

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

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In 2015 the European Securities and Markets Authority (ESMA) introduced guidelines for the disclosures of alternative performance measures (APMs). The use and importance of APMs within corporate disclosures have substantially increased in recent years. They are believed to enhance investors' understanding of a firm's performance, but also to affect investors adversely if disclosed opaquely to draw a biased picture. Thus, we develop a disclosure quality index based on the ESMA APM guidelines to analyse the APM disclosure quality and its potential influencing determinants. Based on hand-collected data gathered from the 2016 group management reports of 134 listed German companies, we find that there is considerable room for improvement regarding disclosure quality of APMs. Using a tobit regression, we find evidence that firm size and ownership diffusion are associated with higher APM disclosure quality while profitability is negatively associated with APM disclosure quality. Empirical evidence for an effect of firm industry is marginal. The study has several practical implications for supervisory and enforcement bodies, auditors, as well as for firms on how to increase the currently mediocre level of APM disclosure quality.

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1 Introduction

In order to make their decisions about the provision of resources to a specific company, investors depend on information which is mandatorily or voluntarily disclosed by the respective company (Healy & Palepu 2001). In this context, the annual report plays a crucial role, as it contains the financial statements as well as the management report¹ and—in many cases—additional sections or reports with information about the company, its economic position and course of business. In all parts of the annual report and—more generally—in other kinds of capital market communication as well, financial performance measures are of major importance, as they condense the economic position and performance of the company (Gladen 2014). However, not all disclosed measures are defined in the applicable financial reporting framework. *Alternative performance measures* (APMs; also referred to as “non-GAAP [performance] measures” or “pro-forma” earnings) are measures that are defined and computed by companies themselves, and hence provide leeway for companies (Doyle et al. 2013). The use of such APMs is not a new phenomenon. However, researchers as well as standard setters emphasize that a proliferation of APMs has taken place over the last years (Kabureck 2017, Afterman 2015, Brouwer 2013) and whether the increased usage of APMs is a curse or a blessing for investors, is intensely debated (Young 2014, Allee et al. 2007). Whether APMs have a beneficial or detrimental effect on investors hinges on the disclosure quality of APMs. For example, if definitions and calculations of APMs are disclosed transparently and consistently applied over time, they can convey a higher level of information to investors. Otherwise, biased and opaque disclosure of APMs can be used to impair investors and comparability of financial information (Bhattacharya et al. 2004).

Against this background, different regulatory bodies have taken up the matter and issued guidance on how companies should use and disclose APMs (Hitz 2010). Most recently, guidance was published by the European Securities and Markets Authority (ESMA) in late 2015 that came into effect in 2016. Because of the supposedly double-edged effect of APMs on investors, it is necessary to gain a better understanding of the empirical disclosure quality, and potential determinants that explain variance in APM disclosure quality. Particularly, we analyse a set of determinants that can be hypothesized to be associated with APM disclosure quality in a sample of 134 German firms’ group management reports. We use the 2015

¹ In the EU, capital market-oriented companies are required to complement the financial statements with a management report (7th Accounting Directive 83/349/EEC 1983). Other jurisdictions require similar reports, such as the MD&A in the USA (Regulation S-K, Item 303). The IASB has issued a practice statement (IASB 2010), intended for jurisdictions that do not have own requirements for management reports.

ESMA APM guidelines to establish a suitable, multi-faceted measure of APM disclosure quality.

Our paper contributes to the ongoing APM debate in several ways. First, the few studies that investigate APM disclosure quality mostly focus on specifically labelled performance measures, e.g. “key performance indicators” (Bini et al. 2017, Agyei-Mensah 2015, Dainelli et al. 2013, Aripin 2010), are exclusively limited to earnings measures (Black et al. 2017, Isidro & Marques 2013, Jennings & Marques 2011, Marques 2010, Heflin & Hsu 2008, Fields et al. 1998) and/or investigate the value relevance of APM disclosures (Guillamon-Saorin et al. 2017, Elzahar et al. 2015, Marques 2006). Our study takes a more comprehensive perspective and examines disclosure quality for all categories of APMs. This broader perspective is consistent with the notion that investors are not only affected by earnings measures, but by other APMs (e.g., growth figures, debt ratios, etc.) as well.

