Alternative Performance Measures: Determinants of Disclosure Quality - Evidence from Germany

Alternative performance measures (APMs) might be used to improve the information environment or strategically to mislead the market. The recently introduced European Securities and Markets Authority APM guidelines are intended to enhance corporate financial disclosures. We analyse the disclosure quality and determinants of all types of APMs in management reports of German listed firms for two financial periods. Although the quantity of APM disclosures is extensive, it differs across firms' characteristics, and there is considerable room for improvement regarding disclosure quality. APM disclosure quality is positively associated with firm size and negatively associated with profitability. However, not all firms' characteristics can be applied *per se* as universal determinants of APM disclosure quality and a distinction must be made between different types of APMs. For example, high ownership concentration is negatively associated particularly with the quality of profitability APMs. Firms' leverage is only positively associated with the disclosure quality of non-profitability APMs.

Keywords: disclosure quality, alternative performance measures, non-GAAP measures, pro forma financial measures, voluntary disclosure, ESMA guidelines

Subject classification codes: M40, M41

1. Introduction

Voluntary disclosures are one of the mechanisms firms use to mitigate information asymmetry and reduce the cost of capital (Healy & Palepu, 2001; Verrachia, 1983). *Alternative Performance Measures* (APMs, also referred to as 'non-GAAP [performance]' or 'pro-forma' measures) are increasingly used by managers to voluntarily convey additional information about the firms' financial position and performance to the market. The proliferation of APMs has sparked debate about whether they are a curse or a blessing (e.g. Allee, Bhattacharya, Black & Christensen, 2007; Brouwer, Faramarzi & Hoogendoorn, 2014; Young, 2014). On the one hand, if the definitions and calculations of APMs are disclosed transparently and consistently, the information environment will be enhanced, and this should lead to positive economic effects. On the other hand, inconsistent, biased and/or opaque APM disclosures might lead to obfuscation that impairs economic values (Bhattacharya, Black, Christensen & Mergenthaler, 2004; Doyle, Jennings & Soliman, 2013).

The European Securities and Markets Authority (ESMA) aim to enhance the disclosure of APMs by introducing new guidelines with effect from 2016 (ESMA, 2015). An APM is defined by ESMA '[…] *as a financial measure of historical or future financial performance, financial position, or cash flows, other than a financial measure defined or specified in the applicable financial reporting framework'* (ESMA, 2015, p. 6-17). While the decision of *whether* to disclose APMs is voluntary, the ESMA APM guidelines introduce requirements about *how* APMs should be disclosed. Firms that choose to disclose APMs are expected to comply with the ESMA APM guidelines. The vital and supposedly double-edged effect of APMs on investors and this newly created European policy setting provides the motivation to analyse APM disclosure quality.

We analyse all types of financial APMs and which firm determinants affect the quality of APM disclosures using a sample of 133 German firms' group management reports for 2016

and 2017 financial periods. We use ESMA's seven APM quality requirements to establish a robust, multi-faceted index of APM disclosure quality. By collecting all APMs, we paint a more complete picture of disclosures than studies that examine only (adjusted) earnings measures. For this purpose, we categorise the 2,620 collected APMs and divide them into two main groups, profitability APMs (earnings measures) and non-profitability APMs (non-earnings measures).[1]

Our findings show that German firms make intense use of APMs in their management reports with a total number of 1,321 (1,299) APMs in 2016 (2017). On average, ten APMs are disclosed by each firm with a minimum of two up to 20 APMs per management report. Furthermore, our dichotomous disclosure quality index (DQI) over the two financial periods shows a mean value of 0.62, with a minimum of 0.40 and a maximum of 0.91. No firm reaches full compliance for all its disclosed APMs, which illustrates that more regulatory effort is necessary to ensure compliance with the ESMA APM guidelines.

Furthermore, we identify several determinants that affect APM disclosure quality. We find that firm size is positively and profitability is negatively associated with APM disclosure quality for profitability as well as non-profitability APMs. We do not find effects of firms' leverage for profitability APMs but a positive association for non-profitability APMs. Higher ownership concentration has a (marginal) negative relation to disclosure quality of APMs, particularly for profitability APMs. Additionally, Big Four auditors are negatively associated with APM disclosure quality of non-profitability APMs. Interestingly, just the *quantity* of

[1] Profitability APMs are also called 'pro forma earnings' or 'non-GAAP earnings measures' in the accounting and finance literature (e.g. Doyle et. al., 2013; Jennings & Marques, 2011; Leung & Veenman, 2018; Young, 2014). We use the terms profitability/non-profitability APMs throughout the paper. Non-profitability APMs compromise the following APM categories: asset/capital structure, liquidity/cash flow, capital efficiency, stock market/valuation, and volume/growth.

disclosed profitability APMs appears to be negatively related to disclosure *quality* of profitability APMs.

Our regulatory setting, the recently issued ESMA APM guidelines, is a highly topical issue for academics, practitioners and regulators. Our study gives an overview of the status-quo and contributes to the ongoing APM policy debate as well as extant literature in several ways. First, prior literature focuses on the quantity, frequency or the value relevance of APMs in financial communication (e.g. Black, Christensen, Kiosse & Steffen, 2017; Dainelli, Bini & Giunta, 2013; Elzahar, Hussainey, Mazzi & Tsalavoutas, 2015; Marques, 2006, 2010; Stenheim, Beckman, Olsen Valltoft & Madsen, 2018; Watson, Shrives & Marston, 2002), or just provides descriptive statistics of APM disclosures (Blab & Turi, 2018; Wühst & Rosner, 2015). Furthermore, most prior studies limit their analyses to earnings measures and specific aspects of earnings disclosures (e.g. Guillamon-Saorín, Isidro & Marques, 2017; Heflin & Hsu, 2008; Hitz, 2010; Isidro & Marques, 2013; Jennings & Marques, 2011; Reimsbach, 2014). The few studies that examine APM disclosure quality in annual reports empirically focus on specific (labelled) performance measures (Agyei-Mensah, 2015; Aripin, 2010; Bini, Dainelli & Giunta, 2017)[2]. Our study takes a more comprehensive approach by examining disclosure quality for *all* disclosed APMs within the management report. This broader perspective acknowledges the notion that investors are not only affected by earnings measures but also by other APMs (e.g. cash flow figures, debt ratios, etc.). Furthermore, these few related studies use indices based on the authors' defined requirements or derived from regulatory frameworks and recommendations that often do not explicitly refer or apply to APM disclosures (Agyei-

[2] Aripin (2010) collects and analyses 43 predefined and generalised ratios but excludes firm specific APMs, industry specific APMs and adjusted financial numbers. Agyei-Mensah (2015) does not discuss what kind of financial ratios is collected. Bini et al. (2017) focus on APMs that are presented, e.g. as 'main performance results' or 'key performance indicators'.

Mensah, 2015; Aripin, 2010; Bini et al., 2017).[3] However, measurement of respective characteristics is extraordinarily challenging, and the assessment needs to be context-specific with regard to the particular research area and question (Botosan, 2004). This study adopts a conceptually robust and grounded approach by constructing an index generated from the objective and uniform ESMA APM disclosure quality requirements.

Second, by using a comprehensive approach and analysing all types of APMs, to the best of our knowledge this is the first study to demonstrate that specific firm characteristics *cannot* be applied *per se* as universal determinants of disclosure quality for APMs and that a distinction must be made between different types of APMs. For example, we find that leverage and ownership concentration are not universally applicable firm characteristics that affect all APMs in the same way and to the same extent. We contend that a more comprehensive analysis that focuses not just on profitability APMs is meaningful and provides new insights into corporate disclosure strategies.

Third, we relax the assumption made in previous studies that disclosure quantity is a measure of quality, an approach that is controversial (e.g. Aripin, Ho & Tower, 2014; Beattie, McInnes & Fearnley, 2004). Our paper addresses calls for better measures of APM disclosures by evaluating disclosure quality in a multidimensional and principle-oriented way (Beattie et al., 2004).

Fourth, our study is the first to provide empirical evidence about determinants of APM disclosure quality constructed from ESMA benchmarks using a large sample of German data.

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[3] Particularly, Aripin (2010) build an index from the qualitative characteristics of the IFRS framework to analyse APM disclosure quality. Due to strong generalisation, some of the 12 criteria derived from the IFRS characteristics are not directly related to APM disclosure quality and the qualitative disclosure requirements *per se* required by regulators. For example, a graphical or tabular presentation, specific disclosure locations, or a comparison with target benchmarks and industry consistency are defined as quality requirements. Agyei-Mensah (2015) bases his analysis on the index by Aripin (2010). Bini et al. (2017) implement their own index based on the work of Aripin (2010) in conjunction with recommendations of standard setters and regulators published until then. Consequently, Bini et al. (2017) do not cover all defined quality requirements of the new ESMA APM guidelines.

Germany provides an interesting setting for this research because, as opposed to other countries, both financial statements and management reports are subject to a full statutory audit and may be subject to an additional examination by the two-tier national enforcement system. The enforcement system complements the work of the supervisory board and the auditor, which ought to lead to a higher level of disclosure quality than unaudited reports. Even though the disclosure of APMs is voluntary and the statutory audit process *per se* does not legally include the audit of compliance with the guidelines, both audit stages focus primarily on the European (and national) enforcement priorities, under which APM disclosures and the application of the ESMA guidelines have been listed every year since 2016 (ESMA, 2016, 2017a, 2018, 2019a). This has led to enforced actions relating to the application of the APM guidelines in Europe (ESMA, 2019b). Furthermore, we find anecdotal evidence that German firms consider the ESMA guidelines for their APM disclosure, have adapted accordingly and, thus, improved their APM disclosures.

The remainder of this paper is organised as follows. Sections 2 and 3 describe the relevant background as well as regulatory framework and develop our hypotheses. The research design, including the description of the data collection, is introduced in section 4. Section 5 discusses the empirical findings, and section 6 presents some further analyses. The final section concludes the paper and discusses limitations as well as possible future research directions.

2. Background and Regulatory Setting

2.1. Relevance of Alternative Performance Measures

Although the use of APMs has proliferated over the last years (Afterman, 2015; Kabureck, 2017), no formal definition exists in relevant financial reporting frameworks. The lack of conceptual underpinnings affords managers considerable discretion in defining, calculating and disclosing APMs (Doyle et. al., 2013; Isidro & Marques, 2008, 2015) and raises serious

questions about the usefulness of APMs. On the one hand, APMs might enable managers to convey a higher level of information to investors and thereby reduce information asymmetry. On the other hand, APMs might impair comparability and enable managers to obfuscate and/or bias disclosures (Abad et al., 2019; Bhattacharya et al., 2004; Brouwer et al., 2014; ESMA, 2015).

Advocates of APMs set forth several arguments. Considering the 'decision usefulness' approach, APM disclosures are relevant for risk and return evaluations and enhance the consistency of financial communication for investors (e.g. Elzahar et al., 2015; Guillamon-Saorín et al., 2017; Young, 2014). APM disclosures aid analyses, increase understandability and improve efficiency for investors (Allee et al., 2007; Bhattacharya et al., 2004; Bini et al., 2017; Watson et al., 2002). Furthermore, APMs improve the usefulness and quality of annual reports (Bini et al., 2017) and are value relevant (e.g. Stenheim et al., 2018). Though mainly focused on earnings measures, the separation of recurring and non-recurring income items may increase transparency by providing a clearer picture of a firm's financial performance (Bhattacharya et al., 2004; Brouwer et al., 2014; Leung & Veenman, 2018; Young, 2014), and cross-sectional and time-series comparisons are enhanced if unusual events are excluded. Regulatory and supervisory bodies do not dispute these benefits and show no signs of inhibiting the use of APMs (Kabureck, 2017; International Accounting Standards Board [IASB], 2017, 2019; International Organization of Securities Commissions [IOSCO], 2016).

Critics of APM disclosures offer at least three arguments. First, APMs provide another avenue for managerial opportunism through the release of strategic and/or biased disclosures. For example, management may use APM disclosures to present higher earnings (e.g. by classifying expenses as non-recurring expenses, delaying losses and presenting financials in a more favourable light) to increase stock valuations and, ultimately, personal benefits (Bhattacharya et al., 2004; Young, 2014). Second, the lack of generally agreed conceptual

underpinnings obstructs cross-sectional and time series comparability, for example when APM definitions regularly change arbitrarily (Bhattacharya et al., 2004). Third, several performance measures do not convey significant additional information because they merely present previously available information in a different format (Watson et al., 2002). In conclusion, the relevance-reliability trade-off is whether the benefits of affording management freedom to use APMs to signal insider information outweighs management's ability to use APM disclosures opportunistically (Young, 2014).

2.2. Regulations of Alternative Performance Measure Disclosures

In the last decades, supervisory and regulatory bodies have taken up these concerns and issued guidance on APMs with the objective of ensuring consistency, quality and restricting adverse influences on investors (Hitz, 2010)[4]. In 2005, the Committee of European Securities Regulators (CESR) issued an APM disclosure recommendation for European listed firms relating to financial information of all types of capital market communication (except prospectuses). In contrast to sparse guidance provided by applicable legislation in national member states, CESR (2005) lists a series of requirements to ensure high quality disclosure of APMs (e.g. explanation of relevance, provision of comparatives, consistency over time). However, the definition and scope of an APM remained relatively unclear, resulting in weak effects for corporate disclosures.

