directors in companies with more concentrated ownership receive less incentive compensation. They assume this is due to the fact that more concentrated ownership is linked to more effective monitoring. It is more important for companies without such additional monitoring authority to set the supervisory board incentives to perform the monitoring adequately.

Due to the higher costs related to organization, consensus building and taking action, it is more challenging for individual shareholders of companies with wider and more dispersed ownership to initiate shareholder activism, the common 'free-rider' problem (Maug 1998).

Apart from ownership concentration, the composition of owners matters as well. German companies have a tradition of family ownership (Chizema 2008). According to findings from Chen et al. (2008) voluntary disclosure is heavily influenced by family ownership, more than by insider or concentrated ownership. They find that family firms provide fewer earnings forecasts and conference calls, but more earnings warnings. The authors argue that this is due to a longer investment horizon, better monitoring of management, and lower information asymmetry between owners and managers while facing bigger reputational costs in times of struggles.

Similarly, Ali et al. (2007) state that family firms are more likely to warn for bad news. Additionally, they find that family firms report better quality earnings, but make fewer disclosures about their corporate governance practices. Family companies might have less need to disclose management compensation in the annual report as they govern managers tighter and suffer less from information asymmetry. This assumption would be in line with the finding that family companies disclose less about their corporate governance practices. According to Fernandez and Nieto (2006) firms with high proportions of family ownership are more likely to have family members and friends as directors. This is another reason why compensation disclosure may not be in their best interest.

Prediction 3: For these reasons, ownership structure and especially family ownership is expected to influence the degree of transparency in compensation reports.

3 Data sources and scope

We test our empirical predictions using panel data of public German corporations listed in the German Stock Exchanges DAX and MDAX as these are the two most important indices of the prime standard. By including the MDAX, a higher cross-sectional variation in industries and firm size is guaranteed. This is important to increase the likelihood of cross-sectional variation in disclosure levels as Lang and Lundholm (1993) found disclosure to be related to firm size and Botosan (1997) states that disclosure patterns differ between industries. To guarantee consistency, companies changing their fiscal year dates in the regarding years have been removed from the sample.

The sample identifying determinants of disclosure contains 429 company-year observations with transparency, compensation, governance, ownership and firm variables. Governance, compensation and transparency data was hand-collected from

the annual reports for the years 2006 to 2014 for all companies and their executive board members (German "Vorstandsmitglieder"). In addition to annual reports, governance data has also been collected from BoardEx, a database for biographical information on most board members and senior executives around the world, and supervisory directors' CVs on the company's web page. Executive compensation was hand-collected from the annual report's compensation reports for the years 2006–2014. A descriptive study of the hand-collected data is published annually (see for example Friedl et al. 2016) and publicly discussed in the media (for example Cabras 2015). Transparency data has been collected with the help of a self-developed index (see Appendix) and the annual reports.

The index consists of three parts, the first one collecting information on the compensation components, the second examining the compensation report's readability and the third shedding light on the compensation's adequacy. Ownership data is derived from Hoppenstedt Aktienführer. Hoppenstedt Aktienführer is a yearly publication that provides detailed information (e.g., ownership structure, board composition, balance sheet information) on German listed firms. Data on analyst forecasts is derived from I/B/E/S, other firm and industry control variables are retrieved from Thomson Reuters Datastream service. If control variables are missing, the observation is excluded from the regarding analysis.

4 Methodology

The following section provides an overview of the methods employed to test the impact of executive compensation, governance, ownership, and firm characteristics on compensation disclosure. For reasons of better readability, a comprehensive overview of the developed disclosure index can be found in the appendix.

4.1 The index score

As stated above, a comprehensive explanation of the index score calculation can be found in the appendix. Yet, as the index is our main dependent variable, we show the main calculation model here as well. The index score can be calculated by either adding up the achieved points or by building a relative score. As proposed by Marston and Shrives (1991), we chose a relative score which is calculated as the following:

Index Score:

$$Score = \frac{\sum Achieved\ points}{\sum Maximum\ points\ achievable}$$

By applying a relative score, the index can account for the fact that not all companies have the same compensation components. This ensures that companies without specific pay components are not disadvantaged and guarantees that each company can reach a disclosure score of 100%.

4.2 The calculation of excessive compensation

In the following, we introduce the calculation of the variable *AvgExcessComp*, which is needed to understand whether excessive compensation is a motivation for lacking disclosure. Excessive compensation is measured as actual compensation minus the econometrically predicted expected compensation and therefore equals the compensation beyond economically explainable levels:

Regression model for expected compensation:

$$ln(AdjTotalComp_{it}) = \beta_0 + \beta_l \sum_{l=1}^{L} Manager_{lit} + \beta_m \sum_{m=1+l}^{M} Firm_{mit} + \varepsilon_{it}$$

The model follows prior research by Core et al. (2008), Kuhnen and Niessen (2012), Core et al. (1999), Murphy (1999) and Smith and Watts (1992). In Table 3 the variables are explained.

With the results of the regression above, the variable expected compensation (*ExpComp*) can be econometrically predicted. With the predicted variable excessive compensation, *ExcessComp*, can be calculated as follows:

Excessive compensation:

$$ExcessComp_t = Residual\left(TotalComp_{it}\right) = TotalComp_{it} - ExpComp_{it}$$

We compute the % of excessive compensation as:

Percentage excessive compensation:

$$PctExcessComp_{it} = log\left(TotalComp_t\right) - log\left(ExpComp_t\right)$$

The variable *AvgExcessComp* is calculated as the mean of all executives' excessive compensation within a board-year at firm level.

4.3 Determinants of (non-)disclosure

We identify the determinants of transparency in compensation reports in the three addressed influencing areas compensation, governance and firm variables with the following regression model:

Regression model for determinants of (non-)disclosure:

$$Score_{it} = \alpha_i + \gamma_t + \beta_l \sum_{l=1}^{L} Compensation_{lit} + \beta_m \sum_{m=1}^{M} Governance_{mit} + \beta_n \sum_{n=1}^{N} Industry_{nit} + \beta_k \sum_{k=1}^{K} Firm_{kit} + \varepsilon_i$$

where i = 1,…, K stands for the company, t = 1,…, T for the period and $Score_i$ for the transparency score the company i receives for its compensation report in period t. l, m and n are the corresponding observations of the variables. α_i is the company specific y-intercept and γ_t the time dependent and company constant time effect of the specific year. The β-coefficients describe the influence of the observed compensation characteristics ($Compensation_{li}$), governance characteristics ($Governance_{mi}$), industry characteristics ($Industry_{ni}$) and firm characteristics ($Firm_{ki}$). ε_i indicates the

idiosyncratic error term. As *Score* is a percentage variable we will apply a generalized linear model with a logit link, binomial distribution family and robust standard errors clustered at firm-level.