Second, previous studies often used disclosure quantity as a measure for quality. However, this approach is questionable (Aripin et al. 2010, Beattie et al. 2004). Since APMs are neither regarded as good or bad per se, a quality assessment has to consider how and for what purpose they are used (Afterman 2015). Thus, better measures for APM disclosure quality are needed that allow to evaluate disclosure quality in a multidimensional and principle-oriented way (Beattie et al. 2004). A respective approach is employed in this study as we adopt a self-constructed disclosure index that considers the quality requirements of APM disclosure derived from the ESMA APM guidelines.

Third, the ESMA APM guidelines were published and became effective only recently. To the best of our knowledge, there is no empirical research within this regulatory setting yet. Fourth, Germany provides an interesting setting for this research. German management reports are comparably extensive and constitute a clearly identifiable section of the annual report. Further, just like the financial statements, German management reports are subject to a statutory audit, which might lead to a higher level of disclosure quality. Consequently, they build a good foundation for a comprehensive cross-company investigation on disclosure quality determinants. Respective German studies are scarce and set the typical earnings measure focus (Hitz 2010, Reimsbach 2014, Thale 2013, Volk 2007, Küting & Heiden 2002) or remain in purely descriptive statistics (Wühst & Rosner 2016, Blab et al. 2018).

Our findings show that German companies make intense use of APMs in their management reports as on average ten APMs are disclosed by each company. However, the quality of these disclosures is mediocre. With a maximum attainable value for our disclosure

quality index of 1, the mean disclosure quality index is just 0.57 with a maximum of 0.81. This implies that, currently, no company reaches full compliance for all its disclosed APMs and that more regulatory effort is necessary to ensure compliance with the ESMA APM guidelines. Additionally, we identify several determinants that are associated with APM disclosure quality. We find that firm size and ownership diffusion are positively, and profitability is negatively associated with APM disclosure quality. Further, we find weak evidence that APM disclosure quality varies systematically across industry sectors. In additional tests, we show that the number of analyst following a firm is also associated with APM disclosure quality, but we do not find empirical support for an effect of stock-market listing tier (Prime Standard vs. General Standard²). Interestingly, also the *quantity* of disclosed APMs appears to be unrelated to APM disclosure *quality*.

2 Background and hypotheses development

The use of APMs in group management reports and in various kinds of disclosed financial information has proliferated over the last years (Kabureck 2017, Afterman 2015). However, APMs lack a specific definition in the relevant financial reporting framework. Thus, companies are provided with room for discretion in defining, calculating and disclosing these measures (Isidro & Marques 2008, 2015, Doyle et al. 2013). Thus, the ongoing debate regarding usefulness of APMs is intense. Proponents argue that APMs are able to convey a higher level of information to investors, while opponents argue that APMs impair comparability and are used with biased disclosure in order to mislead investors (Bhattacharya et al. 2004). Consequently, the intensity of the debate may be attributed to the fact that there can be different underlying motives for the use of APMs by management, which are difficult to entangle for external parties (Young 2014).

Empirical research has consistently shown the relevance of APMs, particularly for risk and return evaluations of investors (e.g., Guillamon-Saorin 2017, Elzahar 2015, Wyatt 2008, Banker & Mashruwala 2007, Palepu 1986). Further, it is argued by academics as well as by several professional entities that performance measure disclosures may improve the usefulness and quality of external reporting (Bini et al. 2017, Hooks et al. 2002). A range of arguments, though mainly focused on earnings measures, is raised in that context. First, it is

² The German stock exchange has two separate market segments, the *general standard* and the *prime standard*. Both segments differ substantially in terms of visibility to the public and media and analyst coverage. Also, the prime standard is intended for companies with an international focus and only companies traded in this standard are eligible for being included in one of the German stock market indices, for example the blue chip market index DAX (Deutscher Aktienindex).

reasoned that the separation of income streams, in particular the separation of recurring and nonrecurring items, may increase transparency by providing a clearer picture of a company's historical and expectable financial performance (Young 2014, Bhattacharya et al. 2004). Second, cross-sectional and time-series comparisons are believed to be enhanced if certain effects are excluded (e.g., unusual events). Third, it is argued that APMs are extensively used by investors, which underscores their relevance and makes it only plausible to include them in disclosures in order to enhance consistency of financial communication (Young 2014). Further, it is reasoned that disclosure of performance measures can ease analyses and help to quickly understand the information which might increase efficiency for all investors, particularly for less experienced investors (Bini et al. 2017, Allee et al. 2007, Watson et al. 2002). Thus, as the existence of such benefits is not disputed by regulatory and supervisory bodies, it is no surprise that there are no serious intentions to strictly inhibit the use of APMs in companies' disclosures (Kabureck 2017, IASB 2017, IOSCO 2016).