Thus, further guidance for disclosure has been necessary, and CESR's successor, ESMA, published new APM disclosure guidelines in late 2015, which took effect on 3rd July 2016. The guidelines reflect the authority's reinforced ambition to regulate APM disclosure and surpass other existing reporting guidance regarding specificity and detail (e.g. the International

[4] For example, in 2002, the IOSCO had already released a '*Cautionary Statement Regarding Non-GAAP Results Measures*' advising issuers and investors to exert care when presenting and interpreting non-GAAP measures (IOSCO, 2002).

Financial Reporting Standards (IFRS) Practice Statement Management Commentary (IASB, 2010))[5] for APMs published as part of regulated information (ESMA, 2015).

ESMA sought to substantially expand its sphere of influence and control the standard-setting agenda with the issuance of flexible guidelines to promote convergence (Moloney, 2013). While the guidelines are non-binding by definition, an intention of legally binding force can be deduced from the specific characteristics and their wording for several reasons (European Commission, 2014; van Rijsbergen, 2014). First, ESMA has the power of 'soft law' administrative rule-making by issuing guidelines not limited to a specific legislative framework[6] (EU, 2010; Walla, 2012; van Rijsbergen, 2014). Formal non-binding guidelines are of legal relevance as they have a presumption of interpretative correctness (e.g. in lawsuits), particularly when they specify, interpret, or complement legislative acts (Frank, 2015). Second, national competent authorities *must* make every effort to adopt on a 'comply or explain' basis, *should* incorporate the guidelines into their supervisory practices and monitor whether issuers comply with them. Non-compliance by national competent authorities must be explained. The 'naming and shaming' mechanism is reinforced as ESMA publishes details of any non-compliance and annually reports the compliance status to the EU Parliament, Commission and Council (Frank, 2015; van Rijsbergen, 2014). Hence, these principles lead to the guidelines being factually binding (Walla, 2012). Third, even though the audit of compliance with the

[5] Currently, the IASB addresses the APM issue in its 'Disclosure Initiative' with the completed sub-project 'Principles of Disclosure' and in its standard-setting project 'Primary Financial Statements' (IASB, 2017, 2018, 2019). In its recently published Exposure Draft, the IASB indends to introduce (i) three new profit subtotals, including operating profit, (ii) a required better analysis of operating expenses, including guidance on any unusual income or expenses and (iii) a definition of 'management performance measures' (MPMs) with requirements for the disclosure (e.g. disclosed in a single note, reconciliation to IFRS figures). These proposals related to MPMs are in line with ESMA APM quality requirements but are not as detailed as the ESMA guidelines. For example, the IASB does not consider cash flow measures, ratios (e.g. return in equity), adjusted revenue and growth rates as meeting the definition of MPMs, and therefore only subtotals of income and expenses would be included (IASB, 2019, B80). Also, the IASB considered but rejected to define 'EBITDA' because of a lack of consensus with regard to the definition and calculations (IASB, 2019). Nevertheless, the IFRS proposals might aid users by enhancing the understandability of APMs and increasing compliance amongst firms in member states.

[6] This distinguishes these soft law measures from technical standards (EU, 2010, Art. 16).

ESMA APM guidelines is not *per se* legally enshrined in the statutory audit process, ESMA has defined the disclosure of APMs and the compliance with the ESMA APM guidelines four times in a row (since 2016) as one of the European common enforcement priorities (ECEP) or as a specific requirement relating to the sections of the annual financial report other than the financial statements (ESMA, 2016, 2017a, 2018, 2019a). ESMA's repeated emphasis on the ESMA APM guidelines shows the continuing high relevance for the European capital market and policy setting. Moreover, in December 2019, ESMA published a detailed report demonstrating that incorrect implementation of the ESMA guidelines has led to enforced actions. ESMA states that '*In 2017 and 2018, European enforcers have taken a total of 171 actions relating to the application of the APM Guidelines*', examining 916 management reports in the context of ESMA's ECEP, representing an action rate of 18.7% (ESMA, 2019b). ESMA expects that enforcers '*will (continue to) take appropriate actions whenever material misstatements in connection with the application of the APM Guidelines are identified*' and continues to monitor developments and market practices regarding APMs (ESMA, 2019b). All these actions and mechanisms suggest that the (correct) application of the ESMA APM guidelines is part of the enforcement mechanism.

Furthermore, ESMA has highlighted the management report as one of the most important applications of the APM guidelines. In Germany, as opposed to other countries, the management report is subject to a full statutory audit (§ 316 (2) Handelsgesetzbuch (HGB) [German Commercial Code]). Subject matter and scope of the audit are defined in § 317 (2) HGB.[7] Additionally, German listed firms may be examined by the Financial Reporting

[7] In particular, a true and fair view of the economic position has to be conveyed, opportunities and risks of future development have to be properly presented, and in all material respects it has to comply with the legal requirements. Additionally, in the absence of an applicable IFRS for the management report, in 2004 the Accounting Standards Committee of Germany (ASCG) issued German Accounting Standard (GAS) 15 on Management Reporting, superseded in 2013 by GAS 20, to complement the HGB sections. It gives specific recommendations regarding which information a management report should include. However, GAS 20 does not provide a general definition of performance measures and only contains rudimentary guidance on how to present

Enforcement Panel (FREP)[8]. The enforcement procedure comprises the financial statements and the management report. Thus, German management reports are subject to two auditing mechanisms having the same matter and scope that should have a positive impact on the quality of disclosures. In line with the ESMA's ECEP, also FREP has set out the presentation of financial performance in accordance with the ESMA APM guidelines as one of the enforcement priorities for random-sampling investigations in 2017 (FREP, 2016a; Hitz & Schnack, 2019).

Thus, the decision of *whether* firms disclose APMs is voluntary. However, if European firms choose to disclose APMs in the context of regulated information, they are expected to apply the ESMA APM guidelines, and hence, the disclosure quality level should respond to the defined requirements. Moreover, although firms are not required to refer to the ESMA guidelines, we find 31 firms that have disclosed APMs in separate sections of the management report (as ESMA several times recommended to do, e.g. ESMA, 2019b). Of these firms, 11 firms included a direct reference to the ESMA APM guidelines and their application (e.g. BASF SE, Cancom SE). Additionally, four firms have explained that they have adapted and changed the definitions and labels of APMs in order to comply with the newly introduced ESMA APM guidelines or to improve transparency (e.g. HeidelbergCement AG, RWE AG).

ESMA argues that adherence to the ESMA APM guidelines can enhance reliability, comparability and comprehensibility of APMs and that a common approach toward APMs is inevitable in order to ensure consistent and effective supervisory practices. This, in turn, is

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respective financial and non-financial key performance measures (e.g. presentation of calculation, reconciliation, and discussion of changes).

[8] German listed firms are subject to a two-tier enforcement system established in 2005 based on the Bilanzkontrollgesetz [Financial Statements Control Act]. The first tier involves the FREP as a government-appointed private institution. The second tier is performed by the Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin) [Federal Financial Supervisory Authority] (for further information see also Hitz & Schnack, 2019). BaFin reported to ESMA that they comply with the APM guidelines by incorporating them into their supervisory practices (ESMA, 2017b).

regarded as a prerequisite to achieve comprehensive investor protection in the EU (ESMA, 2015). Hence, the guidelines are a further step towards strengthening transparency to protect investors and, thus, essentially promote the integrity of the European financial market. Therefore, it is essential to analyse the APM disclosure quality based on this new conceptually sound regulatory framework.

3. Prior Research and Hypotheses Development

Agency and signalling theories explain corporate disclosures as mitigating information asymmetry and adverse selection problems (Healy & Palepu, 2001; Jensen & Meckling, 1976; Urquiza, Navarro, Trombetta & Lara, 2010; Watson et al., 2002). Based on these theoretical foundations as well as on prior research (e.g. Hellman, Carenys & Moya Gutierrez, 2018), we develop a set of hypotheses regarding the determinants of APM disclosure quality.

Firm size is one of the most theoretically discussed determinants as the negative effects of information asymmetries are likely to be higher for large firms because of the need for greater interaction with capital markets (Ng & Koh, 1994; Singhvi & Desai, 1971; Watson et al., 2002). Firm size is affected by the agency problem because capital providers price their capital claims higher under asymmetric information. Consequently, large firms that are under considerable public scrutiny have incentives to reduce information asymmetries and political costs through higher quality disclosures (Jensen & Meckling, 1976; Watson et al., 2002). Furthermore, large firms might have better resources and processes in place to accumulate, process and present information, and the incremental cost to provide the information adequately to the public is believed to be smaller (Singhvi & Desai, 1971).

Voluntary disclosure studies document a significant positive association between disclosure quantity and firm size (Ahmed & Courtis, 1999; Broberg, Tagesson & Collin, 2010; Chow & Wong-Boren, 1987; Hassan, Giorgioni & Romilly, 2006; Meek, Roberts & Gray,

1995; Zarzeski, 1996), disclosure quality and firm size (Singhvi & Desai, 1971) or both (Palmer, 2008). Focusing on performance measures, studies show that large firms are more likely to disclose APMs than small firms (Watson et al., 2002), to report non-GAAP earnings in press releases (Isidro & Marques, 2015) and to provide higher quality disclosures (Aripin, 2010; Bini et al., 2017). Taking these aspects into consideration, we hypothesise the following[9]:

H1: *The quality of APM disclosures is positively associated with firm size.*

Agency and signalling theories suggest a positive relationship between a firm's *profitability* and the quantity and quality of disclosure (Bini et al., 2017; Watson et al., 2002). Firms with good performance have an incentive to signal this to capital providers (Vural, 2018; Watson et al., 2002). Following the political cost argument, Watson et al. (2002) reason that more profitable firms — being under higher public scrutiny — try to avoid additional regulations and restrictions through comprehensive and compliant disclosures. Arguments of strategic and opportunistic approaches point in a similar direction: Less profitable firms might be tempted to cherry-pick performance measures to select favourable metrics and depict biased and less transparent disclosures (Watson et al., 2002).

However, Leung and Veenman (2018) find that profitability APMs, such as disaggregated GAAP earnings figures, can better reflect future performance, especially when a GAAP loss can be converted into a non-GAAP profit. They argue that corporate losses tend to be less persistent than profits, leading to reduced informativeness of GAAP losses for forecasting and valuation compared to GAAP profits. Thus, high quality disclosures of adjusted (non-GAAP) measures might also be particularly crucial for loss firms to increase informativeness.

[9] For consistency reasons, all of our hypotheses are stated in the alternative form.

Empirical evidence is mixed. Some studies report a positive association (e.g. Hassan et al., 2006; Raffournier, 1995; Singhvi & Desai, 1971), no relation (e.g. McNally, Eng & Hasseldine, 1982; Palmer, 2008), conflicting results (Ahmed & Courtis, 1999) or a negative association (e.g. Inchausti, 1997) between profitability and voluntary disclosure. For APMs, a positive relationship between firms' profitability and disclosure quality (Aripin, 2010) is opposed by insignificant results (Agyei-Mensah, 2015; Bini et al., 2017). As the literature does not provide consistently clear results, we formulate a non-directional hypothesis:

H2: *The quality of APM disclosures is associated with profitability.*

The divergence of interests between equity holders and creditors create agency costs that increase with the level of gearing (Ahmed & Courtis, 1999; Watson et al., 2002). On the one hand, conflicts can be minimised by using debt covenants, monitoring measures and voluntary disclosures. Accordingly, agency theory provides arguments as to why higher *leverage* could be associated with a higher quantity and quality of disclosures (Jensen & Meckling, 1976; Watson et al., 2002). On the other hand, higher gearing reduces the agency costs of free cash flow and limits the room for managers' discretion (Jensen, 1986). Furthermore, high leverage causes higher monitoring of creditors which results in a decreased demand of shareholders for additional information (Broberg et al., 2010).

Prior studies document a positive relation between the quantity of voluntary disclosure and leverage (Ahmed & Courtis, 1999; Broberg et al., 2010; Jensen & Meckling, 1976; Watts, 1977), an insignificant relation (e.g. Chow & Wong-Boren, 1987; Raffournier, 1995) or a negative relation (e.g. Hassan et al., 2006; Meek et al., 1995; Zarzeski, 1996). Additionally, certain empirical findings suggest that leverage positively influences voluntary disclosure quality (Ng & Koh, 1994; Urquiza et al., 2010). However, no evidence is found so far regarding the association with disclosure quality of performance measures (Aripin, 2010; Bini et al., 2017). APM studies just find an association for the disclosure quantity of performance

measures (Agyei-Mensah, 2015; Watson et al., 2002). The contrasting theoretical and empirical findings lead us to the following non-directional hypothesis:

H3*: The quality of APM disclosures is associated with leverage.*

The structure of a firm's *ownership* affects information asymmetry and agency costs due to the separation of ownership and control (Jensen & Meckling, 1976). The agency costs of equity decrease with higher ownership concentration. Moreover, shareholders with a large percentage of the firm's equities are better equipped to monitor and restrict wealth transfers of managers. Thus, managers of firms with lower ownership concentration are likely to voluntarily disclose higher quality and quantity to mitigate information asymmetries and reduce agency costs (Raffournier, 1995).