In the following, the possible determinants of compensation report transparency as independent variables are described:

Compensation characteristics. According to the managerial power theory introduced by Bebchuk et al. (2001), compensation reports might be opaque in order to prevent public outrage over executive compensation. Both, *AvgTotalComp* and *AvgExcessComp*, are tested as it is unclear whether managers are more afraid of justified outrage over excessive compensation. Additionally, we control for *CVerticality*, i.e., the ratio between a company's average executive and average employee compensation.

Governance characteristics. The managerial power theory assumes that the corporate governance system within the company is not capable of limiting the managerial rent extraction. We consequently control for board size (*BoardSize*), meeting frequency of the board (*NoMeetings*), and how many (former) CEOs sit in the supervisory board (*CurrentExec*, *FormerExec*). As both the number of current and former executives are heavily influenced by the number of directors in the board, we calculate *CurrentExec* and *FormerExec* as the share of directors in the supervisory board. *BoardSize* itself is highly influenced by the company size. Thus, *BoardSize* is measured as the residual of regressing the number of directors on the number of employees and industry dummies to ensure comparability with same industry and size companies.

Corporate governance may not only be exerted within the company but also through more indirect channels. Research has shown that owners have a strong influence on firm outcomes (Hartzell and Starks 2003; Wu 2004). We therefore include ownership variables in the analysis. Herein, the *Freefloat* indicates the ownership spread—the higher it is, the lower is the likelihood of organized shareholder activism. Furthermore, we include the percentage of family members in the executive or supervisory board (*FamilyBoard*) and the percentage of shares the family holds (*FamilyShares*) as family influence measures.

Industry characteristics. An alternative approach to explaining lacking transparency is pursued by research on proprietary costs. In his model on discretionary disclosure Verrecchia (1990) introduces costs associated with disclosing information which may be proprietary in nature. The publication of proprietary information may bear costs for the disclosing company as the information is no longer proprietary after it has been made public. Previous studies have proxied proprietary costs with the help of industry rivalry: Higher industry competition should lead to higher disclosure costs of proprietary information. To control for this an alternative determinant of compensation disclosure, we follow Robinson et al. (2011) and Karuna (2007) by examining product differentiation (*ProductDiff*), relative market size (*MarketSize*) and costs of entering the industry (*EntryCosts*).

Firm characteristics. Finally, we control for firm specific variables. Bigger firms likely have more resources to set up a proper disclosure process and are therefore expected to be more transparent. An alternative reason might be that bigger firms have higher agency costs and a wider ownership base which might lead to additional incentives to engage in voluntary disclosure. Evidence with regards to size and disclosure of compensation by Ben-Amar and Zeghal (2011), Muslu (2010), Chizema (2008) and Coulton et al. (2001) support this assumption. *FirmSize* is measured as the logarithm of sales. Older firms might be well experienced with the handling of shareholders and potential investors but on the other hand less willing to adjust established processes to new requirements (Chizema 2008). *FirmAge* is the number of years from founding year to current fiscal year. Prior studies also suggest that a firm's information environment influences the extent of voluntary disclosure (Lang and Lundholm 1993). We therefore include proxies for growth opportunities (*TobinsQ*) and analyst following (measured via the number of earnings *Forecasts*). The findings with regards to performance and disclosure of compensation are mixed. While Ben-Amar and Zeghal (2011) do not find evidence for a relationship, Muslu (2010) and Coulton et al. (2001) find a positive relation between performance and disclosure. Performance is measured via return on assets (*ROA*) and total stockholder return (*TSR*).

Endogeneity. A common problem of empirical research in the area of governance and executive pay is endogeneity. While this paper aims to understand the impact of compensation on the company's disclosure transparency, the compensation itself might have been influenced by compensation disclosure in the first place. To control for these effects, we follow the approach of Chatterje and Hambrick (2011) as well as Martin et al. (2013): an endogeneity control variable was created by regressing the respective endogenous variable on its main drivers. Given that the main results did not change when we included the endogeneity controls, we omit them in the main analysis to save degrees of freedom.

5 Results

5.1 Summary statistics and correlation analysis

Table 1 provides the summary statistics of the sample. On average the disclosure variable *Score* lies around 40%, so less than half of the information that could be given is actually provided in the compensation report. The minimum is close to zero while the best companies disclose around 70% of information.

Interestingly, the variable *AvgExcessComp* exhibits a negative mean, which indicates that German DAX and MDAX companies are on average paid less than would be expected according to performance, company size and future company prospects. While companies in the German DAX exhibit on average positive excessive compensation, we find negative excessive compensation for companies in the German MDAX. However, in both indices, one can find companies with positive and negative excessive compensation. As the sample contains companies with very

Table 1 Descriptive statistics

Variable	N	Mean	sd	Min	Max	p25	p50	p75
Score	429	0.414	0.095	0.060	0.670	0.350	0.410	0.460
ScorePart1	429	0.415	0.117	0.080	0.778	0.333	0.395	0.500
ScorePart2	429	0.771	0.179	0.250	1	0.636	0.857	0.875
ScorePart3	429	0.282	0.114	0	0.571	0.200	0.300	0.350
CVertical-ity	429	44.190	29.980	2.066	210.500	23.020	36.190	57.240
CVerticali-tyEndo	429	43.030	15.300	−2.341	93.160	33.400	41.900	51.600
AvgEx-cess-Comp	429	−0.184	2.172	−7.054	11.170	−1.268	−0.333	0.906
AvgTotal-Comp	429	2108	1149	490	8419	1265	1867	2758
AvgExp-Comp	429	5.886	2.807	0	15.120	3.687	5.310	7.515
Former-Exec	429	0.045	0.048	0	0.286	0	0.046	0.077
Curren-tExec	429	0.127	0.087	0	0.400	0.063	0.129	0.182
BoardSize	429	16.770	5.524	6	33	13	16	21
ExcBoard-Size	429	0.220	3.987	−9.822	14.600	−2.345	0.068	2.313
NoMeet-ings	429	5.888	1.850	4	18	5	5	7
Freefloat	429	0.560	0.232	0	1	0.368	0.586	0.732
Family-Share	429	0.105	0.191	0	1	0	0	0.152
Family-Board	429	0.261	0.440	0	1	0	0	1
Market-Size	429	7.540e+09	4.700e+09	5.680e+08	1.360e+10	2.980e+09	8.740e+09	1.150e+10
Product-Diff	429	1.125	0.047	1.036	1.332	1.102	1.113	1.139
EntryCosts	429	1.850e+07	1.010e+07	2.272e+06	6.670e+07	1.500e+07	1.860e+07	2.510e+07
Herfindahl	429	−4.853	0.697	−5.470	−2.395	−5.296	−5.216	−4.604
FirmAge	429	89.910	56.590	−1	255	36	96	134
ROA	429	5.425	6.979	−35.920	78.810	2.710	4.790	7.540
TSR	429	0.142	0.418	−0.901	2.400	−0.105	0.122	0.398
TobinsQ	429	1.484	0.716	0.773	5.975	1.078	1.281	1.577
FirmSize	429	15.900	1.521	12.430	19.130	14.660	15.870	17.120
Forecasts	429	25.230	7.332	2	44	19	25	31