Notwithstanding, arguments to the contrary have also been raised. Particularly, it is argued that opportunism of management leads to a strategic and biased use of APMs. This implies that management prefers to present higher earnings (e.g., by preferably reporting nonrecurring expenses in contrast to nonrecurring earnings or by declaring normal recurring expenses as one-time items), delay losses and generally present financials in a more favourable light with the motive to increase stock valuations and, ultimately, personal benefits (Young 2014, Bhattacharya et al. 2004). Further, the concern is raised that lacking definitions and uniform applications are obstructing instead of enhancing comparability across firms or even between different firm years, when arbitrary definitional changes of the measures occur (Bhattacharya et al. 2004). Besides, it is claimed that several performance measures do not convey significant additional information since they just process available information and could be derived by users through their own calculations (Watson et al. 2002). In conclusion, Young (2014) sees a dilemma for investors and regulatory bodies between giving management freedom to use APMs in order to communicate insider information and simultaneously limiting management's ability to employ APM disclosures opportunistically. He concludes that it is a conflict area between relevance and reliability.

Regulating alternative performance measure disclosure

Consequently in recent decades, different supervisory and regulatory bodies have taken up these concerns and issued guidance on APMs with the proclaimed objective of ensuring a certain level of consistency and quality and restricting an adverse influence on investors (Hitz

2010). However, a commonly accepted and conclusive definition of the measures that are covered by the term APM has not yet emerged.

The efforts of international securities supervisory bodies about the disclosure of APMs date back several years. In 2002, the International Organization of Securities Commissions (IOSCO) had already released a “Cautionary Statement Regarding Non-GAAP Results Measures” advising investors and issuers to use care when presenting and interpreting non-GAAP measures (IOSCO 2002). In 2005, with reference to the IOSCO statement, the Committee of European Securities Regulators (CESR) issued a recommendation on APMs for listed companies within the EU, applicable for all kinds of reporting to markets (except for prospectuses) if financial information is included. The definition of an APM, however, remained relatively unclear: On the one hand, it was specified that only financial performance measures are within the scope, while on the other hand, it was stated that APMs may also reflect aspects like business activity (e.g., production levels). The document listed a comprehensive catalogue of requirements that need to be complied with to ensure high quality disclosure of APMs (e.g., definition, explanation of relevance, provision of comparatives, consistency over time, etc.) (CESR 2005).

Although these requirements were far more exhaustive than the guidance provided by applicable legislation in the member states, the effect of respective CESR recommendations was weak. CESR’s successor, ESMA, gave this as the reason to reinforce regulatory action regarding APMs. ESMA published its new APM guidelines in late 2015. According to the guidelines, “[...] an APM is understood 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. 17 (6)). The guidelines gained effectiveness on 3rd July 2016, implying that they are of relevance for the 2016 management reports (ESMA 2015). While not adding much to the quality requirements already stated in the CESR recommendation (Wühst & Rosner 2016), the compliance and reporting obligations stated in the guidelines particularly reflected the authority’s reinforced ambition to regulate the APM sphere (ESMA 2015, 2014). Further, regarding specificity and detail, the ESMA APM guidelines surpass other guidance documents (e.g., IFRS Practice Statement Management Commentary³) and only apply to APMs that are

³ The IASB addresses the APM issue in its non-binding framework “IFRS Practice Statement Management Commentary”, in its research project “Primary Financial Statements” as well as in its ongoing “Disclosure Initiative” with the sub-project “Principles of Disclosure” (IASB 2017, 2010). With regard to the latter, in its recently published discussion paper, the IASB states that amendments to IAS 1 have improved the use of non-

published as part of regulated information. Management reports that are disclosed in accordance with the Transparency Directive⁴ are highlighted as one specific piece of such information (ESMA 2015).