A lower quantity of voluntary disclosure by concentrated ownership firms is documented in most studies (e.g. Chau & Gray, 2002; Isidro & Marques, 2013), although contradictory results are presented by Haniffa and Cooke (2002). Singhvi and Desai (1971) find a positive relation between the number of shareholders and the quality of disclosure. With regard to the quality of APM disclosures, Aripin (2010) and Agyei-Mensah (2015) both report a negative association with higher ownership concentration, although the significance level is low in the former. Given the agency theory foundation, we hypothesise as follows:

H4: *The quality of APM disclosures is negatively associated with ownership concentration.*

4. Data and Research Design

4.1. Sample Selection

The ESMA APM guidelines are addressed towards issuers of traded securities on a regulated market and only apply to APMs published as part of regulated information, such as

Transparency Directive[10] disclosures complementing the consolidated financial statements according to IFRS. Management reports are highlighted as one specific example of such regulated information (ESMA, 2015). German management reports are comparably extensive and form a clearly identifiable section in annual reports. Consequently, they build a good foundation for a comprehensive cross-sectional investigation of APM disclosure quality. The German stock market is divided into the Prime Standard and the General Standard (01/2017: 301 firms and 149 firms, respectively, Deutsche Börse, 2017a). Different transparency requirements apply to both tiers of firms.[11] We exclude firms of the finance, insurance and real estate (FIRE) super sector because these firms are subject to additional legal and financial reporting requirements (Dainelli & Bini, 2011). To produce a wide and representative sample, using a stratified random sample approach, we draw 25 firms from each of the four major indices of the Prime Standard (DAX, MDAX, SDAX and TecDAX) and 35 firms of the General Standard. Our sample consists of 135 German firm management reports for the reporting years 2016[12] and 2017, representing one third of the Prime Standard and one quarter of the General Standard[13]. We exclude one DAX firm that does not publish consolidated financial statements in conjunction with a group management report and one SDAX firm whose shares were delisted later in 2017. Table 1 summarises the final sample of 266 firm-year observations.

[10] The Transparency Directive (Directive 2004/109/EC) was issued in 2004 and developed further disclosure obligations for European security issuers in regulated markets in order to further harmonise information duties. The Directive demands issuers to publish annual reports that comprise audited financial statements, the management report and a responsibility statement by the legal representatives that the annual report conveys a true and fair view (Transparency Directive, Art. 4).

[11] Both tiers differ substantially in terms of visibility to the public, media, and analyst coverage. The prime standard is intended for firms with an international focus, and firms traded in this standard are eligible for being included in one of the German stock market indices (e.g. the blue-chip market index DAX). Thus, these firms are subject to higher overall transparency requirements (e.g. analysts' conferences at least once a year) as well as to a higher probability of being selected by the FREP for an additional enforcement (FREP, 2016b).

[12] Since the ESMA guidelines gained effectiveness in July 2016, the first reporting year which is shaped by this particular regulatory setting is 2016.

[13] With regard to listed firms in the Prime Standard and General Standard in 01/2017.

[insert Table 1 here]

4.2. Dependent Variable: Disclosure Quality Index

We hand collect APMs for the sample of 133 group management reports for the financial periods 2016 and 2017 and use identification and coding rules derived from the ESMA APM guidelines. In the first step, two coders identify all APMs disclosed in the management report and allocate the APMs to predefined categories for detailed analyses (Aripin, 2010; Bini et al., 2017; Dainelli & Bini, 2011)[14]. We extend prior literature by adopting the ESMA's approach to reject a restriction to specifically labelled figures and measures (e.g. 'key performance indicator'[15], Bini et al., 2017) and by collecting all types of APMs (e.g. not just profitability APMs) (ESMA, 2017c).

In the second step, two coders independently assess the disclosure quality based on the seven disclosure quality requirements (*disclosure principles, presentation, reconciliation, explanation on the use, prominence, comparatives and consistency*, summarised in Table 2), and 14 quality sub-requirements (presented in the second column of Table 2) derived from the ESMA APM guidelines and the supplementary information provided (ESMA, 2015, 2017c). Appendix A explains the identification of APMs and the assessment of disclosure quality based on our coding rules using the 2016 management report of ProSiebenSat1 Media SE as an example.

[insert Table 2 here]

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[14] We allocate APMs into the following categories: (1) asset/capital structure (2) capital efficiency (3) liquidity/cash flow (4) profitability (5) stock market/valuation (6) volume/growth.

[15] In Germany, GAS 20.P45 requires listed firms to present their internal management system, including the performance indicators used for internal management purposes. Thus, management reports typically contain a separate section that explains which performance indicators are applied for this purpose. Furthermore, several firms state which measures they regard as APMs. However, these statements were not considered decisive for the identification and inclusion of an APM. Several management reports exemplify that additional measures are disclosed which are not introduced as such by the firm. Limiting the analysis to declared measures could therefore depict a biased picture.

Our dichotomous scoring system (1 assigned if a [sub-]requirement is complied with and 0 otherwise) requires that an individual disclosure quality requirement can only be completely satisfied if *both* quality sub-requirements are met.[16] Since the ESMA APM guidelines prescribe no hierarchy and *a priori* there is no indication why certain requirements should be more important, our DQI is unweighted (Bini et al., 2017).

We aggregate the information to a DQI for each APM by dividing the number of complied disclosure quality requirements by the total number of requirements. In order to achieve an index for the APM disclosure quality on a firm level, the arithmetic mean of the scores of all APMs disclosed by one firm is computed. This ensures that a higher number of disclosed APMs is not associated with higher quality (Afterman, 2015). DQI takes the values from 0 (if no disclosed APM meets any quality requirement) to 1 (if all disclosed APMs meet all quality requirements). The following formula condenses the calculation of the DQI variable for any firm i, where n reflects the number of APMs disclosed by the firm and requirement kj reflects the k-th out of seven disclosure quality requirements which is measured in the dichotomous logic for any APM j:

$$DQI_i = \frac{1}{\mathrm{n}} \sum_{j=1}^{n} \frac{\sum_{k=1}^{7} requirement_{kj}}{7} \qquad (1)$$

As manual coding may be subjective, we assess the reliability level by computing an agreement ratio between the two coders. The overall rate of agreement was almost 90%, which is considered satisfactory (Bini et al., 2017; Clatworthy & Jones, 2003; García Osma & Guillamon-Saorín, 2011). Additionally, we estimate Cronbach's alpha for capturing the

[16] For example, for the ESMA APM quality requirement 'Explanation on the use': (1) Firm indicates the purpose of the APM by a 'profitability measure' (sub-requirement (1) *purpose* = 1). However, this does not sufficiently explain why a specific measure provides useful information (sub-requirement (2) *why* = 0), leading to an overall score for 'Explanation on the use' = 0. In Appendix A, the assessment of the disclosure quality for each quality requirement is provided by using a firm example.

validity of our DQI. With a Cronbach's alpha coefficient of 96.54% our reliability level is far higher than for similar disclosure studies that carry out a second coding (Botosan, 1997; Gul & Leung, 2004; Vural, 2018).

4.3. Research Design

We construct the following regression model to test our hypotheses:

$$DQI_{it} = \alpha_0 + \beta_1 SIZE_{i,t} + \beta_2 PROFIT_{i,t} + \beta_3 LEV_{i,t} + \beta_4 OWNER_{i,t} + \sum_{s=5}^{24} \beta_s \, Controls_{i,t} + Year + \varepsilon_{i,t} \quad (2)$$

where i denotes the respective firm at time t, α_0 is the constant term (intercept), β_1 to β_{24} are the estimated coefficient for each determinant and control variable and ε is the error term. Firm size (SIZE) is proxied by the natural logarithm of total assets (e.g. Ahmed & Courtis, 1999; Bini et al., 2017; Raffournier, 1995). Profitability (PROFIT) is captured by the income to total revenue ratio (profit margin) (e.g. Ahmed & Courtis, 1999; Wallace & Nasar, 1995; Wallace, Nasar & Mora, 1994). Leverage (LEV) is measured by total debt divided by total equity (e.g. Ahmed & Courtis, 1999; Bini et al., 2017; Guillamon-Saorín et al., 2017; Wallace et al., 1994). To measure ownership (OWNER), we use the percentage of all block holder ownerships (e.g. Cormier, Aerts, Ledoux & Magnan, 2009; Eng & Mak, 2003).

To control for firms' industry, we follow the Deutsche Börse (2017b) broad industry classification system using a categorial variable (IND) that divides firms into nine super sectors, leaving us with eight super sectors after excluding the FIRE super sector. We also include control variables that are commonly assumed to influence the quality of disclosures such as growth opportunities, corporate governance characteristics, risk factors and capital efficiency measures (e.g. Altman, 1968; Aripin, 2010; Fama & French, 1992, Guillamon-Saorín et al., 2017; Leung & Veenman, 2018; Raffournier, 1995; Singhvi & Desai, 1971; Vural, 2018). Furthermore, we control for loss-making firms (LOSS) and specific firm as well

as disclosure complexity characteristics. Particularly, we add the variable SEGMENTS, being the number of reportable business segments in the management reports, and NUMBER APM to the model. The latter captures the number of disclosed APMs in the management reports. So far, such an association has only been statistically investigated by Dainelli and Bini (2011) who, however, only find a weak negative relation when regressing APM disclosure quality on APM disclosure quantity. The authors infer that for firms which disclose large amounts of APMs, the probability that quality criteria are not adequately considered for all disclosed APMs might be higher. In other words, firms with fewer disclosed APMs may be able to pay more attention to the quality of each. Table 3 provides the definitions and sources of variables as well as details on the measurements. Table 4 summarises the key financial characteristics of the sample firms.

[insert Table 3 here]

[insert Table 4 here]

5. Empirical Results

5.1. Descriptive Statistics for APM Disclosures

Table 5 presents descriptive analyses of the quantity of APM disclosures. Panel A shows that all firms disclose APMs with a minimum of two, a maximum of 20 and an average of 10 per management report. The total quantity of disclosed APMs by German listed firms is extensive — 1,321 in 2016 and 1,299 in 2017. Furthermore, as we collect 480 different APM names (labels) representing just 175 different APMs[17], our sample highlights the considerable discretion exercised by corporate management.

[17] For example, different APM labels for economic value added are 'Added Value', '[Firm's name] value added', 'Net value added', and 'Value contribution'. Adjusted EBIT is also called, for example 'EBIT before special items', 'EBIT pre', 'EBIT excluding special factors', 'Normalised EBIT', 'Recurring EBIT', 'EBIT I', 'Adjusted operating result', 'Adjusted operating profit', 'Adjusted profit from operating activities', 'Adjusted net operating

[insert Table 5 here]

The most commonly disclosed category is profitability APMs (e.g. [adjusted] EBIT, EBITDA, or EBIT margin), representing almost half of all identified APMs (n = 1,202). Every firm discloses at least one profitability APM and on average almost five in each management report. This result is supported by Panel B that reports the ten most common disclosed APMs. This predominance partly explains the obsession in APM literature with profitability measures (e.g. Heflin & Hsu, 2008; Isidro & Marques, 2013). However, studies that focus only on earnings measures ignore the greater number of other APMs, for example asset/capital structure APMs (306 in 2016 and 301 in 2017). On average, firms disclose more than two asset/capital structure APMs (e.g. equity ratio or net working capital). Capital efficiency APMs (e.g. ROCE) are less frequently disclosed (98 in 2016 and 99 in 2017) but one in every five firms discloses this category. Stock market/valuation APMs (e.g. economic value added) are rarely disclosed in management reports (mean = 0.56) but might appear in the share and stock market performance sections of annual reports outside our research setting. To compare APM disclosures more comprehensively, next to profitability APMs, we summarise all other categories (asset/capital structure, capital efficiency, liquidity/cash flow, stock market/valuation, and volume/growth) into the category 'non-profitability APMs'. The number of non-profitability APMs (n = 1,418 for both financial periods) exceeds the corresponding number of profitability APMs. Assuming that these results are generalisable, studies focusing on earnings capture less than 50 percent of the APMs and hence paint an incomplete picture of corporate disclosures.

profit', 'Adjusted profit from ordinary activities', 'Adjusted operational earnings', 'Operating income before extraordinary effects', 'Operating EBIT before extraordinary expenses', etc. Occasionally, firms label an APM still 'EBIT' even if they adjusted the number disclosed as line item in the profit and loss statement.

Table 5, Panel C and Panel D provide descriptive statistics for the quantity of APM disclosures classified by stock market indices and by industries. The average use of APMs increases from General Standard to SDAX and TecDAX to MDAX and DAX firms. With regard to the heterogeneity among firms of the respective indices, the TecDAX stands out with the highest standard deviation in both financial periods. From an industry perspective, firms assigned to basic materials (mean = 12.14) and pharma & healthcare (mean = 11.08) disclose the greatest number of APMs. These industries tend to engage in more extensive disclosures and are under high public scrutiny as, for example, basic materials include the major German chemical firms (Brammer & Pavelin, 2006). However despite high public scrutiny of the utility industry, firms in this super sector disclose the fewest APMs (mean = 6.75) with high homogeneity among firms (standard deviation of just 2.80), which is in line with prior research findings (Watson et al., 2002).

Although we do not make any prior assumptions regarding the APM disclosure *quantity*, the number of disclosed APMs appears to differ with respect to certain firm characteristics, and this may also influence the APM disclosure *quality*. To more finely examine the use of APMs disclosures, we create subsamples based on specific firm characteristics and report the results of t-tests in Table 6[18]. Large firms disclose on average four more APMs than small firms. Furthermore, more profitable firms and firms with higher leverage disclose significantly more APMs than their counterparts. Similarly, loss firms disclose on average significantly fewer APMs than non-loss firms. Firms with Big Four auditors and a high number of reportable business segments disclose significantly more APMs. Contrarily, firms with a high concentration of ownership and a high earnings volatility disclose significantly fewer APMs.