Score is the disclosure score developed to measure the transparency of compensation disclosure. CVerticality is the ratio between average executive compensation and average employee compensation. CVerticalityEndo is an endogeneity control that is created by regressing FirmSize, performance (ROA and TSR), industry, and year dummies of t-1 on verticality. AvgExcessComp is the average residual of the actually paid compensation minus the predicted compensation for a given company year. AvgTotalComp is the average total compensation across the executive board in t. AvgExpComp is the average of the predicted compensation. FormerExec and CurrentExec is the share of former/current executives serving on the supervisory board. BoardSize. excBoardSize is measured as the residual of regressing the number of directors on the number of employees and industry dummies. This residual variable indicates by how

Table 1 (continued)

much larger (smaller) a board is in comparison to companies in the same size and according company size. NoMeetings is the number of meetings the supervisory board conducts during a given year. Freefloat is the proportion of shares of a company that is traded in the stock market. FamilyShare is the share of a company's stock that is owned by the founding family. FamilyBoard is the number of executive or supervisory board members from the founding family. MarketSize is the sum of sales within one industry code. ProductDiff is calculated as total industry sales divided by total operating costs. Total industry sales is the sum of primary industrial segment sales. Total operating costs is the sum of operating costs for firms in a given industry. EntryCosts is the cost of property, plant and equipment for firms in a given industry weighted by the company's market share. Market share is obtained by dividing the segment sales of a firm by the market size (the sum of the segment sales of all firms that have this particular industry as their primary industry). All three variables are logarithmized to account for their skewdness. Herfindahl refers to the Herfindahl–Hirschman Index which is calculated as the sum of the squared market shares of each firm competing in the market. The market share is the company's sales in comparison to the worldwide sales in the respective industry. FirmAge is the number of years from founding year to current fiscal year. ROA is income before extraordinary items divided by average total assets. TSR (total stock return) is the ending stock price minus the initial stock price plus dividends divided by the initial stock price. TobinsQ is total assets minus common stock plus the market value of equity deflated by total assets. FirmSize is the logarithm of sales. Forecasts is the number of earnings forecasts

high excessive compensation, the estimation for excessive compensation is upwardly biased so that "normal compensation" already seems underpaid.

Table 2 illustrates the correlations between the variables used in the analysis suggesting limited multi-collinearity issues. Also, we find a high correlation between the measures of industry rivalry (*ProductDiff*, *MarketSize* and *EntryCosts*). Furthermore, there is high correlation between ownership variables (*FamilyShare*, *FamilyBoard* and *Freefloat*) and between the various compensation variables (*CVerticality*, *AvgTotalComp*, *AvgExcessComp*).

Finally, *Forecasts* and *FirmSize* exhibit correlation with other explaining variables. To ensure that correlations are within reasonable limits for regression analysis, we computed variance inflation factors (VIF). VIFs were all below 5 with an average of 1.85 and below 4 with an average VIF of 1.99 respectively for model (1) and (3) of Table 4. When including *AvgTotalComp*, the VIF of *AvgTotalComp* and *FirmSize* rises above 10 (the rest of VIFs remaining low). We therefore estimated a separate model including total compensation (column (2) and (4) of Table 4). VIFs for model (2) and (4) of Table 4 are all below 5. Consequently, the results suggest that the analysis does not suffer from any issues of multicollinearity and that the variables can be used jointly in regression models (Hair 2006).

5.2 Regression analysis

Table 3 presents the results from regressing determinants of compensation on the adjusted total compensation of a company's executives. This regression is needed to calculate excessive pay as the difference between total pay and the predicted expected pay. Similar to previous research, tenure, company size and an executive's role are important determinants of executive pay. Current performance as well as the company's prospects further increase compensation.

Table 4 shows the results of a generalized linear model with a logit link, binomial distribution family and robust standard errors. The dependent variable, *Score*, is the

Table 2 Correlation matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	Score	1																				
2	AvgTotal-Comp	0.23	1																			
3	CVertical-ity	0.06	0.64	1																		
4	AvgEx-cess-Comp	−0.02	0.43	0.47	1																	
5	Former-Exec	0.05	0.11	0.05	−0.08	1																
6	Curren-tExec	−0.02	−0.04	−0.05	−0.13	0.06	1															
7	BoardSize	−0.13	−0.13	−0.16	−0.1	−0.16	0.09	1														
8	NoMeet-ings	0.04	0.05	0.12	−0.06	−0.06	−0.07	0.04	1													
9	Comp-Dummy	−0.06	0.03	0.01	−0.01	−0.21	0.05	0.07	0.14	1												
10	Family-Share	−0.12	0.03	0.05	0.03	0.19	−0.09	0	−0.18	−0.07	1											
11	Family-Board	−0.14	0.07	0.08	0.09	0.09	−0.07	0.13	−0.11	0.01	0.66	1										
12	Freefloat	0.07	0.14	−0.03	0.05	0.05	−0.05	−0.13	0.02	0.02	−0.35	−0.28	1									
13	Market-Size	0.13	0.08	−0.01	0	−0.03	0.02	−0.1	−0.01	0.01	0.09	0.14	0.16	1								
14	Product-Diff	0	−0.06	−0.09	0.12	−0.03	−0.09	0.06	0.04	−0.05	−0.12	−0.02	0	−0.28	1							
15	Entry-Costs	0.2	0.07	0.03	0.06	−0.2	−0.04	−0.13	−0.06	0.1	−0.07	−0.02	0.02	0.44	0.23	1						
16	FirmAge	−0.03	−0.01	−0.11	−0.06	0.03	0.15	0.13	−0.1	0	−0.05	−0.07	0.1	0.27	−0.27	0.02	1					
17	ROA	−0.06	0.14	0.11	0.07	0.09	−0.14	−0.07	−0.11	−0.07	0.24	0.21	0	−0.02	0.2	0.02	−0.1	1				