Thus in Germany, capital market orientated firms have to disclose their management report to complement the consolidated financial statements in the annual report with qualitative and prognostic information. The management report, as an integral part of the annual report, has a long-standing tradition in Germany, is subject to a statutory audit, and may be additionally examined by the Financial Reporting Enforcement Panel (FREP)⁵. Since its initial establishment, the legal requirements in Europe for management reports have been continuously enhanced by several legislative acts. Particularly, Directive 2003/51/EC (Modernisation Directive) significantly extended the requirements and introduced that the discussion should be based on the most relevant financial performance indicators. Thereupon, 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. However, GAS 20 does not provide a general definition of performance measures, but only explicitly demands that the “most important financial key performance indicators” have to be included in the management report (GAS 20.101), especially the measures used for internal management (GAS 20.P45, 20.102). Further, the standard just contains rudimentary guidance on how to present respective financial and non-financial measures (e.g., presentation of calculation, reconciliation, and changes).

Therefore, further guidance for the disclosure of APMs has been necessary and according to the ESMA, the new APM guidelines aim at increasing the usefulness and transparency of APMs included in regulated information. However, it has to be mentioned,

IFRS subtotals in the statements of financial performance and financial position, as several requirements for the disclosure have been established (e.g., mandatory reconciliation of respective subtotals to IFRS figures) (IASB 2017). However, due to the diversity of disclosed performance measures and the tendency to modifications, the board discusses the necessity to define further performance measures within IFRS (e.g., operating profit). The objective is to restrict disclosure leeway and to define general requirements which all performance measures used have to meet (e.g., explanation of relevance, consistency over time, etc.) (IASB 2017, IFRS Foundation 2016).

⁴ In 2004, Directive 2004/109/EC (Transparency Directive) developed further disclosure obligations for European security issuers in regulated markets. The purpose was to improve the harmonization of information duties. The Directive demands issuers to publish annual reports that comprise audited financial statements, the management report as well as a responsibility statement by the legal representatives that the annual report convey a true and fair view (Transparency Directive, art. 4)

⁵ German listed companies are subject to a two-tier enforcement system established in 2005 based on the Bilanzkontrollgesetz (BilKoG). The enforcement procedure implies an additional examination of the financial reports and thus complements the audits carried out by the supervisory board and the statutory auditor. The first tier involves the FREP as a government-appointed private institution. The second tier is performed by the Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht; BaFin).

that although issued guidelines are regarded as a flexible instrument to promote convergence, the legal authority is not fully clear. By definition, the guidelines adopted by ESMA are of a non-binding nature. However, an intention of legally binding force can be deduced from the specific characteristics as well as from their wording (EC 2014, van Rijsbergen 2014). Respective guidelines refer to art. 16 of the ESMA Regulation⁶ and state that competent authorities as well as financial market participants *must* make every effort to comply with the guidelines. Further, competent authorities *should* incorporate the guidelines into their supervisory practices, monitoring whether or not issuers comply with them. In addition, the “comply or explain” mechanism demands that competent authorities report their (intended) compliance or their reasons for non-compliance (van Rijsbergen 2014, ESMA Regulation, art. 16). Concerning Germany, BaFin already reported to ESMA that they comply with the guidelines by incorporating them into their supervisory practices (ESMA 2017a) and, equivalent to the ESMA enforcement priorities for 2016 (ESMA 2016), the FREP set out the presentation of financial performance measures as one of the enforcement priorities for 2017 (FREP 2016). Notwithstanding, the practical implementation in auditing practices still remain uncertain as the audit of the compliance with the ESMA APM disclosure guidelines per se are not part of the statutory audit process.

Nevertheless, ESMA argues that adherence might enhance comparability, reliability and comprehensibility of APMs and thus enable issuers to provide a faithful representation of financial information. With regard to the Transparency Directive, ESMA further argues that a common approach toward APMs is inevitable in order to ensure consistent and effective supervisory practices. This, in turn, is regarded as a prerequisite to achieve equivalent investor protection in the EU (ESMA 2015).