[insert Table 6 here]

[18] We thank an anonymous referee for suggesting this analysis.

5.2. Descriptive Statistics for the Disclosure Quality index

Table 7 shows that the total DQI ranges between 0.40 and 0.91 with a mean of 0.62. No firm fully complies with *all* requirements for *all* APMs. The average disclosure quality is quite stable between 2016 and 2017 for both the total DQI (mean = 0.61 and 0.64, respectively) and for all individual ESMA APM quality requirements.

The means for the quality requirements *disclosure principles*, *presentation*, *reconciliation* and *comparatives* range quite similarly from 0.54 to 0.59. Some firms have a score of 0.00 (i.e. no disclosed APM complies with this specific requirement), and others reach a score of 1.00 (i.e. all disclosed APMs comply with this specific requirement).

The quality requirements *consistency, prominence* and *explanation on the use* paint a different picture. On the one hand, *consistency* and *prominence* have considerably higher means (in total 0.94, 0.87) and medians (in total 1.00 and 0.94, respectively), indicating that most APMs are disclosed consistently over time and are not presented with more emphasis than GAAP measures. On the other hand, the lowest mean of 0.32 for *explanation on the use* implies that firms do not even provide one third of its APMs with sufficient explanation. Consistent with the descriptives of Wühst and Rosner (2016) and ESMA's observations (ESMA, 2019b), the maximum values for both years of 0.78 and 0.86 indicate no firm satisfactorily explains the use and purpose of all its APMs.

[insert Table 7 here]

Relating firms' industries and stock market indices, Table 8 shows several trends observed for the quantity of APM disclosures are also present for APM disclosure quality. For both financial periods, the mean DQI increases from the General Standard to the DAX. Furthermore, TecDAX firms again show the highest standard deviation (0.11) and are thus characterised by heterogeneity. The utilities super sector exhibits the highest mean (0.77), minimum (0.62) and maximum (0.91) DQI. These results are interesting because utility firms are subject to the most

stringent legal regulations and, similarly, have the lowest mean of disclosed APMs per management report (see section 5.1).

[insert Table 8 here]

Table 9 presents results of disclosure quality by APM categories. For both financial periods most APM categories are in a rather narrow range with a mean DQI between 0.62 and 0.69, implying that no substantial differences in disclosure quality between these APM categories can be observed. Volume/growth APMs (e.g. organic growth) have a lower mean DQI of 0.49. A corresponding picture emerges when we consider the share of fully compliant APMs with the ESMA guidelines in the sense that the share cumulative for both financial periods is the lowest for volume/growth APMs (6.0%). The results imply that firms tend to neglect statements on how they derive and define volume/growth APMs. In total, out of the assessed 2,620 APMs, only 282 (10.4%) comply with all seven ESMA APM quality requirements.

[insert Table 9 here]

5.3. Panel Regression Analysis

Table 10 presents the Pearson's correlation coefficients for all variables in our analyses. High and statistically significant correlations exist between several variables. To avoid multicollinearity with SIZE (0.8297), we do not include the number of analysts following a firm in our regression model. All other Pearson correlation coefficients are below 0.7 and VIF test results are below 5 (untabulated) and thus fall beneath the thresholds generally considered as critical (Garson, 2012; Maddala, 1992).

[insert Table 10 here]

We test the regression model (eq. 2) using the random effects estimator with generalised least squares (GLS). The Breusch-Pagan test reveals unobserved heterogeneity within our data sample ($p = .000$), which can be solved by using the fixed effects (FE) or random effects (RE)

models (Breusch & Pagan, 1979). The Hausman test suggests that the RE estimator better fits our data (p = .7998) (Hausman, 1978; Hausman & Taylor, 1981; Nikolaev & van Lent, 2005). In order to avoid autocorrelation, we cluster standard errors at the firm level in each regression analysis (Petersen, 2009). The few previous studies that assess the disclosure quality of APMs in the context of financial communication either only examine profitability APMs ('earnings measures') or only collect predefined key figures (Aripin, 2010; Bini et al., 2017). We extend this literature by taking a more comprehensive approach by analysing APM disclosure quality for the entire sample and for all APM categories separately. Table 11 presents regression results for the entire DQI (model 1), the DQI of profitability APMs (2), the DQI of non-profitability APMs (3) and the latter disaggregated into DQIs of asset/capital structure (4), capital efficiency (5), liquidity/cash flow (6), stock market/valuation (7), and volume/growth (8) APMs.

[insert Table 11 here]

The results show, as expected (H1), that larger firms (SIZE) disclose APMs with a higher quality (DQI (1) p = .000)[19], which is in line with prior disclosure quality studies. Previous studies report inconsistent results with regard to the association of disclosure quality and firms' profitability (e.g. Aripin, 2010; Bini et al., 2017; Wallace & Nasar, 1995). Our findings support our hypothesis that firms' profitability is associated with APM disclosure quality (H2). The coefficient of PROFIT is significant and has a negative sign (DQI (1) p = .000), which applies to profitability APMs as well as non-profitability APMs. These results are robust whether we control for loss-making firms or not. Our results suggest that the lowest profit firms make the highest APM quality disclosures, which we contend may be motivated to enable stakeholders to better understand the 'bad news' of the low GAAP performance (Inchausti, 1997; Wallace & Nasar, 1995). Consistent with these lines of thought, Leung and Veenman (2018) show that

[19] All p-values are two-tailed.

loss firms use profitability APM disclosures to offset the low predictive ability of GAAP figures, resulting in higher informativeness for investors. Additionally, we find a marginal negative association between loss firms (LOSS) and disclosure quality of non-profitability APMs (DQI (3) p = .067), which, however, does not impact the results for firms' profitability. This may tentatively support the argument by Leung and Veenman (2018). The lower disclosure quality of non-profitability APMs may be because for loss-making firms these APMs do not have the same informativeness, especially when profitability APMs, such as disaggregated GAAP earnings figures, can better reflect future performance or a GAAP-loss can be converted into a non-GAAP profit (Leung & Veenman, 2018).[20] Conversely, we may argue that highly profitable firms might not feel the need to provide high quality disclosures because the underlying financials 'speak for themselves' and investors are satisfied with the reported results (Wallace et al., 1994; Wallace & Nasar, 1995).

Our quality findings may also be interpreted alongside the disclosure quantity results. Prior research finds that more profitable firms disclose a greater quantity of voluntary disclosures (Owusu-Ansah & Yeoh, 2005) because (i) they might wish to expand the social acceptance of their profitable operations and (ii) have an incentive to signal the good performance to investors (Bini et al., 2017; Watson et al., 2002). Consistent with these studies, our results presented in Table 6 also show that high-profit firms disclose significantly more APMs. Taken together, these results suggest that as high-profit firms disclose more APMs to highlight their good performance, this may increase the probability that they are not able to provide disclosure quality at the upper most level for all of the numerous disclosed APMs. This result is consistent with the argument that higher levels of disclosure *quantity* do not necessarily imply greater disclosure *quality* (Beretta & Bozzolan, 2008).

[20] Since our sample consists of a limited number of loss firms (firm-year observations = 31), we leave further empirical testing of this relationship as an avenue for future research.

The results for the entire DQI and the DQI for profitability APMs do not support an association (H3) between firms' leverage (LEV) and APM disclosure quality (DQI (1) p = .239, DQI (2) p = .271). This is in line with prior studies that focus on the quality of a subset of APM disclosures and report insignificant results (Agyei-Mensah, 2015; Aripin, 2010; Bini et al., 2017). However, we do find that firms' leverage is associated with disclosure quality of non-profitability APMs (DQI (3) p = .023). The positive coefficient shows that firms with higher leverage ratios disclose non-profitability APMs with a higher disclosure quality. This result is mainly driven by asset/capital structure APMs. Heavily indebted firms seem concerned with a high level of disclosure quality of asset/capital structure APMs to minimise agency conflicts. This is interesting given German firms are characterised by comparably high leverage (Cascino et al., 2014; La Porta, Lopez-de-Silanes, Shleifer & Vishny, 1997) and subject to restrictions and monitoring measures that stem from debt instruments. Higher than average debt ratios may significantly increase these restrictions and concomitant costs, resulting in significant effects on non-profitability APM disclosure quality.

For H4, we find a marginally negative association between higher ownership concentration (OWNER) and APM disclosure quality (DQI (1) p = .077). This provides tentative support for the argument that a lower ownership concentration leads to better APM disclosure quality. This result is particularly driven by profitability and capital efficiency APMs shown in models (2) and (5), for which the significance and coefficients are even stronger.

With regard to our control variables, the utilities coefficient for firms' industry (IND) is significantly different from the other industry sectors for the entire DQI (DQI (1) p = .000) and the DQI of profitability APMs (DQI (2) p = .001). Thus, the results provide limited support for

an association between APM disclosure quality and firms' industry sector.[21] These are particularly interesting given that utilities are characterised by a very low number of disclosed APMs but have the highest APM disclosure quality (see Table 5 and 8).[22]

Furthermore, we find a significant association between APM disclosure quality and INTANGIBLES, BANKRUPTCY and earnings volatility (EAV). Firms with high levels of intangible assets, such as knowledge-intensive firms, provide higher quality APM disclosures. Furthermore, firms perceived to be risky because of their higher earnings volatility and higher risk of bankruptcy provide higher quality APM disclosures. These findings are consistent with arguments of voluntary disclosures being helpful to mitigate agency conflicts, information asymmetry and insurance costs.

The BIGFOUR variable shows a marginal negative association with the entire DQI (DQI (1) p = .095) that is driven by the disclosure quality of non-profitability APMs (DQI (3) p = .024), specifically asset/capital structure and liquidity/cash flow APMs. These findings contradict studies that document higher disclosure quality and compliance with regulations by firms that engage large (Big Four) audit firms (Ahmed & Courtis, 1999; Aripin, 2010; Singhvi & Desai, 1971). We acknowledge that these results do not necessarily imply that Big Four firms do not attach importance to the disclosure of APMs. This is evident from numerous Big Four publications on APM disclosures (e.g. Deloitte, 2016; Ernst & Young, 2018; KPMG, 2018). However, it seems that further implementation activities for all APM categories in the

[21] We chose the industry super sector Consumer Goods as our baseline industry dummy, as this industry sector shows an average disclosure quality across all sectors. Thus, there are industry sectors with a lower or higher disclosure quality (see Table 8).

[22] However, the findings should be interpreted with caution for several reasons. First, as shown in the descriptive statistics, the number of sample firms in the utilities sector only amounts to six firms. However, in total this sector comprises just eight firms in Germany due to the specific characteristic of utility firms. Thus, our sample covers almost the entire sector population. Additionally, two utility firms have just been de-merged from two other sample firms in 2016, with those firms still holding major stakes. Thus, the independence of the observations may be questionable. Second, Watson et al. (2002) discuss several aspects that could explain industry variations in disclosure such as historical and bandwagon effects, public scrutiny, regulation and legitimisation. Stringent regulations are especially relevant for the utility sector.

auditing practices of Big Four firms might be required to raise firm compliance. One explanation for these results may be that non-Big Four firms are less inclined to construct audit-firm specific check lists but instead directly apply external guidance such as the ESMA APM guidelines, which may explain the higher disclosure quality for the full portfolio of APMs. Additionally, given the higher reputation of Big Four audit firms (e.g. Eshleman & Guo, 2014; McMeeking, Peasnell & Pope, 2006), firms that hire non-Big Four auditors might seek to reduce information asymmetries and provide investors with better insights and compensate for the (presumably lower quality) audit by expending greater effort in the quality of disclosures of all APM categories. Additionally, whilst in Germany management reports are audited, this does not necessarily imply that auditors attest to the quality of APM disclosures. We acknowledge that audit quality differs from (APM) disclosure quality but believe that our results offer considerable potential for future avenues of investigation.[23]

Finally, our prior discussion about the relation of disclosure quantity (NUMBER APM per CATEGORY) to disclosure quality is supported for profitability APMs (DQI (2) p = .000). The negative coefficient implies that the more profitability APMs a firm discloses the lower the disclosure quality of these APMs. The reason why we find an association particularly for this APM category may be that profitability APMs are the category most disclosed (on average almost five APMs per management report, see Table 5), and thus a disproportionately high number of disclosures impacts the quality for this APM category.

In summary, our results separating profitability APMs and non-profitability APMs show that there are significant differences between different types of APMs, and researchers are advised that a more comprehensive analysis than simply focusing on profitability APMs provides more and new meaningful insights.

[23] We thank two anonymous referees for pointing out these arguments.

6. Sensitivity Analyses

To check the robustness of our findings, we conduct several robustness tests. First, we run a panel tobit regression with left and right-censoring limits since DQI takes the values between 0 and 1 (Cooke, 1998). Our untabulated results are qualitatively identical.[24]

Second, in line with prior research studies (e.g. Airpin, 2010; Hossain, Perera & Rahman, 1995), we test alternative proxies for firm size (*natural logarithm of total revenue*), profitability (*return on equity*), and leverage (*total debt divided by total assets* and *long-term debt divided by total assets*). The results of these models reaffirm the findings of our main model. For ownership, we used several alternative proxies such as 'TOP x' *(percentage of shares controlled by the largest five/ten/twenty owners),* INSIDER (*percentage of shares held by executive directors)* and FREEFLOAT (*free float number of shares divided by total number of shares)*. The proxies *Top 5* and *Top 10* reaffirm our baseline findings.