Table 2 (continued)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
18	TSR	−0.05	0.05	0.02	−0.02	0.01	−0.02	−0.11	−0.08	−0.01	0.04	0.05	0.01	0.01	0.04	0	0.01	0.18	1			
19	TobinsQ	−0.11	0.07	0.02	0.03	0.17	−0.09	−0.09	−0.09	−0.04	0.43	0.34	−0.07	−0.09	0.08	−0.01	−0.14	0.44	0.22	1		
20	FirmSize	0.27	0.69	0.39	−0.08	0.11	0.18	0	0.04	0.06	−0.11	−0.09	0.07	0.01	−0.17	0.06	0.09	−0.19	−0.04	−0.29	1	
21	Forecasts	0.25	0.53	0.021	−0.04	0.22	0.07	−0.02	0.01	0.08	0.03	−0.01	0.18	0.16	−0.03	0.16	0.01	0.03	−0.12	0.04	0.63	1

Table 3 Firm-level pooled cross sectional OLS regression to predict expected compensation

Variables	Log(AdjTotalComp)t
Tenure	0.0262*** (0.0043)
$FirmSize_{t-1}$	0.293*** (0.0054)
ROA	0.0097*** (0.0031)
ROA_{t-1}	0.0017 (0.0037)
ROA_{t-2}	0.001 (0.0024)
$TobinsQ_{t-1}$	0.168*** (0.0167)
$Leverage_{t-1}$	0.0641 (0.0497)
CEO	0.532*** (0.0201)
TSR	0.0800** (0.0364)
TSR_{t-1}	− 0.0086 (0.0429)
TSR_{t-2}	0.0569 (0.0356)
Year FE	Yes
Industry FE	Yes
Constant	2.211*** (0.104)
Observations	3071
Adjusted R-squared	0.575

The column represents the results of a pooled cross-sectional OLS regression. The sample consists of 3,071 observations for German DAX and MDAX members of the executive board from fiscal years 2006 to 2014. Total compensationt is salary, short-term incentive, mid-term incentive and long-term incentive (here meaning stock-based compensation) as well as other annual pay for the manager in the year t. Compensation for executives with less than 365 days of presence in the board has been adjusted by dividing through the number of days and taking the result times 365. Total compensation amounts are given in thousands of Euros. Total adjusted compensation is logarithmized. Tenuret is the manager's tenure in years at the end of the fiscal year. Log(Sales)t-1 is the logarithm of firm sales for the year t-1. ROAt, ROAt-1 and ROAt-2 are income before extraordinary items divided by average total assets for year t, t-1 and t-2 respectively. TobinsQt-1 is TobinsQ at the end of the year t-1. TobinsQ is the market value of a company's assets divided by the book value. CEO is a dummy indicating whether a manager has been CEO in the year t. TSR, TSRt-1and TSRt-2 is total stock return in the year t, $t-1$ and $t-2$ respectively. Industry and year fixed effects are included but not tabulated. Robust standard errors in parentheses

***$p<0.01$, **$p<0.05$, *$p<0.1$

number of points gained in the disclosure index divided by the maximum reachable points for each company. Columns 1 and 2 examine the impact of governance and compensation as well as company characteristics on a company's disclosure decision. Time and industry fixed effects are included. As some of the industry dummies are significant, column 3 and 4 examine the alternative explanation for withheld information, namely industry rivalry.

The results suggest that overall, the managerial power theory has to be rejected. Neither *AvgExcessComp* nor governance variables exhibit significant coefficients

Table 4 Determinants of (non-)disclosure

Variables	(1) Percentage score	(2) Percentage score	(3) Percentage score	(4) Percentage score
Compensation				
AvgExcessComp	0.0124		0.0143	
	(0.0091)		(0.0092)	
CVerticality	−0.0708**		−0.0875**	
	(0.0336)		(0.0351)	
AvgTotalComp		−3.12e−06		−5.29e−06
		(2.19e−05)		(2.10e−05)
Governance				
BoardSize	−0.0045	−0.0039	−0.004	−0.0034
	(0.004)	(0.0041)	(0.0041)	(0.0042)
FormerExec	0.0908	0.0331	0.142	0.0646
	(0.361)	(0.360)	(0.351)	(0.348)
CurrentExec	−0.0623	−0.0104	−0.0355	0.0100
	(0.194)	(0.194)	(0.191)	(0.191)
NoMeetings	−0.003	−0.0058	−0.0041	−0.008
	(0.0088)	(0.009)	(0.0091)	(0.0095)
Ownership				
Freefloat	−0.133	−0.120	−0.0576	−0.0422
	(0.0842)	(0.0848)	(0.0816)	(0.0811)
FamilyShare	−0.176	−0.164	−0.121	−0.117
	(0.154)	(0.156)	(0.144)	(0.146)
FamilyBoard	−0.107**	−0.108**	−0.0913*	−0.0919*
	(0.0485)	(0.0493)	(0.0478)	(0.0483)
Industry				
MarketSize			0.0350	0.0377
			(0.0284)	(0.0285)
ProductDiff			0.994**	1.276***
			(0.444)	(0.439)
EntryCosts			−0.0543*	−0.0551*
			(0.0308)	(0.0312)
Industry FE	Yes	Yes	No	No
Company				
FirmAge	−0.0007**	−0.0007**	−0.0007**	−0.0006**
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
ROA	0.0004	−0.0005	0.0019	0.0009
	(0.0023)	(0.0022)	(0.0022)	(0.002)
TSR	−0.0288	−0.0321	−0.0376	−0.0387
	(0.0502)	(0.0501)	(0.0521)	(0.0524)
TobinsQ	−0.0125	−0.0141	−0.00478	−0.0093
	(0.0374)	(0.0372)	(0.0395)	(0.0397)
FirmSize	0.0723***	0.0566***	0.0807***	0.0621***
	(0.0187)	(0.0205)	(0.0184)	(0.0189)
Forecasts	0.005	0.0051	0.0053*	0.0056*
	(0.0031)	(0.0032)	(0.00312)	(0.0032)
Time FE	Yes	Yes	Yes	Yes

Table 4 (continued)

Variables	(1) Percentage score	(2) Percentage score	(3) Percentage score	(4) Percentage score
Constant	− 1.416*** (0.266)	− 1.406*** (0.312)	− 1.615*** (0.553)	− 1.704*** (0.571)
Observations	429	429	429	429