Hypotheses development

Companies disclose information in many ways. As outlined, the annual report plays a crucial role in this regard, since it contains information that has to be disclosed mandatorily and since it is frequently complemented by voluntary sections. All these disclosures are critical to the functioning of capital markets as investors and creditors use the information in

⁶ ESMA has the power to use a mechanism of administrative rule-making, i.e., rule-making by “soft law” through the issuance of guidelines (van Rijsbergen 2014). The ESMA Regulation does not limit the release of guidelines to a specific legislative framework which distinguishes these soft law measures from technical standards (ESMA Regulation, art. 16). ESMA has made marked use of this discretion and shown ambition to control the standard-setting agenda through its own-initiative guidelines, implying a substantial expansion of its sphere of influence (Moloney 2013).

order to make their decisions about the provision of resources to a specific company. In other words, these disclosures mitigate information asymmetry (Alberti-Alhtaybat et al. 2012, Jensen & Meckling 1976). Agency theory is widely used to theoretically substantiate disclosure research (e.g., Shehata 2014, Brouwer 2013, Cotter et al. 2011, Urquiza et al. 2010, Watson et al. 2002) and several determinants that are believed to influence disclosure practices have been discussed against the background of the agency problem (see Hellmann et al. 2018). Signalling theory also draws on information asymmetry and is primarily concerned with the mitigation of problems resulting from adverse selection (Urquiza et al. 2010). As Morris (1987) demonstrates, both, agency and signalling theory are consistent and have a considerable overlap. Further, positive accounting theory draws heavily on the idea of agency costs (Watts & Zimmerman 1990) and, as Watson (2002) reasons, signalling as well as positive accounting arguments can theoretically substantiate similar disclosure decisions. Based on this theoretical foundation as well as on prior empirical research, a set of hypotheses regarding the determinants of APM disclosure quality is developed.

Firm size is one of the most theoretically discussed determinants for quantity as well as the quality of disclosed information. Particularly, the negative effects of information asymmetries are likely to be higher for large firms since it is assumed that these firms are interacting more with capital markets and depending on the marketability of their securities (Watson et al. 2002, Ng & Koh 1994, Singhvi & Desai 1971). So, large companies are particularly affected by the agency problem and especially harmed by the fact that capital providers price their claims (capital cost) higher under asymmetric information. Consequently, they have an incentive to reduce information asymmetries, e.g., through higher quality disclosures (Botosan 2006, Leftwich et al. 1981, Jensen & Meckling 1976). Further, factors on the cost side contribute as large companies might have better resources and processes in place to accumulate, process and present information, the incremental cost to provide the information adequately to the public is believed to be smaller (Buzby 1975, Singhvi & Desai 1971). Finally, it is reasoned that larger firms are under greater public scrutiny and thus have an incentive to provide higher quality disclosures in order to reduce political costs which might occur through tighter regulations or additional pressure by supervisory bodies (Watson et al. 2002). Several prior studies support these theoretical considerations. Studies have documented a significant positive association between the quantity of disclosure and firm size (Rahman & Hamdan 2017, Tauringana & Chithambo 2016, Broberg et al. 2009, Hassan et al. 2006, Akhtaruddin 2005, Ahmed & Courtis 1999,

Zarzeski 1996, Meek et al. 1995, Cooke et al. 1989, 1992, Chow & Wong-Boren 1987, Firth 1979), between disclosure quality and firm size (Hasan et al. 2008, Wallace et al. 1994, Wallace & Nasar 1995, Singhvi & Desai 1971) or both (Palmer 2008). There is only a small subset of studies which are focused on performance measures. For a UK sample, Watson et al. (2002) find that large firms are more likely to disclose APMs than small firms. Investigating on Australian and Italian companies respectively, Aripin (2010) and Bini et al. (2017) find a positive association between size and the disclosure quality of performance measures. Isidro and Marques (2015) show that the decision to report non-GAAP earnings in press releases is positively influenced by the firm's size. Taking these aspects into consideration, we hypothesize the following:

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

Leverage, particularly the relation between debt and equity, is another investigated determinant of disclosure practices in several studies. From a theoretical perspective, it is argued that the divergence of interest between creditors on the one side, and managers and equity holders, on the other implies additional agency costs. These increase with the gearing of the company, particularly due to the risk that managers might use their discretion to shift resources away from creditors to equity holders (Watson et al. 2002, Ahmed & Courtis 1999). For the purpose of restricting such conflicts, debt covenants and monitoring measures are widespread. Additionally, managers should have an incentive to reduce information asymmetry and the associated cost by providing additional information voluntarily. Accordingly, agency theory provides arguments as to why higher leverage could be associated with a greater extent as well as with better quality of disclosed information (Watson et al. 2002, Jensen & Meckling 1976). On the contrary, Jensen (1986) argues that a higher debt ratio reduces the agency costs of free cash flow as debt decreases the cash flow available and thus limits the room for managers' discretion. Further, high leverage causes higher monitoring of creditors which results in a decreased demand of shareholders for additional information (Broberg et al. 2010). For leverage, several studies observe a positive relationship with regard to the quantity of financial disclosure (Broberg et al. 2010, Al-Shammari et al. 2008, Ahmed & Courtis 1999, Watts 1977, Jensen & Meckling 1976) whereas others do not report significant relations (e.g., Raffournier 1995, Wallace & Naser 1995, Chow & Wong-Boren 1987) or find that disclosure quantity decreases with leverage (e.g. Hassan et al. 2006, Zarzeski 1996, Meek et al. 1995). Further, certain empirical findings suggest that leverage also influences positively disclosure quality (Urquiza et al. 2010, Ng &

Koh 1994). However with regard to the disclosure of performance measures, the empirical support is weak so far. Against their assumptions from an agency theory perspective, Aripin (2010) and Bini et al. (2017) find no association between leverage and disclosure quality of APMs. An association has only been found regarding the quantity of performance measure disclosure (Agyei-Mensah 2015, Watson et al. 2002). With regard to the contradictorily theoretical foundation as well as the mixed empirical findings from the general disclosure literature, we propose the following non-directional hypothesis:

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

A company's *profitability* has been hypothesized to be related to the quantity and quality of disclosure in several studies. From the perspective of agency and signalling theory, a positive relation between the two factors is supported by both theoretical streams (Bini et al. 2017, Watson et al. 2002). Particularly, Watson et al. (2002) argue that companies with good performance have an incentive to signal this to capital providers to assure them of their strong financial position. The authors further consider the political cost argument, reasoning that more profitable companies are under higher public scrutiny and thus may try to avoid additional regulations and restrictions by comprehensive and compliant disclosure practices. Arguments of strategic and opportunistic approaches point in a similar direction: Less profitable companies could be likely to use certain performance measures to selectively highlight favourable aspects and thus depict a biased picture. This could imply a less balanced disclosure and, particularly, a less transparent way of disclosing respective measures (Watson et al. 2002). While some studies report positive associations (e.g., Juhmani 2017, Hassan et al. 2006, Akhtaruddin 2005, Raffournier 1995, Singhvi & Desai 1971), other studies find no relationship (e.g., Palmer 2008, McNally et al. 1982), conflicting empirical results (Ahmed & Courtis 1999) or even negative relations (e.g., Inchausti 1997, Wallace & Naser 1995). With regard to performance measures, a positive relationship between firms' performance and disclosure level (Aripin 2010, Watson et al. 2002) as well as disclosure quality (Aripin 2010) has been reported, though there are insignificant results too (Bini et al. 2017, Agyei-Mensah 2015). For our analyses, we hypothesize the following:

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

The structure of company's *ownership* is another determinant which is discussed in the context of voluntary disclosures (Aripin et al. 2014). According to Jensen and Meckling (1976), ownership structure affects information asymmetries and agency costs that occur due to the separation of ownership and control. In the context of disclosure research, it is argued