Third, as our baseline DQI does not consider partial compliance of the 14 quality sub-requirements, we take into account the compliance of each identified sub-requirement because disclosure quality ought to increase with each compliance of a sub-requirement, independent of the total compliance of a quality requirement. We define a second disclosure quality index (DQI2) as the aggregate of 14 quality sub-requirements on an APM level and then compute the arithmetic mean of all APMs on firm level (similarly to DQI, Eq. 1). Furthermore, since ESMA stresses that to comply with APM guidelines a firm must comply with *all* stated quality requirements, we test the dichotomous dependent variable DQI3 that takes the value of 1 only

[24] We also perform the random-effects regression using the log of the odds ratios of DQI as the dependent variable in order to address the possible violation of the normality assumption (Al-Shammari, Brown, & Tarca, 2008; Cooke, 1998; Inchausti, 1997). We obtain qualitatively identical results with slightly larger p-values.

if *all* seven APM quality requirements are complied with and 0 otherwise (similarly to DQI, Eq. 1). For both regressions, we obtain the same qualitative results for our main determinants.

Fourth, we take into account alternative measures and compute a weighted DQI. For our baseline regressions, we use an unweighted DQI as there is no indication as to why certain quality requirements or types of APMs should be more important than others. Particularly, the ESMA APM guidelines prescribe no hierarchy and a weighting would introduce subjectivity to the analysis (Bini et al., 2017). Nevertheless, we noted that it can be argued that the more information disclosed, the more difficult it is to provide consistently high disclosure quality (captured by the control variable NUMBER APM). Similarily, it can be argued that it is more difficult for a firm to achieve a high level of disclosure quality if the firm discloses APMs of each category instead of disclosing only APMs for two categories. This notion would suggest a negative association between the *breadth* of disclosed APM categories and disclosure quality. Therefore, we re-run our regression model with a WEIGHTED DQI as dependent variable that considers the *breadth* of APM disclosures. We use the separate six indices of each APM category (DQI 'category', see Table 9) and divide the sum by the total number. A consequence of this construction is that for firms that do not disclose at least one APM in each APM category, the WEIGHTED DQI cannot obtain the maximum value. In order to obtain the maximum value, firms must disclose at least one APM per each category. Consequently, the disclosure quality of the WEIGHTED DQI is on average 0.41 and lower compared to our original entire DQI with a mean of 0.62. The correlation between the entire DQI and WEIGHTED DQI is 0.59. The results presented in Table 12 are qualitatively identical to model (1) of Table 11, except that ownership concentration (OWNER) becomes non-significant and leverage (LEV) now supports a positive association with APM disclosure quality. Whilst weighted indices have been constructed in other studies, a limitation of such replication in this study is that management may not disclose an APM of each category because they believe it

is inapplicable or irrelevant to their firm. Firms are neither required to disclose APMs of a specific category nor a minimum number of APMs. Therefore, it may be difficult to justify that a firm is penalised for this 'lack of information'.

[insert Table 12 here]

7. Conclusion

Using the recently introduced ESMA APM guidelines, we analyse the disclosure quality and its firm determinants for all types of financial APMs in the management reports of 133 German firms. This study makes several contributions to the literature. First, we construct a robust disclosure quality index generated from the objective and uniform ESMA APM guidelines to specifically analyse the disclosure quality requirements for APM disclosures. We find that German firms make intense use of APMs that differs across firms' characteristics but there is considerable room for improvement to meet ESMA disclosure quality requirements. Second, our study takes a comprehensive approach by examining disclosure quality for all categories of APMs and shows that specific firm characteristics are not universally applicable determinants and do not affect all APMs in the same way and to the same extent. By focusing on profitability and non profitability APMs, this study provides new insights into corporate disclosure strategies. We find evidence that firm size is positively and that profitability is negatively associated with disclosure quality for all APMs. For profitability APMs, higher ownership concentration has a negative relation to disclosure quality, and also the number of disclosed APMs in this category negatively affects the disclosure quality. For non-profitability APMs, leverage has a positive association and Big Four a negative association with disclosure quality. Third, we address calls for methodological improvements by analysing disclosure quality in a multidimensional and principle-oriented way (Beattie et al., 2004). Fourth, to the best of our knowledge this is the first study to robustly investigate the ESMA APM regulatory setting using a large sample of German data. German management reports are subject to a full

statutory audit and may be examined by the national enforcement bodies that ought to lead to a higher level of disclosure quality than unaudited reports.

Our regulatory setting, the ESMA APM guidelines, is a highly topical issue for European firms. Our results give an overview of the status-quo, contribute to the ongoing APM policy debate (e.g. DRSC, 2020; EFRAG, 2020; FRC, 2017; IASB, 2019) and have several implications for regulatory and enforcement bodies, practitioners and academics. First, our methodology, drawing from ESMA guidelines, can be used to improve our understanding of the intricacies of APM disclosure strategies. For example, the substantial variance in the APM disclosure quality suggests that managers may not interpret several disclosed measures as APMs within the application of the ESMA APM guidelines or report APMs disproportionately, presumably to meet their own motives. Further clarification, guidance and interpretations from regulators as well as greater efforts and resources from firms are needed to achieve the intended effect of the regulatory initiatives. Second, our study may inform standard setters and provide evidence of disclosed APMs and the quality requirements needed to improve such disclosures. For example, the extensive and sometimes varied use of the definition and labelling of APMs, such as for EBIT and EBITDA, and the limited given explanations of such measures reduce the decision usefulness of APMs and increase information asymmetries. With regard to the ongoing APM policy debate, standard setters should consider extending the framework to include more definitions and disclosure requirements to increase comparability and thus the information content and quality (e.g. IASB's on-going discussion and standard-setting project on APMs (MPMs), see also Abad et al., 2019). It is evident that more action needs to be taken, and the European and national regulatory and enforcement bodies might consider making the ESMA APM guidelines mandatory in order to effectively increase APM disclosure quality.

This study is to be interpreted in light of several limitations. First, although German management reports build a good foundation for a comprehensive cross-sectional

investigation, our results may not be generalisable to other published financial information, non-listed firms, or other regulatory settings. Second, while the collection and analysis of the dependent and independent variables are labour intensive, these are not without limitations, and other measurements might yield a larger sample size and/or different results. For example, even though we believe that our self-constructed DQI generated from the objective and uniform ESMA APM guidelines is adequate to analyse APM disclosure quality and we test alternative DQI measures, quality remains an abstract construct. Other approaches to measure APM disclosure quality and other indices are justifiable and could yield other insights.

We open up several avenues for future research. Subsequent longitudinal studies could investigate changes in APM disclosure quality, and it may be worthwhile to analyse performance measures from the perspective of the still ongoing debate in the regulatory environment and upcoming new regulations by the IASB. Also, future research can conduct further analyses on firm determinants such as firms' profitability, especially regarding loss firms, and their relation to APM disclosure quality since the results of this study run partially against expectations about the alleged strategic and opportunistic usage of APMs. Finally, we leave it to future research to assess the relationship between audit quality and APM disclosure quality.

APPENDIX A
Assessment of Disclosure Quality using the Example of ProSiebenSat.1 Group

To illustrate our manual data collection procedures and coding rules in detail, we describe the assessment of the APM disclosure quality for the 2016 Annual Report of the ProSiebenSat.1 Group (P7S1). With a DQI of 0.70 the disclosure quality is above overall and industry average but in line with other DAX listed firms.

APM Identification

In the first step, we collect all APMs disclosed in the management report and allocate them to the predefined categories of (1) asset/capital structure, (2) capital efficiency, (3) liquidity/cash flow, (4) profitability, (5) stock market/valuation, and (6) volume/growth. ESMA clarifies that APMs are frequently derived from or based on information contained in financial statements and defined by the applicable financial reporting framework by adding or deducting certain elements (e.g. [adjusted] EBITDA). In the respective management report of P7S1, the APMs are identified as follows: 'Recurring EBITDA', 'Recurring EBITDA margin', 'EBITDA', 'Operating costs', 'Underlying net income' (all category 4), 'Equity ratio', 'Leverage', 'Net financial debt' (category 1), 'Free cash flow' (category 3), and 'Basic earnings per share (underlying)' (category 5). These APMs are all disclosed in the beginning of the report under 'Key Figures used' (p. 73) and/or are further discussed under the 'Group Financial Position and Performance' section (p. 126). In accordance with the ESMA APM definition and rules for identification, we do not consider performance measures as APMs that are defined in the financial reporting framework, e.g. 'Basic earnings per share' as in IAS 33, 'Revenues' as in IFRS 15, 'Financial Result' as in IAS 1, and 'Cash flow from investing activities' as in IAS 7 as well as those of a physical or non-financial nature, such as 'user per month' or 'audience market share'.

Furthermore, we include APMs only once in the analysis that are used to reflect both total group level and segment level performance if no differences between the basis of calculations on the two levels could be identified. For P7S1, analysing the reconciliation of 'Recurring EBITDA' on group level (p. 123) and on segment level (p. 189), no difference in the basis of calculation could be identified. Consequently, we identify the measure on both levels as one APM.

Additionally, we collect measures twice that are presented in an absolute way and as a ratio, since it is reasoned that the relative way of presenting (ratio) conveys additional information. Therefore, in addition to 'Recurring EBITDA', we also identify 'Recurring EBITDA margin' as an APM (p. IV, 122, 133). It is reasoned that the relative way of presenting (ratio) conveys additional information as given on page 122: '*The margin development reflects mix effects from the distribution of revenues*'.

In line with the guidelines, we also exclude measures which simply report items from the financial statements (e.g. 'selling expenses', p. 178) as they are lacking in aggregation, ratio-building, adjustment or comparable operation (Bini et al., 2017; ESMA, 2015, 2017c). Furthermore, we do not consider information on shareholdings (e.g. 'Composition of the Subscribed Capital', p. 60), transactions (e.g. 'Director's dealings notifications', p. 44) and voting rights (e.g. 'Signification voting rights', p. 43) as well as information that is disclosed to demonstrate compliance with contractual agreements or legislation (e.g. 'Compensation of Executive Board Member in Accordance with GAS 17', p. 51). According to the ESMA APM guidelines, each growth or change rate that results from the relation of items of different periods and adjustments to line items of financial statements may constitute APMs (e.g. revenue growth, p. 88). However, not all deviations from GAAP measures can be defined as an APM to be analysed in respect of the ESMA APM guidelines, as measures such as constant currency revenue growth or value of order book exemplify (Deloitte, 2016; Ernst & Young, 2016; ESMA, 2015). Respective rates are extensively dispersed over management reports and several firms present comprehensive reconciliation tables in which each line item of a financial statement is adjusted, e.g. to consider a currency impact, and they do not seem to have further relevance besides reconciliation. We exclude such items from the analysis unless they are particularly emphasised, e.g. through repetitive use within tables as well as narratives or presentation in a way that suggests individual relevance. The same logic is applied for ratios other than change rates (e.g. functional cost ratios).

APM Disclosure Quality

In the second step, we assess the disclosure quality of each identified APM. In the following, we elaborate on the quality requirements and sub-requirements defined in Table 2 using 'Recurring EBITDA' as an example. In order to keep it short, we will only go into more detail on further identified APMs in case of particular deviations.

Disclosure Principle
The definition of the identified APM 'Recurring EBITDA' is given including its distinct components as 'Recurring earnings before interest, taxes, depreciation and amortization' (p. 73) with a reference to more information in the glossary. Further, the report provides the basis of calculation as '*It describes earnings before interest, taxes, depreciation, adjusted for certain influencing factors*', which are then explained in detail (p. 73). Hence, the two sub-requirements of the ESMA APM quality requirement *Disclosure Principles* are considered as fulfilled (coded 1).

Presentation
With regard to the disclosure requirement of *Presentation*, the first sub-requirement is fulfilled as the management report provides a clear and readable presentation of the definition of 'Recurring EBITDA' (p. 74), coded 1. However, the second requirement (meaningful label) is not fulfilled. As stated in the 2015 ESMA APM guidelines, the issuer should label the APM meaningfully, in particular not in an over-optimistic, confusable or misleading way. The label 'recurring' is to be considered to violate this sub-requirement for two reasons: First, the term 'recurring' can be associated with an optimistic and protected or guaranteed profit. Furthermore, the use of 'non-recurring' is explicitly mentioned in the ESMA guidelines (guideline 25) as not being a meaningful label. Thus, 'recurring' can be interpreted as the opposite of infrequent or unusual, which supports our finding of an over-optimistic label. Second, as mentioned in the definition of this APM on page 73, the APM is '*adjusted for certain influencing factors*'. This information about the calculation of the APM is not reflected in the label and is hence misleading in this regard as well. Consequently, the quality sub-requirement of the use of meaningful labels is not fulfilled, coded 0, and in sum, the quality requirement *Presentation* was not fulfilled (coded 0).

Outlook to P7S1 2017 management report
In this context, the management report states that the labelling of 'Recurring EBITDA' and 'Underlying net income' will be changed to 'adjusted EBITDA' and 'adjusted net income' with the financial year 2017 (p. 74). The refinement of the management system should then result in '*increased transparency (…), integrated and consistent treatment, (…) standardization in the labelling of the adjusted earnings-related performance indicators*' (p. 74).