This table shows the results of a generalized linear model with a logit link, binomial distribution family and robust standard errors. The dependent variable, Score, is the number of points gained in the disclosure index divided by the maximum reachable points for each company. AvgExcessComp is the average residual of the actually paid compensation minus the predicted compensation for a given company year. CVerticality is the ratio between average executive compensation and average employee compensation. AvgTotalComp is the average total compensation across the executive board in t. BoardSize is measured as the residual of regressing the number of directors on the number of employees and industry dummies. This residual variable indicates by how much larger (smaller) a board is in comparison to companies in the same size and according company size. FormerExec and CurrentExec is the share of former/current executives serving on the supervisory board. NoMeetings is the number of meetings the supervisory board conducts during a given year. Freefloat is the proportion of shares of a company that is traded in the stock market. FamilyShare is the share of a company's stock that is owned by the founding family. FamilyBoard is the number of executive or supervisory board members from the founding family. MarketSize is the sum of sales within one industry code. ProductDiff is calculated as total industry sales divided by total operating costs. Total industry sales is the sum of primary industrial segment sales. Total operating costs is the sum of operating costs for firms in a given industry. EntryCosts is the cost of property, plant and equipment for firms in a given industry weighted by the company's market share. Market share is obtained by dividing the segment sales of a firm by the market size (the sum of the segment sales of all firms that have this particular industry as their primary industry). All three variables are logarithmized to account for their skewness. FirmAge is the number of years from founding year to current fiscal year. ROA is income before extraordinary items divided by average total assets. TSR (total stock return) is the ending stock price minus the initial stock price plus dividends divided by the initial stock price. TobinsQ is total assets minus common stock plus the market value of equity deflated by total assets. FirmSize is the logarithm of sales. Forecasts is the number of earnings forecasts. Industry and year fixed effects are included but not tabulated. Robust standard errors in parentheses

***p < 0.01, **p < 0.05, *p < 0.1

with the predicted signs. However, the coefficient of *CVerticality*, is significant with a negative sign. This indicates that companies choose to be less transparent in compensation reports to prevent public discussions on social equity issues. This is a particularly interesting finding as companies listed in the US are obliged to publish such a ratio in the compensation reports from 2017 onwards. Thus, we cannot confirm an association of excessive compensation and the level of disclosure, yet, we find evidence supporting a negative association between the verticality of pay and disclosure. Meanwhile neither board size nor meeting frequency or the number of (former) CEOs on board influence the degree of disclosure.

We find that neither *Freefloat* nor *FamilyShare* have a significant influence. However, the variable *FamilyBoard* does show a significant and negative coefficient thus pointing to an influence of family ownership. The reason could be that family companies monitor managers closer and exhibit lower information asymmetry between owners and managers, especially when family members are actively involved in the daily business. Overall, this result is line with findings from prior literature (i.e., Ali et al. 2007).

The company related findings are rather interesting. We could argue, that they point towards a rejection of managerial power as driver of non-disclosure and stand in favor of aspects of efficiency and simplification. Bigger companies disclose more information on compensation (positive and significant coefficient of *FirmSize*). This may be due to increased public attention yet also resource availability for setting up a proper disclosure process. Yet, we could also argue in favor of the managerial power theory here. Larger firms are obviously under stronger public scrutiny, which in change might limit managerial power. This would be an interesting topic for further investigation also taking the public outrage component into account. Interestingly, but in line with research on institutional inertia and change (Chizema 2008), older companies struggle more to disclose executive compensation than younger companies (significant and negative coefficient of *FirmAge*). Again, this could be an argument in favor of the managerial power theory as here the management might exert a higher amount of power.

Finally, as there are industry effects on executive compensation disclosure, it is worth looking at the industry rivalry variables *MarketSize*, *ProductDiff* and *EntryCosts.* According to Robinson et al. (2011) the competitiveness of a market or industry should increase in *MarketSize* and decrease in *ProductDiff* and *EntryCosts*. If disclosure is indeed inversely linked to industry rivalry, disclosure should decrease in *MarketSize* and increase in *ProductDiff* and *EntryCosts*. While *MarketSize* exhibits no significant coefficient, *ProductDiff* shows a medium positive coefficient and *EntryCosts* a weak negative impact on disclosure. Results are therefore not fully consistent with theory and it remains to understand whether disclosure is indeed linked to industry rivalry.

5.3 Robustness checks

5.3.1 Alternative measure for proprietary costs

Previous literature often employs the Herfindahl–Hirschman Index as variable to measure industry rivalry. As can be observed in Table 5, the alternative use of the Herfindahl–Hirschman Index for measuring proprietary costs does not exhibit a significant coefficient. At the same time the variable *Herfindahl* changes only a few of the other coefficients in sign or significance.

5.3.2 Endogeneity

Due to the endogenous setting of the analysis, doubts may be raised about the unbiasedness of the coefficients. In order to address this concern, an endogeneity control variable was created by regressing the respective endogenous variable on its main drivers. The predicted level of pay in $t-1$ is included as endogeneity control in all the models containing executive pay or excessive pay. For verticality, we regress *FirmSize*, performance (*ROA* and *TSR*), industry and year dummies of the previous year on *CVerticality* and include the predicted value as endogeneity control in the respective models (see Table 6). As with the Herfindahl–Hirschman Index,

Table 5 Determinants of (non-) disclosure—alternative industry measure (robustness check)

Variables	(1) Percentage score	(2) Percentage score
Compensation		
AvgExcessComp	0.0173*	
	(0.009)	
CVerticality	−0.101***	
	(0.0342)	
AvgTotalComp		5.16e−06
		(2.14e−05)
Governance		
BoardSize	−0.0026	−0.0015
	(0.0042)	(0.0042)
FormerExec	0.355	0.279
	(0.317)	(0.309)
CurrentExec	−0.0497	0.0056
	(0.191)	(0.190)
NoMeetings	−0.0007	−0.0055
	(0.009)	(0.0093)
Ownership		
Freefloat	−0.0405	−0.0268
	(0.0781)	(0.0786)
FamilyShare	−0.140	−0.149
	(0.143)	(0.146)
FamilyBoard	−0.0756	−0.077
	(0.0480)	(0.0485)
Industry		
Herfindahl	0.0045	0.0038
	(0.0223)	(0.0227)
Industry FE	No	No
Company		
FirmAge	−0.0007***	−0.0007**
	(0.0003)	(0.0003)
ROA	0.003	0.0018
	(0.002)	(0.0018)
TSR	−0.0295	−0.0299
	(0.0525)	(0.0529)
TobinsQ	−0.0175	−0.0272
	(0.0402)	(0.0414)
FirmSize	0.0734***	0.0428**
	(0.0176)	(0.0180)
Forecasts	0.006*	0.0067**
	(0.0031)	(0.0032)
Time FE	Yes	Yes
Constant	−1.453***	−1.332***
	(0.287)	(0.311)
Observations	429	429

This table shows the results of a generalized linear model with a logit link, binomial distribution family and robust standard errors.