that agency costs of equity increase with ownership diffusion. This is attributed to the fact that higher ownership concentrations imply less conflicting parties. Further, large shareholders are better equipped to monitor and restrict wealth transfers of managers. It is therefore assumed that managers of firms with a more diffused ownership are likely to disclose more and better information voluntarily in order to mitigate information asymmetries and reduce concomitant agency costs (Raffournier 1995). Particularly, a greater quantity of disclosure for diffused ownership firms is documented in several studies (e.g., Barako et al. 2006, Chau & Gray 2002, Hossain et al. 1994), though there are contradictory results too (e.g., Haniffa & Cooke 2002). Further, Singhvi and Desai (1971) find a positive relation between the number of shareholders and the quality of disclosure. With regard to the disclosure of performance measures, Aripin (2010) finds a positive association between ownership dispersion and the quantity of disclosure, though this is not supported in a subsequent study by Aripin et al. (2014). Further, Aripin (2010) as well as Agyei-Mensah (2015) report a negative association between the quality of APM disclosure and higher ownership concentration, though the significance level is low in the first case. Similarly, Isidro and Marques (2013) find a negative relationship between the presence of non-GAAP earnings reporting in press releases and different measures of ownership concentration. Given the agency theory foundation and prior empirical findings, we hypothesize as follows:

H4: The quality of APM disclosures is positively associated with ownership diffusion.

Several studies investigate the hypothesis that the *industry* a firm belongs to affects its disclosure policies. It is argued that different industries are subject to a varying tightness of regulations and differing public scrutiny. Thus, companies have differing incentives to engage in voluntary and high-quality disclosures to avoid political cost. Also, signalling arguments are presented, assuming that companies compare each other within their industry and have an incentive to comply with industry best practices by disclosing information in a certain quantity and quality (Watson et al. 2002). Further, differing proprietary costs between industries, historical evolutions and bandwagon effects in certain industries with dominant players are referred to as possible reasons for divergent disclosure practices (Aripin 2010, Cooke 1992). However, results are mixed, which may be attributed to the fact that there is a lack of consistency regarding industry classifications (Ahmed & Courtis 1999). Further, countries and disclosure items under investigation vary considerably. For example, McNally (1982) does not find differences between industry groups regarding the quantity of disclosure of financial and non-financial information in New Zealand, whereas Brammer and Pavelin

(2006) find significant associations between the quantity and quality of voluntary environmental disclosures and industry type in the UK. With regard to performance measures, Watson et al. (2002) report that industry is an important determinant of financial ratio disclosure for UK companies. Aripin (2010) finds that the quantity of APM disclosure is not related to a firm's industry in Australia, while there is an association between APM disclosure quality and industry. Thus, the following hypothesis shall be tested:

H5: The quality of APM disclosures is associated with industry.

3 Research design

Sample selection

The ESMA APM guidelines only apply to APMs that are published as part of regulated information whereby management reports that are disclosed in accordance with the Transparency Directive are one specific part of such information (ESMA 2015). Especially German management reports, which are subject to a statutory audit, are comparably extensive and form a clearly identifiable section of annual reports. Consequently, they build a good foundation for a comprehensive cross-company investigation on APM disclosure quality. Our sample comprises 135 group management reports for the reporting year 2016⁷ of listed German companies that disclose consolidated financial accounts according to IFRS. The ESMA guidelines on APMs are addressed at issuers of securities which are admitted to trading on a regulated market. The German Stock market has approximately 450 listed companies and is divided into the Prime Standard and the General Standard (02/2017: 301 companies, and 149 companies, respectively (Deutsche Börse 2017a)). Different transparency requirements apply to both tiers of companies. In order to cover a wide and representative sample of the regulated market in Germany, we use a stratified random sample approach. First, we randomly drew 25 companies from each of the four major indices of the Prime Standard: DAX, MDAX, SDAX and TecDAX. Second, we randomly selected 35 companies of the General Standard. This implies that approximately one third of the Prime Standard and one quarter of the General Standard are covered in our sample. We excluded companies of the finance, insurance and real estate (FIRE) super sector because these companies are subject to different legal requirements (Dainelli & Bini 2011, Hossain et al. 1995) and set a different focus in their reporting, including performance measures. We

⁷ Since the ESMA guidelines gained effectiveness in July 2016, the first reporting year which is shaped by this particular regulatory setting is 2016.

further excluded companies which do not publish consolidated financial statements in conjunction with a group management report. The final sample size was reduced to n=134, since only 24 DAX⁸ companies met the selection criteria outlined above. Table 1 explains our sample composition from an index, industry and auditing perspective.