Reconciliation
According to the ESMA APM guidelines, a *Reconciliation* of APMs to the most directly reconcilable line item, subtotal or total of the financial statements should be disclosed. A detailed reconciliation of 'Recurring EBITDA' including a presentation of the measures (second sub-requirement) is provided on both, group and segment, levels (p. 123, 189). We consider both quality sub-requirements and, thus, the quality requirement of *Reconciliation* as fulfilled (coded 1). In contrast to 'Recurring EBITDA', for example, the identified P7S1 APM 'Leverage' states a differentiated example of not complying with this requirement. 'Leverage' is described as follows: '*The leverage ratio indicates the level of net financial debt in relation to LTM recurring EBITDA*' (LTM = last twelve months, p. 91, 127). Therefore, it meets the quality requirement of *Disclosure Principles*. However, although reconciliation is provided for recurring EBITDA, the reconciliation for net financial debt, an APM as main ratio component, is missing. Thus, a direct numerical calculation to the most reconcilable line item that defines the exact value is not provided nor is the APM with its main components presented when mentioning the APM in the management report (e.g. p. 173, 179, 281). Hence, we consider the disclosure quality requirement *Reconciliation* for 'Leverage' as not fulfiled (coded 0).

Explanation on the use
P7S1 provides an explanation on the use of 'Recurring EBITDA'. For the first quality sub-requirement, the firm states that it is one of the '*central key figures used to manage profitability*' (p. 90), which

mentions the purpose of the use. Furthermore, it is stated that the APM provides '*additional information which also allows multi-year performance comparison*' (p. 74). This gives an explanation for why this APM provides useful information. The disclosure quality requirement *Explanation on the use* is thereby fulfilled. In contrast, the violation of the disclosure requirement of the explanation of use can be discussed, for example, with the identified APM 'Equity ratio'. Despite the mentioning of the APM in diverse contexts of the report (p. 4, 126, 132, 140), it does not provide an explanation on the underlying purpose for which the APM is used and why the APM provides useful information. As a result, both quality sub-requirements are considered as not fulfilled for the APM 'Equity ratio', coded 0.

Prominence
The ESMA APM quality requirement *Prominence* may be misjudged by a subjective perception. Therefore, we define concrete examples as coding rules that would indicate a violation of this quality requirement. For example, in general, the style of presentation should be equal between APMs and GAAP-measures. A violation criterion may be in capital or bold letters, italics, other (background) colours and larger fonts of APMs. Furthermore, the disclosed APMs should not be significantly highlighted or excessively used (e.g. provide a discussion for APMs, such as EBITDA, but only a short or no discussion for revenue). For the management report of P7S1 all APMs are presented with no more prominence, emphasis and authority than figures directly stemming from the financial statement, thereby providing no distraction from GAAP measures (see comparison on pages IV, 73, 88). It is especially notable that the firm notes that APMs 'do not replace IFRS figures and are not more important than the IFRS figures' (p. 73). The Prominence requirement is considered to be fulfilled, coded 1 for both quality sub-requirements.

Comparatives
Comparatives to the previous financial year of 'Recurring EBITDA' are presented throughout the management report (e.g. on pages II, IV, 88, 115, 122) and reconciled (p. 123). We consider the quality requirement of *Comparatives* to be fulfilled (coded 1).

Consistency
The P7S1 management report fulfils the APM quality disclosure requirement of *Consistency* in terms of definition and calculation over time (and also within the management report) as labelling, definitions and calculations are used consistently. As there was no change to be explained, the second quality sub-requirement is also fulfilled.
In addition, as already explained under the *Presentation* requirement, P7S1 has already pointed out in the 2016 management report that a labelling change for two APMs will take place for future financial communication and explained in detail the reasons why this change will result in more relevant information. As this change will have the effect that in the future there will be no more mislabelling violations (Sub-requirement of *Presentation*), this adjustment is to be welcomed and shows the firm to be rethinking.

The following table displays the above described APM disclosure quality assessment of the 2016 Annual Report of the P7S1 applying the dichotomous scoring system.

Requirement	Sub-requirement	Recurring EBITDA	Equity Ratio	Leverage
Disclosure Principles	· Definition of APM	1	0	1
	· Basis of calculation	1	0	1
Presentation	· Clear / readable	1	0	1
	· Meaningful label	0	1	1
Reconciliation	· Reconciliation to line item	1	1	0
	· Presentation of line item	1	0	0
Explanation on the use	· Purpose of APM	1	0	1
	· Explanation why	1	0	1
Prominence	· Not more prominence	1	1	1
	· No distraction	1	1	1
Comparatives	· Presentation comparatives	1	1	1
	· Reconciliation comparatives	1	1	0
Consistency	· Definition and calculation	1	1	1
	· Restated comparatives	1	1	1
DQI per APM		**0.86**	**0.43**	**0.71**

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Table 1. Sample composition (for 2016)

Industry super sector		General Standard	DAX	MDAX	SDAX	TecDAX	Total
Basic materials		2	3	5	1	0	**11**
Consumer goods		4	7	3	4	0	**18**
Consumer services		5	1	4	3	0	**13**
Industrials		14	5	10	12	5	**46**
Information technology		5	2	0	2	12	**21**
Pharma & healthcare		2	3	1	2	5	**13**
Telecommunication		1	1	0	0	3	**5**
Utilities		2	2	2	0	0	**6**
Total		**35**	**24**	**25**	**24**	**25**	**133**
Big Four auditor							
	YES	12	24	24	20	21	**101**
	NO	23	0	1	4	4	**32**
Audit committee							
	YES	10	24	23	20	21	**98**
	NO	25	0	2	4	4	**35**

Note: This table shows the sample composition for the industry super sectors by indices at the end of 2016. In 2017, two firms of the industry super sector *Industrials* quoted in the General Standard instead of the SDAX. Thus, in 2017, the sample consists of 37 General Standard firms and 22 SDAX firms. Additionally, one firm of the SDAX implemented an audit committee in 2017.

Table 2. ESMA APM guidelines – Definition of the disclosure quality index variable

ESMA APM quality requirements	Sub-requirement
Disclosure principles	Definition of the APM including its distinct components
	Provision of the basis of calculation, including hypotheses and assumptions
Presentation	Clear and readable presentation of the definition
	Use of meaningful labels (particularly not over–optimistic, confusable or misleading)
Reconciliation	Reconciliation to the most directly reconcilable line item, subtotal or total of the financial statements
	Presentation of the most directly reconcilable line item, subtotal or total of the financial statements
Explanation on the use	Mention of the purpose for which the APM is used
	Explanation why the APM provides useful information
Prominence	No presentation with more prominence, emphasis and authority than figures directly stemming from the financial statements
	No distraction from figures directly stemming from the financial statements
Comparatives	Presentation of comparatives
	Reconciliation of comparatives
Consistency	Definition and calculation of the APM is consistent over time
	Presentation of restated comparatives

Note: The table gives an overview of the items contained in the composite DQI that is applied in the regression models as the dependent variable. The seven quality requirements in the first column reflect the requirements set out in the ESMA guidelines. Our coding procedure implies that a quality disclosure requirement can only be completely satisfied if both sub-requirements presented in the second column of Table 2 are met. The outlined sub-requirements are derived from the detailed explanations of the ESMA guidelines which elaborate on the ESMA main quality requirements.

Table 3. Variable definitions

Dependent variable	Description and measure	Source
DQI	Disclosure quality index as a score of APMs for each firm and ESMA APM requirements with scores from 0 (if no APM meets any requirement) to 1 (if all APMs meet all requirements)	Self-constructed
Independent variables		
SIZE	Natural logarithm of the book value of total assets at the end of the respective financial year	Compustat
PROFIT	Net income divided by total revenue of the respective financial year	Compustat
LEV	Total debt divided by total equity at the end of the respective financial year	Compustat
OWNER	Percentage of all shareholders with more than five percent at the end of the financial year	Orbis & report
Control variables		
IND	Industry; set of dummy variables representing the eight super sectors (w/o FIRE) according to Deutsche Börse (Basic materials, Consumer goods, Consumer services, Information technology, Industrials, Pharma & healthcare, Telecommunication, Utilities)	Deutsche Börse
LOSS	Binary indicator variable that is assigned the value of 1 if the firm has generated losses (IFRS) and 0 otherwise, in the respective financial year	Compustat
MTB	Market value of ordinary equity divided by the balance sheet value of the ordinary equity at the end of the respective financial year	Worldscope (# 03501)
CAPEX	Capital expenditures divided by total assets of the respective financial year	Compustat
INTANGIBLES	Total intangibles assets divided by total assets at the end of the respective financial year	Compustat
BIGFOUR	Binary indicator variable that is assigned the value of 1 if the auditor belongs to the Big Four firms and 0 otherwise in the respective financial year	Annual report
COMMITTEE	Binary indicator variable that is assigned the value of 1 if the firm has an audit committee in place and 0 otherwise in the respective financial year	Annual report
PRIME	Binary indicator variable that is assigned the value of 1 if the firm is listed in the Prime Standard and 0 otherwise in the respective financial year	Deutsche Börse
BANKRUPTCY	Dummy variable representing Altman Z-score (Altman, 1968) that is assigned the value of 1 for low (> 3.0), 2 for middle (< 1.8 & < 3.0), and 3 for high (< 1.8) bankruptcy risk firms	Compustat
EAV	Earnings volatility in the operating performance measured by firm-specific standard deviation of annual earnings scaled by total assets using a time-series of (maximum) five years	Compustat
CA_TURNOVER	Total revenue divided by the average of current assets of the respective financial year	Compustat
ROA	Net income divided by total assets of the respective financial year	Compustat
SEGMENTS	Number of reportable business segments in the management report of the respective financial year	Annual report
NUMBER APM	Number of disclosed APMs in the management report of the respective financial year	Annual report

Table 4. Summary data on sample firms per year (n=133)

	Mean		Standard deviation		p25		Median		p75	
	2016	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**
DQI	0.610	0.639	0.098	0.113	0.536	0.556	0.623	0.636	0.671	0.714
SIZE	14.266	14.299	2.415	2.384	12.707	12.593	14.290	14.300	15.825	15.844
PROFIT	-0.073	0.037	1.164	0.208	0.020	0.021	0.050	0.051	0.081	0.093
LEV	2.042	1.626	4.385	1.523	0.809	0.786	1.427	1.257	2.219	2.054
OWNER	0.517	0.511	0.268	0.272	0.296	0.275	0.536	0.535	0.720	0.703
LOSS	0.120	0.113	0.327	0.318	0	0	0	0	0	0
MTB	3.039	3.574	2.590	3.115	1.500	1.767	2.270	2.710	3.420	4.130
CAPEX	0.038	0.039	0.031	0.029	0.017	0.019	0.031	0.032	0.047	0.052
INTANGIBLES	0.209	0.218	0.193	0.206	0.048	0.049	0.150	0.150	0.329	0.349
BIGFOUR	0.759	0.767	0.429	0.424	1	1	1	1	1	1
COMMITTEE	0.737	0.744	0.442	0.438	0	0	1	1	1	1
PRIME	0.737	0.722	0.442	0.450	0	0	1	1	1	1
BANKRUPTCY	1.820	1.677	0.777	0.754	1	1	2	2	2	2
EAV	0.034	0.032	0.075	0.047	0.007	0.007	0.014	0.015	0.039	0.039
CA_TURNOVER	2.370	2.365	1.305	1.212	1.577	1.581	2.199	2.125	2.827	2.962
ROA	5.107	6.205	7.561	7.351	2.930	3.570	4.850	5.690	7.790	8.570
SEGMENTS	3.316	3.293	1.616	1.585	2	2	3	3	4	4
NUMBER APM	9.932	9.767	4.252	4.187	7	7	9	10	13	12

Note: This table shows the descriptive statistics for all variables of the sample firms for the financial periods 2016 and 2017 used in the main analyses. All variables are defined in Table 3.

Table 5. Quantity of APM disclosures

Panel A: Quantity of APM disclosures by APM categories

APM category	Mean	Standard deviation	p25	Median	p75	Minimum	Maximum	Number of APMs in sample			Share in sample
								2016	2017	∑	
Profitability	4.52	1.80	3	4	6	1	9	607	595	1,202	45.9%
Non-profitability	5.37	3.24	3	5	7	0	1	714	704	1,418	54.1%
Asset/capital structure	2.28	1.56	1	2	3	0	8	306	301	607	23.2%
Capital efficiency	0.74	0.91	0	1	1	0	4	98	99	197	7.5%
Liquidity/cash flow	0.88	0.84	0	1	1	0	4	117	117	234	8.9%
Stock market/valuation	0.56	0.86	0	0	1	0	4	74	74	148	5.6%
Volume/growth	0.87	1.15	0	0	1	0	6	119	113	232	8.9%
Total	**9.85**	**4.21**	**7**	**9.5**	**13**	**2**	**20**	**1,321**	**1,299**	**2,620**	**100.0%**

Note: This table shows the quantity of APMs subclassified by APM categories, cumulative for the financial periods 2016 and 2017. The category *Non-profitability* summarises the categories asset/capital structure, capital efficiency, liquidity/cash flow, stock market/valuation, and volume/growth.