Table 5 (continued)

The dependent variable, Score, is the number of points gained in the disclosure index divided by the maximum reachable points for each company. AvgExcessComp is the average residual of the actually paid compensation minus the predicted compensation for a given company year. CVerticality is the ratio between average executive compensation and average employee compensation. AvgTotalComp is the average total compensation across the executive board in t. BoardSize is measured as the residual of regressing the number of directors on the number of employees and industry dummies. This residual variable indicates by how much larger (smaller) a board is in comparison to companies in the same size and according company size. FormerExec and CurrentExec is the share of former/current executives serving on the supervisory board. NoMeetings is the number of meetings the supervisory board conducts during a given year. Freefloat is the proportion of shares of a company that is traded in the stock market. FamilyShare is the share of a company's stock that is owned by the founding family. FamilyBoard is the number of executive or supervisory board members from the founding family. The Herfindahl–Hirschman Index is calculated as the sum of the squared market shares of each firm competing in the market. The market share is the company's sales in comparison to the worldwide sales in the respective industry. FirmAge is the number of years from founding year to current fiscal year. ROA is income before extraordinary items divided by average total assets. TSR (total stock return) is the ending stock price minus the initial stock price plus dividends divided by the initial stock price. TobinsQ is total assets minus common stock plus the market value of equity deflated by total assets. FirmSize is measured via the logarithm of sales. Forecasts is the number of earnings forecasts. Industry and year fixed effects are included but not tabulated. Robust standard errors in parentheses

***p < 0.01, **p < 0.05, *p < 0.1

AvgExcessComp again exhibits a positive slightly significant coefficient, which is quite puzzling. A possible answer could be that such companies face more public scrutiny for their pay and try to mitigate this by providing more information in the report. *FirmSize* and *FirmAge* remain significant with the expected signs. The same holds for *FamilyBoard*, which once again exhibits a significant negative coefficient. In model 1 and 2 also *Freefloat* is significant with the predicted sign. However, that result is not robust across the analyses. Similarly, *Forecasts* once again shows significant coefficients with the expected sign. Governance variables remain insignificant once again. The Industry Rivalry variables react similar to the first analyses: *ProductDiff* and *EntryCosts* show significant coefficients. Model 3 additionally presents a moderately significant positive coefficient for *MarketSize*. Given that the competitiveness of an industry should increase in *MarketSize* and decrease in *ProductDiff* and *EntryCosts*, transparency should decrease with higher *MarketSize* and increase with higher *ProductDiff* and *EntryCosts*. This prediction only holds for *ProductDiff*, the other variables show coefficients with signs not predicted. Given the lacking result for the alternative examination of industry rivalry with the help of the Herfindahl index, these results leave doubts whether companies really suffer from proprietary costs when not disclosing compensation data in more detail.

Table 6 Determinants of (non-)disclosure—endogeneity controls (Robustness check)

Variables	(1) Percentage score	(2) Percentage score	(3) Percentage score	(4) Percentage score
Compensation				
AvgExcessComp	0.0188*		0.0196*	
	(0.0102)		(0.0104)	
CVerticality	−0.105**		−0.124***	
	(0.0421)		(0.0451)	
AvgTotalComp		−1.45e−06		−7.17e−06
		(2.37e−05)		(2.25e−05)
Governance				
BoardSize	−0.0019	−0.0012	−0.0012	0.0002
	(0.0041)	(0.0042)	(0.0042)	(0.0043)
FormerExec	−0.0071	−0.108	−0.0355	−0.142
	(0.398)	(0.4)	(0.386)	(0.382)
CurrentExec	−0.213	−0.136	−0.200	−0.0986
	(0.205)	(0.204)	(0.206)	(0.202)
NoMeetings	0.0007	−0.0052	−0.0009	−0.0075
	(0.0093)	(0.0096)	(0.0098)	(0.0103)
Ownership				
FamilyShare	−0.148	−0.120	−0.0684	−0.0293
	(0.168)	(0.167)	(0.157)	(0.154)
FamilyBoard	−0.142***	−0.141***	−0.124**	−0.124**
	(0.0502)	(0.0517)	(0.05)	(0.0516)
Freefloat	−0.230**	−0.192**	−0.133	−0.0824
	(0.0932)	(0.0932)	(0.0927)	(0.0916)
Industry				
MarketSize			0.0648**	0.0478
			(0.0327)	(0.0314)
ProductDiff			1.498***	1.402***
			(0.467)	(0.46)
EntryCosts			−0.0865**	−0.0599*
			(0.0338)	(0.0321)
Industry FE	Yes	Yes	No	No
Endogeneity				
$AvgExpComp_{t-1}$	−0.0208	−0.0091	−0.0184	−0.00689
	(0.0160)	(0.0149)	(0.0153)	(0.0149)
$CVerticalityEndo_{t-1}$	0.0039		0.0031	
	(0.0027)		(0.002)	
Company				
FirmSize	0.0821**	0.0657**	0.092***	0.0686**
	(0.0340)	(0.0309)	(0.031)	(0.0280)
Forecasts	0.0068**	0.007**	0.0077**	0.0081**
	(0.0033)	(0.0034)	(0.0034)	(0.0034)
FirmAge	−0.0009***	−0.0009***	−0.0008**	−0.00078**
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
ROA	−0.0038	−0.0041	−0.0019	−0.0025
	(0.003)	(0.003)	(0.0032)	(0.0032)

Table 6 (continued)

Variables	(1) Percentage score	(2) Percentage score	(3) Percentage score	(4) Percentage score
TSR	−0.0334	−0.0485	−0.0386	−0.0529
	(0.0537)	(0.0539)	(0.0575)	(0.0579)
TobinsQ	0.0117	0.0049	0.0121	0.0065
	(0.0429)	(0.0434)	(0.0458)	(0.0465)
Time FE	Yes	Yes	Yes	Yes
Constant	−1.387***	−1.4***	−1.803***	−1.854***
	(0.426)	(0.449)	(0.692)	(0.697)
Observations	362	362	362	362

This table shows the results of a generalized linear model with a logit link, binomial distribution family and robust standard errors. The dependent variable, Score, is the number of points gained in the disclosure index divided by the maximum reachable points for each company. AvgExcessComp is the average residual of the actually paid compensation minus the predicted compensation for a given company year. AvgExpComp is the average of the predicted compensation. CVerticality is the ratio between average executive compensation and average employee compensation. AvgTotalComp is the average total compensation across the executive board in t. BoardSize is measured as the residual of regressing the number of directors on the number of employees and industry dummies. This residual variable indicates by how much larger (smaller) a board is in comparison to companies in the same size and according company size. FormerExec and CurrentExec is the share of former/ current executives serving on the supervisory board. NoMeetings is the number of meetings the supervisory board conducts during a given year. Freefloat is the proportion of shares of a company that is traded in the stock market. FamilyShare is the share of a company's stock that is owned by the founding family. FamilyBoard is the number of executive or supervisory board members from the founding family. MarketSize is the sum of sales within one industry code. ProductDiff is calculated as total industry sales divided by total operating costs. Total industry sales is the sum of primary industrial segment sales. Total operating costs is the sum of operating costs for firms in a given industry. EntryCosts is the cost of property, plant and equipment for firms in a given industry weighted by the company's market share. Market share is obtained by dividing the segment sales of a firm by the market size (the sum of the segment sales of all firms that have this particular industry as their primary industry). All three variables are logarithmized to account for their skewness. Endogeneity controls are calculated by regressing common determinants of pay and verticality on the variables AvgTotalComp and verticality. FirmAge is the number of years from founding year to current fiscal year. ROA is income before extraordinary items divided by average total assets. TSR (total stock return) is the ending stock price minus the initial stock price plus dividends divided by the initial stock price. TobinsQ is total assets minus common stock plus the market value of equity deflated by total assets. FirmSize is the logarithm of sales. Forecasts is the number of earnings forecasts. Industry and year fixed effects are included but not tabulated. Robust standard errors in parentheses

***p < 0.01, **p < 0.05, *p < 0.1

6 Discussion and conclusion

We examine voluntary disclosure of companies in compensation reports in a German context which is characterized by relatively low regulatory constraints. To asses disclosure levels, we have developed a unique disclosure index. We find that the developed index can be related to information asymmetry which provides evidence that the index is valid and compensation report transparency is translated into the market's perception of a company's information asymmetry.

The results of the main analysis challenge the assumptions of the managerial power theory. Contrary to expectations, we do not find evidence that companies

with lower transparency in their compensation reports suffer from excessive executive compensation or weak governance. This stands in contrast to previous US studies (Robinson et al. 2011; Coulton et al. 2001; Laksmana 2008; Ben-Amar and Zeghal 2011), which supported the managerial power theory. Our findings are more aligned with those of Muslu (2010) for the European market, who found evidence supporting the optimal contracting theory.

All our other findings indicate that companies opt for higher-quality disclosure primarily due to efficiency-driven considerations: *FirmSize* exerts a significant influence on the extent of disclosure, indicating that resource-constraint companies may allocate fewer efforts to disclosure activities. A company's information environment (measured by the company's forecasts) and company age also exhibit robust impacts on disclosure levels. These findings suggest that achieving transparency in executive compensation necessitates a certain level of financial and time resources, which might not be readily available or prioritized by less experienced firms. This is underlined by a discussion of direct compliance costs for pay ratio disclosure by the US SEC (SEC 2015). The SEC emphasizes the financial and time resources required to adhere to the disclosure guidelines, shedding light on the practical challenges faced by firms in pursuit of transparency. This parallels discussions around Corporate Social Responsibility (CSR) disclosure, where financial and time constraints are recognized as influential factors affecting disclosure implementation. Moreover, external signaling mechanisms, as discussed by Gamerschlag et al. (2011), often contrast with these resource constraints and serve as catalysts for increased disclosure within the field.

However, companies with higher *Verticality* also disclose less detailed compensation reports. This result is extremely robust across all analyses. It may indicate that companies are mainly worried about social equity issues as these create higher public scrutiny. Thus, there is a resource and a strategic component that both influence the transparency of executive pay disclosure. Since literature on the pay ratio influence is scarce, it will remain particularly interesting to compare the results to future research. As for our sample and the German setting, the non-finding of an influence of excessive compensation in combination with a robust result for verticality may be influenced by the overall lower compensation for German executives while having a country setting that has a strong sense for inequality with regards to pay distributions.

Another important driver of non-disclosure is the number of family members on the board (*FamilyBoard*). As the only ownership-related driver, the reason may stem from the heightened vigilance exercised by family-owned enterprises in overseeing managerial activities. Such firms tend to maintain lower levels of information asymmetry between ownership and management, particularly when family members are actively engaged in day-to-day operations. Our result thus aligns with prior literature (Ali et al. 2007). Yet, the overall influence of the ownership structure remains controversial. Therefore, also a country influence can be assumed. Germany, with its strong family tradition, and many firms with highly influential families on their boards, might be especially prone to an influence on the compensation transparency. Especially for family members on the board, the

transparent communication of executive compensation might be seen as a threat to the privacy of the family and the individual (Engel et al. 2019).

Additional analyses could shed light onto the role of industry rivalry as a motivation for retaining information. While only the variable *ProductDiff* exhibits a robust significant coefficient with the predicted sign, all other variables trying to capture industry rivalry fail at providing consistent and significant results. The findings cast doubt on the assumption that companies universally suffer from proprietary costs when not disclosing compensation data in more detail. Maybe executive compensation transparency does not play such an important role in industry rivalry that there is an actual visible influence. Yet, this could again also be assigned to the German sample. As the average compensation is still below the average expected compensation for German firms, maybe the rivalry effect is attenuated. In addition, the analysis was undertaken as literature has shown that companies claim competitive disadvantages (proprietary costs) from transparent reporting (Robinson et al. 2011). Yet, also the study of Robinson et al. (2011) could not reveal any alignment of withheld disclosure and actual proprietary costs. Therefore, it seems that although this might be stated by firms, the actual influence cannot be sufficiently supported.

While family members on the board negatively influence disclosure, none of the governance or other ownership variables revealed any significant influence. As our German setting exhibits the specialty of two-tier boards systems, the non-relevance of the governmental variables could be routed in a stronger power distribution. Thus, we can assume that the idea of a separated board in this case fulfills its task. This also influences the managerial power theory, which in turn does not hold and might have to be adjusted for the German setting. The optimal contracting theory in contrast is supported in this setting as the power distribution seems to enable a mitigation of information asymmetries. In addition, as boards in larger firms also have employee representatives, there might be an additional Germany-specific influencing factor that has not been taken into account with regards to the theoretical setting. As our prior literature analysis also left the decision open, whether former executives on the board bear more costs or benefits for the company, we can now state that we do not find any overall effect, which could also indicate that the directions cancel each other out.

An interesting result is the influence of company age. It negatively influences transparency, which means older firms are less transparent than younger ones. This is counterintuitive at first. From a managerial power perspective, one should assume that older firms might have a stronger tradition of leadership and therefore more influential managers. This could be in line with a lower transparency. Yet, it could also be a simple matter of less change in the systems. Maybe older firms are simply more used to their established routines and adopting new accounting measures is not prioritized. Also, in line with the optimal contracting theory, maybe there is no need or pressure for an adoption of transparent reporting as stakeholders as well as

shareholders are used to a certain system and do not feel that there is a lack of information. Altogether, this could be an interesting field for further investigations.