Panel B: Ten most commonly disclosed APMs

	N			Share of firms using this APM		
APM	2016	2017	∑	2016	2017	∑
EBIT	128	126	254	96.2%	94.7%	95.5%
Equity Ratio	120	118	238	90.2%	88.7%	89.5%
EBITDA	67	67	134	50.4%	50.4%	50.4%
Net Financial Debt	67	67	134	50.4%	50.4%	50.4%
EBT	62	58	120	46.6%	43.6%	45.1%
Free Cash Flow	55	58	113	36.6%	43.6%	42.5%
EBIT margin	50	51	101	37.6%	38.4%	38.0%
Adjusted EBIT	47	41	88	35.3%	30.8%	33.1%
ROCE	43	42	85	31.6%	31.6%	32.0%
Adjusted EBITDA	38	36	74	28.6%	27.1%	27.8%

Note: This panel shows the ten most commonly disclosed APMs by all firms in the management reports for the financial periods 2016 and 2017 (n = 133) and cumulative for both periods (n = 266).

Panel C: Quantity of APM disclosures by stock market indices per year

Index	Number firms		Mean		Standard deviation		p25		Median		p75		Minimum		Maximum	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
DAX	24	24	13.42	13.25	3.24	3.04	11	11.5	13	12	15	15	9	8	20	20
MDAX	25	25	11.76	11.56	3.46	3.65	9	9	12	12	13	14	6	4	19	18
SDAX	24	22	9.79	10.05	3.65	3.23	7	8	9	10	12	12	4	4	18	18
TecDAX	25	25	9.96	9.92	4.69	4.61	6	6	10	11	13	13	2	2	20	20
General Standard	35	37	6.31	6.03	2.36	2.12	4	4	6	6	7	7	3	3	13	11
Total	**133**	**133**	**9.93**	**9.77**	**4.25**	**4.19**	**7**	**7**	**9**	**10**	**13**	**12**	**2**	**2**	**20**	**20**

Note: This table shows the quantity of APMs per management report for the financial periods 2016 and 2017, subclassified by the German stock market indices.

Panel D: Quantity of APM disclosures by industries (cumulative)

Industry Super Sector	Number firms	Mean	Standard deviation	p25	Median	p75	Minimum	Maximum
Basic materials	22	12.14	3.50	9	12	15	7	18
Consumer goods	36	10.08	3.62	8	10	12	3	17
Consumer services	26	8.39	3.99	6	7	11	4	18
Industrials	92	10.03	3.68	7	10	13	3	19
Information technology	42	9.24	4.95	6	7	11	2	20
Pharma & healthcare	26	11.08	5.64	5	12.5	15	2	20
Telecommunication	10	9.20	3.71	6	10	13	4	13
Utilities	12	6.75	2.80	3	8	9	3	9
Total	**266**	**9.85**	**4.21**	**7**	**9.5**	**13**	**2**	**20**

Note: This table shows the quantity of APMs per firm subclassified by industry super sectors and cumulative for the financial periods 2016 and 2017.

Table 6. T-tests for firms' subsamples per number of APMs by categories

Variables		Total number	Number Profitability	Number Non-profitability	Number Asset/ capital	Number Capital efficiency	Number Liquidity/ cash flow	Number Stock market/ valuation	Number Volume / growth
SIZE									
	Low	7.808	4.008	3.800	1.646	0.608	0.562	0.223	0.762
	High	11.802***	5.007***	6.794***	2.890***	0.868**	1.184***	0.875***	0.978
PROFIT									
	Low	7.885	3.808	4.077	1.846	0.692	0.692	0.231	0.615
	High	10.063**	4.596**	5.467**	2.329*	0.746	0.900	0.592**	0.900
LEV									
	Low	9.239	4.462	4.867	2.082	0.703	0.829	0.405	0.848
	High	10.611**	4.602	6.009**	2.574**	0.796	0.954	0.778***	0.907
OWNER									
	Low	10.837	4.756	6.061	2.650	0.854	1.008	0.610	0.959
	High	9.000***	4.315**	4.685***	1.965***	0.643*	0.769**	0.511	0.797
MTB									
	Low	10.183	4.645	5.538	2.419	0.817	0.844	0.591	0.866
	High	9.075*	4.225*	4.850	1.963**	0.563**	0.963	0.475	0.888
EAV									
	Low	10.339	4.578	5.760	2.427	0.818	0.927	0.634	0.953
	High	8.581***	4.365	4.216***	1.905***	0.541**	0.757*	0.351***	0.662*
SEGMENTS									
	Low	9.149	4.472	4.677	2.006	0.627	0.888	0.342	0.814
	High	10.923***	4.591	6.333***	2.705***	0.914**	0.867	0.886***	0.962
LOSS									
	No	10.132	4.630	5.502	2.332	0.753	0.902	0.604	0.911
	Yes	7.710***	3.677***	4.032***	1.903*	0.645	0.710	0.194***	0.581*
BIGFOUR									
	No	7.175	4.0	3.175	1.508	0.397	0.413	0.159	0.698
	Yes	10.680***	4.680***	6.000***	2.522***	0.748***	1.025***	0.680***	0.926*

Note: The table presents t-tests of means for firms' subsamples of low/no and high/yes firm characteristics, where the significant levels are denoted as follows: *p < .10, **p < .05, and ***p < .01. Firm subgroups are based on the mean split into low and high groups based on underlying firm characteristics defined in Table 3 (the variable leverage was grouped by the mean of the respective industry). Loss and Big Four variables are indicator variables. The columns present t-tests per APM categories. Non-profitability summarises the categories asset/capital structure, capital efficiency, liquidity/cash flow, stock market/valuation, and volume and growth.

Table 7. DQI by ESMA APM quality requirements

ESMA APM quality requirement	Mean			Standard deviation			p25			Median			p75			Minimum			Maximum		
	2016	2017	∑	2016	2017	∑	2016	2017	∑	2016	2017	∑	2016	2017	∑	2016	2017	∑	2016	2017	∑
Disclosure principles	0.57	0.61	0.59	0.20	0.24	0.22	0.44	0.44	0.44	0.59	0.64	0.61	0.70	0.80	0.75	0.00	0.00	0.00	1.00	1.00	1.00
Presentation	0.52	0.55	0.54	0.22	0.24	0.23	0.40	0.40	0.40	0.50	0.57	0.56	0.67	0.72	0.71	0.00	0.00	0.00	1.00	1.00	1.00
Reconciliation	0.55	0.56	0.56	0.21	0.24	0.23	0.42	0.38	0.40	0.56	0.58	0.57	0.71	0.75	0.73	0.00	0.00	0.00	1.00	1.00	1.00
Explanation on the use	0.30	0.34	0.32	0.20	0.21	0.21	0.14	0.20	0.14	0.29	0.33	0.33	0.46	0.50	0.50	0.00	0.00	0.00	0.78	0.86	0.86
Prominence	0.85	0.89	0.87	0.18	0.16	0.17	0.77	0.83	0.79	0.92	1.00	0.94	1.00	1.00	1.00	0.17	0.17	0.17	1.00	1.00	1.00
Comparatives	0.53	0.57	0.55	0.21	0.24	0.23	0.40	0.40	0.40	0.54	0.56	0.55	0.69	0.75	0.73	0.00	0.00	0.00	1.00	1.00	1.00
Consistency	0.94	0.95	0.94	0.13	0.10	0.12	0.92	0.91	0.92	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.50	0.25	1.00	1.00	1.00
DQI	**0.61**	**0.64**	**0.62**	**0.10**	**0.11**	**0.11**	**0.54**	**0.56**	**0.55**	**0.62**	**0.64**	**0.63**	**0.67**	**0.71**	**0.69**	**0.40**	**0.41**	**0.40**	**0.84**	**0.91**	**0.91**

Note: This table shows the entire DQI subdivided into the seven ESMA APM quality requirements, for the financial periods 2016 and 2017 and cumulative for both periods.

Table 8. DQI by indices and industries (n=133)

Index	Mean	Standard deviation	p25	Median	p75	Minimum	Maximum
DAX	0.71	0.08	0.65	0.71	0.77	0.56	0.91
MDAX	0.65	0.01	0.57	0.65	0.74	0.46	0.84
SDAX	0.62	0.08	0.57	0.63	0.66	0.46	0.82
TecDAX	0.60	0.11	0.52	0.59	0.65	0.40	0.87
General Standard	0.57	0.01	0.51	0.56	0.64	0.41	0.86
Industry Super Sector							
Basic materials	0.68	0.13	0.62	0.69	0.80	0.43	0.85
Consumer goods	0.63	0.09	0.58	0.64	0.67	0.46	0.81
Consumer services	0.60	0.10	0.52	0.62	0.66	0.43	0.86
Industrials	0.60	0.09	0.52	0.61	0.66	0.41	0.82
Information technology	0.60	0.11	0.54	0.58	0.65	0.40	0.87
Pharma & healthcare	0.63	0.09	0.57	0.64	0.68	0.43	0.80
Telecommunication	0.66	0.13	0.54	0.71	0.76	0.43	0.81
Utilities	0.77	0.08	0.73	0.77	0.82	0.62	0.91
DQI	**0.62**	**0.11**	**0.55**	**0.63**	**0.69**	**0.40**	**0.91**

Note: This table shows the entire DQI subclassified by indices and industry super sectors and cumulative for the financial periods 2016 and 2017.

Table 9. DQI and compliance score with ESMA APM requirements by APM categories

APM category	Mean DQI			Number of APMs			Fully compliant AMPs			Share of fully compliant APMs		
	2016	**2017**	**∑**	**2016**	**2017**	**∑**	**2016**	**2017**	**∑**	**2016**	**2017**	**∑**
Profitability	0.64	0.67	0.65	607	595	1,202	42	77	119	6.9%	12.9%	9.9%
Non-profitability	0.59	0.62	0.61	714	704	1,418	68	86	154	9.5%	12.2%	10.9%
Asset/capital structure	0.61	0.64	0.63	306	301	607	31	35	66	10.1%	11.6%	10.9%
Capital efficiency	0.64	0.67	0.66	98	99	197	13	11	24	13.3%	11.1%	12.2%
Liquidity/cash flow	0.68	0.71	0.69	117	117	234	15	20	35	12.8%	17.1%	15.0%
Stock market/valuation	0.60	0.64	0.62	74	74	148	5	10	15	6.8%	13.5%	10.1%
Volume/growth	0.48	0.50	0.49	119	113	232	4	10	14	3.4%	8.9%	6.0%
Total	**0.61**	**0.64**	**0.62**	**1,321**	**1,299**	**2,620**	**110**	**163**	**273**	**8.3%**	**12.6%**	**10.4%**

Note: This table shows for all APM categories the mean DQI, the full compliance with the disclosure quality requirements and the share of fully compliant APMs in the respective category for the financial periods 2016 and 2017 and cumulative for both periods. The category *Non-profitability* summarises the categories asset/capital structure, capital efficiency, liquidity/cash flow, stock market/valuation, and volume/growth.