Lastly, also *AvgExcessComp* does not show any significant result. This might be the strongest indicator against the viability of the managerial power theory in our analysis. Maybe this is routed in the overall less high executive compensation in Germany as compared to the US. Thus, the higher influence could stem from the verticality, which gives a stronger indication for possible public outrage than an assumed excessive compensation which is overall harder to visualize. Also, the unclear influence of performance (*Forecasts*) might play a role here. German firms do not seem to compensate positive performance as strongly in their executive pay. Meanwhile, Crossland and Hambrick (2007) find strong and robust evidence that CEOs in Germany also have a substantially lower impact on firm outcome than CEOs in the US. This might be part of the explanation for the unstable influence of performance on compensation report transparency.

Overall, the results provide new insights on disclosure by indicating country-based variations as they diverge significantly from findings in Anglo-American studies. The possible concern about infringing public outrage also aligns with the assignment of Germany being a stakeholder-oriented country.

From a legislative perspective, our findings suggest that simplifying and reducing the time required for disclosure may encourage more companies to provide the requested information. Moreover, the dismissal of the managerial power theory's assumption implies that current disclosure requirements may not necessitate tightening. Third, the negative influence of verticality on transparency warrants further examination. While inequality concerns resonate dominantly in public discourse and elections, shareholders, who could benefit from increased information availability, seem less concerned. Companies might need encouragement to pursue a more shareholder friendly disclosure policy. Overall, the observable shift towards model tables could address these issues, facilitating more efficient information retrieval for both companies and shareholders.

To sum up, our paper is motivated by the public discussion on management compensation. Specifically, we seek to empirically evaluate the explanatory power of the managerial power theory (Bebchuk et al. 2001). While the theory has sparked extensive scholarly discussions regarding executive pay adequacy and performance sensitivity, two of its major assumptions—public outrage and camouflage—have received insufficient attention in research. By investigating the question of transparency within a distinct governance, legislative and societal context, this paper contributes to the literature in multiple dimensions.

In conclusion, our study identifies four main determinants shaping the disclosure decisions of German companies: company size, age, family representation on boards, and verticality. The absence of disclosure appears to be a confluence of company resources (company size and forecasts increase disclosure), owner interests (family members in the board decreases disclosure), and concerns about social equity infringement (higher inequity leads to lower disclosure).

Appendix

Setting up the disclosure index

One of the biggest challenges within the field of disclosure research is to come up with a meaningful measure for disclosure itself. Researchers on voluntary financial disclosure frequently use the number of management forecasts, metrics based on the AIMR database or self-constructed indices to measure voluntary disclosure (see Healy and Palepu 2001, for a research overview).

In the German setting and the case of management compensation there is no existing pre-calculated measure provided by any database or former research. We are therefore applying a self-developed disclosure index to measure the amount of disclosure with regards to executive compensation drawing on existing literature on financial disclosure (Botosan 1997) as well as product-related disclosure (Guo et al. 2004). This approach is also common in the specific field of executive compensation disclosure (Coulton et al. 2001; Laksmana 2008). An index can be used both to understand compliance with existing regulation as well as the level of voluntary disclosure, depending on how the index items are determined (Marston and Shrives 1991). Other than Coulton et al. (2001), who derive the index items from Australian law, and Laksmana (2008), who follows a list of SEC recommendations, the index of this paper includes both voluntary and required disclosure items. Consequently, there are as many index items as needed to fully understand the current compensation system and to gain insight into how much is spent for each executive. This way we can identify which companies "drop out" on the way to full disclosure.

The result is an index consisting of three parts and 111 index items: The first part of the questionnaire collects information on the compensation components, the second examines the report's overall readability and the third analyzes whether there is information given on the compensation system's adequacy.

In the first part of the index all possible compensation components are included as distinctive sections: salary, consultancy contracts, one-off payments, fringe benefits, salary, short term incentive (cash based compensation over one year), mid-term incentive (cash based compensation over more than one year) and long term incentive (all share-based compensation and options) as well as pensions. Simple compensation components consist only of a few index items. The section salary for example only checks whether this component is disclosed individually and separately from other components. Additionally, we check whether the company has disclosed any target compensation so to understand the compensation's intended compensation structure. The index items within the sections control whether there is all necessary information to fully understand the pay components and the resulting financial outcomes for the managers and shareholders. It therefore builds an important block of the information available about the installed compensation system. In this part every index item can yield a maximum amount of 1 point.

In the second part of the index the report's readability is examined. This is to understand whether the company uses tables and graphs to ease the reading or whether footnotes or contradictory information are confusing the reader. This part

is important to understand whether companies indeed engage in camouflaging activities. Most index items gain a maximum point of 1. However, there are multiple index items on the readability of the compensation numbers: If for a given executive all numbers can be found in one table and therefore be gathered at one glance, the index assigns three points to the company. If compensation has to be gathered from footnotes or is hidden in long texts, the number of points is reduced accordingly.

The third part of the index aims to understand how the company explains the adequacy of its compensation system and pay setting process. The compensation report should enable the shareholder to understand whether the compensation is adequate and what measures have been taken to reach this goal. The index items therefore aim to understand whether the company is comparing its pay to peers, other employees and performance for example. All index items yield a maximum of 1 point.

Calculating the index score

The index score can be calculated by either adding up the achieved points or by building a relative score. As proposed by Marston and Shrives (1991), we chose a relative score which is calculated as the following:

Index Score:

$$Score = \frac{\sum Achieved\ points}{\sum Maximum\ points\ achievable}$$

By applying a relative score the index can account for the fact that not all companies have the same compensation components. This ensures that companies without specific pay components are not disadvantaged and guarantees that each company can reach a disclosure score of 100%.

Reliability and validity of the created index score

According to Marston and Shrives (1991) social sciences usually consider two criteria to evaluate measures for a score's effectiveness: reliability and validity.

Reliability: Marston and Shrives (1991, p. 197) call index scores reliable if "the results can be replicated by another researcher". As the data is collected with the help of compensation reports in annual reports (which remain constant over time) and we can provide a guide for the data collection, the score should be replicable and also transferable onto other countries' settings. Data was collected and checked through different people, ensuring high reliability in the assignments of the index score.

Validity: According to Marston and Shrives (1991) the index scores "can be considered valid if they mean what the researchers intended" (Marston and Shrives 1991, p.198). The index score aims to provide a measure for disclosure quality of executive compensation. It is also a measure of information asymmetry between

shareholders and directors/managers within the company. To test the validity of the developed index, we follow Laksmana (2008) and Guo et al. (2004). They both use established measures of information asymmetry, stock return volatility and bid-ask spread (Gloston and Milgrom 1985). If the score has a significant impact on the observed information asymmetry between shareholders and the company, the score can be considered valid (Guo et al. 2004; Laksmana 2008).

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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