Table 10. Pearson correlation matrix

	DQI	SIZE	LEV	PRO-FIT	OWN-ER	IND=BM	IND=CG	IND=CS	IND=Ind	IND=InT	IND=P&h	IND=Tel	IND=Ut	LOSS	MTB	CAP-EX	IN-TAN	BIG-FOUR	CO-MM	PRI-ME	BAN-KR	EAV	CA TO
SIZE	**0.5305**	1																					
LEV	**0.2134**	**0.2360**	1																				
PROFIT	-0.0133	0.0136	0.0416	1																			
OWNER	**-0.2464**	**-0.2944**	**-0.1320**	-0.0303	1																		
IND=BM	**0.1535**	**0.1782**	-0.0307	0.0304	-0.0807	1																	
IND=CG	-0.0850	**-0.1918**	-0.0071	0.0345	0.0820	-0.0988	1																
IND=CS	-0.0285	**0.1774**	-0.0297	0.0405	-0.0336	-0.1188	**-0.1302**	1															
IND=Ind	**-0.1432**	-0.0973	0.0357	0.0530	0.0849	**-0.2183**	**-0.2393**	**-0.2393**	1														
IND=InT	-0.1090	**-0.1534**	-0.0856	-0.1029	-0.0577	**-0.1300**	**-0.1425**	**-0.1425**	**-0.3149**	1													
IND=PH	0.0251	-0.0375	-0.0897	-0.0843	-0.0736	-0.0988	-0.1083	-0.1083	**-0.2393**	**-0.1425**	1												
IND=Tel	0.0568	0.0750	-0.0655	0.0099	-0.0118	-0.0593	-0.0651	-0.0651	**-0.1437**	-0.0856	-0.0651	1											
IND=Ut	**0.3025**	**0.2231**	**0.3567**	0.0141	0.0682	-0.0653	-00715	-0.0715	**-0.1580**	-0.0941	-0.0715	-0.0430	1										
LOSS	-0.0272	**-0.1908**	-0.0277	**-0.2987**	0.0012	-0.0240	0.0383	0.0383	-0.0424	-0.0930	**0.1961**	0.1130	0.0904	1									
MTB	-0.0876	**-0.1752**	-0.0415	0.0727	-0.0457	**-0.1214**	**0.1605**	**0.1605**	-0.0504	**0.2638**	-0.0501	-0.0335	-0.0809	-0.0915	1								
CAPEX	-0.0041	-0.0156	0.0127	0.0921	0.0103	0.0165	0.0037	0.0037	-0.0433	**-0.1478**	-0.0324	0.0911	-0.0251	0.0114	0.0263	1							
INTAN	**0.1813**	0.0664	-0.0910	0.0656	**-0.1663**	**-0.1745**	**0.1500**	**0.1500**	**-0.2909**	**0.3587**	**0.1624**	**0.2688**	-0.1197	-0.0085	**0.1364**	**-0.2647**	1						
BigFour	**0.2014**	**0.5812**	0.1200	-0.0411	**-0.1219**	0.1031	**-0.1740**	**-0.1740**	-0.0225	-0.0740	0.0345	-0.0758	**0.1211**	-0.0732	0.0267	-0.0129	-0.0539	1					
COMM	**0.2474**	**0.5710**	0.1174	-0.0522	**-0.2868**	0.1154	**-0.3251**	**-0.3251**	0.0517	**-0.1671**	0.0793	0.0268	**0.1286**	-0.0791	-0.0500	**0.1860**	-0.0582	**0.4975**	1				
PRIME	**0.3121**	**0.6809**	0.0815	-0.0355	**-0.4213**	0.0601	-0.0844	-0.0844	-0.0907	0.0318	0.0865	0.0314	-0.0307	**-0.1215**	**0.1310**	0.0416	**0.1633**	**0.5761**	**0.6047**	1			
BANKR	**0.2228**	**0.2609**	**0.2993**	0.0165	-0.0535	0.0275	-0.0736	-0.0736	0.0431	**-0.2075**	0.0256	0.1166	**0.1897**	**0.2265**	**-0.3957**	-0.0381	0.0565	**0.1285**	0.0629	-0.0015	1		
EAV	-0.0813	**-0.3074**	-0.0240	-0.0537	0.0251	-0.0160	0.0450	0.0450	**-0.1529**	0.0913	**0.2023**	0.0848	-0.0334	**0.2002**	**0.1879**	0.0270	-0.0084	**-0.2524**	**-0.1909**	**-0.2006**	-0.0882	1	
CA_TO	0.0382	-0.0545	-0.0624	**0.1594**	0.1174	-0.1076	0.0878	0.0878	-0.0829	0.0447	**-0.1447**	**0.2519**	0.0976	**-0.1799**	0.0822	**0.1505**	**0.2606**	**-0.1488**	-0.0212	**-0.1653**	-0.1055	0.1052	1
ROA	-0.0893	-0.0390	**-0.1860**	**0.2992**	0.0828	**0.1309**	0.0881	0.0881	0.0102	0.0935	**-0.2564**	-0.0612	**-0.1217**	**-0.5617**	**0.3852**	-0.0475	-0.0234	-0.0135	-0.0526	0.0713	**-0.4344**	0.0083	0.1
SEGM	**0.1915**	**0.4185**	**0.2878**	-0.0686	**-0.1632**	0.0711	-0.0390	-0.0390	0.0495	**-0.1215**	**-0.1581**	-0.0625	**0.1289**	**-0.2016**	-0.0583	0.1098	-0.0851	**0.1563**	**0.1776**	**0.1376**	0.0536	**-0.1984**	0.0
NUM	**0.2776**	**0.5849**	0.0459	0.0865	**-0.2382**	**0.1633**	-0.1147	-0.1147	0.0316	-0.0630	0.0961	-0.0305	**-0.1602**	**-0.1849**	**-0.1611**	0.0618	**0.1291**	**0.3544**	**0.3991**	**0.5337**	0.0536	**-0.1668**	-0.0
Analysts	**0.4629**	**0.8297**	**0.1908**	0.0750	**-0.4532**	**0.1518**	-0.0873	**0.2621**	**-0.1883**	-0.086	-0.0127	0.1060	-0.0167	**-0.2082**	-0.0206	0.0204	**0.1768**	**0.4647**	**0.4658**	**0.6511**	**0.1274**	**-0.1845**	-0.0

Note: This table shows the Pearson correlation coefficients. Bold values indicate a significance level of at least 5%. Ind - Industries: BM: Basic materials, CG: Consumer goods, CS: Consumer service, Ind: Industrials, InT: Information technology, PH: Pharma & healthcare, Tel: Telecommunication, Ut: Utilities. Intan: Intangibles. Comm: Audit committee. Bankr: Bankruptcy. CA_TO: CA_Turnover. Segm: Segments. Num: Number APMs. All variables are defined in Table 3.

Table 11. Random–effects regression analyses per DQI APM category

	(1) DQI	(2) DQI-Profit	(3) DQI-Non-profit	(4)	(5)	(6)	(7)	(8)
SIZE	0.023***	0.027***	0.025***	0.004	0.028**	0.046***	0.047**	0.012
	(0.000)	(0.000)	(0.001)	(0.658)	(0.038)	(0.001)	(0.049)	(0.496)
PROFIT	-0.014***	-0.019***	-0.011***	-0.007**	-0.115	-0.050	-0.025**	-0.007
	(0.000)	(0.000)	(0.000)	(0.021)	(0.682)	(0.642)	(0.011)	(0.314)
LEV	-0.001	-0.001	0.002**	0.002*	0.002	0.001	0.002	0.007
	(0.239)	(0.271)	(0.023)	(0.066)	(0.378)	(0.652)	(0.459)	(0.404)
OWNER	-0.037*	-0.073*	0.010	0.026	-0.158**	0.025	-0.083	0.042
	(0.077)	(0.051)	(0.783)	(0.489)	(0.017)	(0.743)	(0.392)	(0.648)
IND=Basic materials	0.046	0.074*	0.026	0.038	0.087	0.082	0.107	-0.000
	(0.121)	(0.067)	(0.504)	(0.405)	(0.121)	(0.291)	(0.293)	(0.998)
IND=Consumer services	-0.017	-0.015	-0.025	-0.089	-0.002	0.050	0.080	-0.011
	(0.560)	(0.714)	(0.655)	(0.215)	(0.988)	(0.635)	(0.611)	(0.935)
IND=Industrials	0.001	0.029	-0.012	-0.004	0.029	0.056	0.131	-0.158**
	(0.970)	(0.249)	(0.709)	(0.913)	(0.551)	(0.298)	(0.254)	(0.015)
IND=Information technology	-0.038	-0.029	-0.046	-0.067	-0.025	0.003	0.080	-0.062
	(0.154)	(0.396)	(0.311)	(0.200)	(0.790)	(0.977)	(0.575)	(0.451)
IND=Pharma & healthcare	0.001	0.007	0.024	0.009	0.046	-0.053	-0.121	-0.021
	(0.960)	(0.883)	(0.655)	(0.876)	(0.450)	(0.479)	(0.490)	(0.807)
IND=Tele-communication	-0.042	-0.027	0.009	0.014	0.062	0.061	n/a	-0.009
	(0.470)	(0.709)	(0.830)	(0.767)	(0.367)	(0.447)	n/a	(0.938)
IND=Utilities	0.112***	0.165***	0.023	0.061	0.088	0.073	-0.030	n/a
	(0.000)	(0.001)	(0.693)	(0.344)	(0.155)	(0.215)	(0.834)	n/a
LOSS	-0.024	-0.014	-0.039*	-0.038	-0.001	-0.044	-0.114	0.059
	(0.158)	(0.673)	(0.067)	(0.195)	(0.988)	(0.326)	(0.389)	(0.502)
MTB	0.003	-0.001	0.005	0.002	-0.006	0.028***	0.025**	0.000
	(0.362)	(0.826)	(0.190)	(0.672)	(0.387)	(0.000)	(0.022)	(0.972)
CAPEX	0.306	0.070	0.504*	0.301	0.095	0.867*	0.970	0.578
	(0.159)	(0.829)	(0.084)	(0.329)	(0.864)	(0.068)	(0.561)	(0.510)
INTANGIBLES	0.125***	0.128**	0.141**	0.178**	0.061	0.165	0.147	0.354**
	(0.007)	(0.041)	(0.038)	(0.041)	(0.639)	(0.206)	(0.435)	(0.048)
BIGFOUR	-0.027*	-0.012	-0.063**	-0.090***	0.074	-0.075**	-0.057	-0.010
	(0.095)	(0.674)	(0.024)	(0.008)	(0.385)	(0.035)	(0.443)	(0.879)
COMMITTEE	-0.015	-0.041	0.022	-0.014	0.023	0.133**	0.175	0.003
	(0.433)	(0.153)	(0.579)	(0.861)	(0.537)	(0.049)	(0.198)	(0.963)
PRIME	0.005	-0.012	0.055	0.100**	0.062	-0.113	-0.263**	0.003
	(0.775)	(0.695)	(0.114)	(0.029)	(0.440)	(0.171)	(0.033)	(0.974)
BANKRUPTCY	0.017**	-0.011	0.035**	0.031*	0.018	0.019	0.015	0.042
	(0.042)	(0.449)	(0.017)	(0.076)	(0.465)	(0.402)	(0.608)	(0.191)
EAV	0.138***	0.109	-0.044	-0.240	0.978**	0.880**	2.495	-1.046
	(0.010)	(0.117)	(0.835)	(0.104)	(0.018)	(0.033)	(0.129)	(0.182)
CA_TURNOVER	0.001	0.006	0.005	-0.001	0.037	-0.014	-0.021	-0.030
	(0.836)	(0.475)	(0.633)	(0.939)	(0.143)	(0.455)	(0.563)	(0.327)
ROA	0.000	0.002	-0.000	0.002	0.001	-0.006*	-0.003	0.003
	(0.794)	(0.528)	(0.826)	(0.361)	(0.855)	(0.092)	(0.582)	(0.264)
SEGMENTS	-0.003	0.001	-0.008	0.002	0.001	-0.016	0.001	-0.009
	(0.401)	(0.876)	(0.189)	(0.762)	(0.931)	(0.164)	(0.968)	(0.436)
NUMBER APM PER CATEGORY	-0.001	-0.019***	-0.004	0.004	-0.062***	-0.028	-0.024	0.003
	(0.535)	(0.000)	(0.368)	(0.731)	(0.000)	(0.186)	(0.557)	(0.891)
N	266	266	266	255	137	171	99	128
Year	YES	YES	YES	YES	YES	YES	YES	YES
R^2 overall	*0.422*	*0.286*	*0.345*	*0.189*	*0.523*	*0.288*	*0.286*	*0.333*
R^2 between	*0.443*	*0.304*	*0.370*	*0.198*	*0.548*	*0.280*	*0.269*	*0.380*

Note: This table presents the results of the random-effects panel regressions. The dependent variable in Model 1 is the entire DQI. The dependent variable in Model 2 is obtained from profitability APMs and in Model 3 from all non-profitability APMs. The dependent variables in Models 4–8 represent each DQI separately included in the non-profitability APM category, (4) asset/capital structure, (5) capital efficiency, (6) liquidity/cash flow, (7) stock market/valuation, and (8) volume/growth APMs. See Table 3 for variable definitions. The sample consists of 2,620 firm-year observations of German listed firms of 2016 and 2017. The analyses are based on random-effects regression with standard errors clustered at the firm level and fiscal year. P-values (two-tailed) are reported within parentheses below the coefficient estimates, where the significant levels are denoted as follows: *p < .10, **p < .05, and ***p < .01.

Table 12. Random–effects regression analysis with weighted DQI (n=133)

$$\textbf{WEIGHTED DQI}_{i,t} = £_0 + \beta_1 SIZE_{i,t} + \beta_2 PROFIT_{i,t} + \beta_3 LEV_{i,t} + \beta_4 OWNER_{i,t} + \beta_{5\text{-}11} Industrydummies_{i,t} + \beta_{12} LOSS_{i,t} + \beta_{13} MTB_{i,t} + \beta_{14} CAPEX_{i,t} + \beta_{15} INTANGIBLES_{i,t} + \beta_{16} BIGFOUR_{i,t} + \beta_{17} COMMITTEE_{i,t} + \beta_{18} PRIME_{i,t} + \beta_{19} BANKRUPTCY_{i,t} + \beta_{20} EAV_{,t} + \beta_{21} CA\_TURNOVER_{i,t} + \beta_{22} ROA_{i,t} + \beta_{23} SEGMENTS_{i,t} + YEAR + \varepsilon_{i,t}$$

Variables	Coeff.	z–stat	p–value (2–tailed)
(Constant)	-22.486	-1.973	0.048
SIZE	0.047	7.560	0.000
PROFIT	-0.008	-5.075	0.000
LEV	0.001	2.218	0.027
OWNER	-0.006	-0.188	0.851
Control variables			
IND=Basic materials	0.099	2.027	0.043
IND=Consumer services	0.030	0.612	0.541
IND=Industrials	0.051	1.593	0.111
IND=Information technology	0.011	0.249	0.803
IND=Pharma & healthcare	0.064	1.543	0.123
IND=Telecommunication	-0.055	-0.721	0.471
IND=Utilities	-0.065	-1.163	0.245
LOSS=YES	-0.008	-0.501	0.616
MTB	0.004	1.087	0.277
CAPEX	0.205	0.926	0.355
INTANGIBLES	0.097	1.773	0.076
BIGFOUR=YES	-0.050	-1.783	0.075
COMMITTEE=YES	0.029	1.112	0.266
PRIME=YES	0.005	0.187	0.852
BANKRUPTCY	0.015	1.699	0.089
EAV	0.049	0.895	0.371
CA_TURNOVER	-0.008	-0.971	0.331
ROA	0.001	1.411	0.158
SEGMENTS	0.003	0.621	0.535
Year	YES		
R^2 overall	0.497		
R^2 between	0.508		

Note: This table presents the results of the random-effects panel regression for the dependent variable WEIGHTED DQI. WEIGHTED DQI considers the *breadth* of APM disclosures (computed by the sum of the disclosure indices for each of the six APM categories separately, divided by the total number of the six main APM categories). The independent and control variables are defined in Table 3. The sample consists of 2,620 firm-year observations of German listed companies of 2016 and 2017. The analyses are based on random-effects regression with standard errors clustered at the firm level and fiscal year.