[insert Table 1 here]

Data collection

We hand-collected information on APMs from each group management report of the 134 sample companies. We developed our coding rules and procedures according to the 2015 ESMA APM guidelines. Consequently, we did not consider performance measures as APMs that are defined in the financial reporting framework (e.g., IAS 33 *earnings per share*) as well as measures of physical or non-financial nature (e.g., headcount). 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., EBIT). However, this derivation from GAAP measures is not necessarily a characteristic of an APM, as measures such as constant currency revenue growth or value of order book exemplify (Ernst & Young 2016, Deloitte 2016, ESMA 2015). Besides, we excluded information on shareholdings, transactions and voting rights as well as information that is disclosed to demonstrate compliance with contractual agreements or legislation (e.g., lending covenants or calculation logics for executive pay). We implemented the following additional rules for APM identification:

- We excluded measures which simply report items from the financial statements (e.g., employee benefits expense, raw material cost, etc.). According to the ESMA APM guidelines, these items do not reflect APMs as they are lacking in aggregation, ratio-building, adjustment or comparable operation (Bini et al. 2017, ESMA 2015, 2017).
- We included APMs that are used to reflect both, total group level and segment level performance in the analysis only once, if no material differences between the calculations on the two levels could be identified.
- We collected measures that are presented in an absolute way and as a ratio (e.g., EBIT and EBIT margin) twice since it is reasoned that the relative way of presentation (ratio) conveys additional information.

⁸ The DAX consists of the 30 blue chip companies) trading on the Frankfurt Stock Exchange. After excluding the FIRE sector (five companies), thus, our sample covers almost all DAX companies.

- In contrast to other studies, we did not consider measures being labelled in a specific way (e.g., “key performance indicator”) as a necessary condition for inclusion (Bini et al. 2017). This is in line with ESMA’s approach of rejecting a restriction to specifically labelled figures and measures (ESMA 2017b).⁹
- We excluded those measures which are described, but not quantified in the management report, since non-quantified measures do not convey an amount of information to investors in the same way as quantified measures do.
- 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 constitutes APMs. However, respective rates are extensively dispersed over management reports and several companies present comprehensive reconciliation tables in which each line item of a financial statement is adjusted, e.g., to consider a currency impact. The purpose of such items is to present the reconciliation to specific performance measures (e.g., to adjusted constant currency operating profit) and they do not seem to have further relevance besides reconciliation. We excluded such items from the analysis unless particular emphasis is put on them, e.g., through repetitive use within tables as well as narratives or presentation in a way that suggests individual relevance. The same logic was applied for ratios other than change rates (e.g., functional cost ratios).

In the first step of our data collection, we screened the annual report at hand to gain an overview of its structure, possible particularities and APM usage. In the second step, we analysed the management report in detail. At the beginning, we identified and categorized all APMs disclosed in the report based on our coding rules explained above. Afterwards, we analysed for each APM the disclosure APM quality. After having analysed all annual reports in that way, a second round of analysis was conducted in order to check consistency of the coding decisions. In the third step, we aggregated this information to a disclosure quality index on a company level. Based on previous studies in the context of APM disclosure (Bini et al. 2017, Dainelli & Bini 2011, Aripin 2010), we allocated all identified APMs to predefined categories in order to allow for further in-depth analyses.

⁹ GAS 20.P45 requires listed companies 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. Besides, several companies 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 company. Limiting the analysis to declared measures could therefore depict a biased picture.

Dependent variable

The quality of disclosures can be defined in a variety of different ways since quality is to be understood as a multidimensional and complex construct (Beattie et al. 2004). For example, there are a large number of so-called disclosure index studies. Respective research develops and adopts self-constructed disclosure indices in order to capture the quality construct (Hellmann et al. 2018, Beretta & Bozzolan 2007). A common feature of these approaches is that for a list of items, it is checked whether the respective information has been disclosed or not. We adapt this approach to translate the ESMA APM guidelines into measurable items, the ESMA APM quality requirements, in order to calculate our dependent variable, the APM disclosure quality index (DQI). The six disclosure quality requirements, reported in detail in Table 2, (*disclosure principles, presentation, reconciliation, explanation on the use, prominence and comparatives*) reflect the requirements set out in the ESMA APM guidelines¹⁰. In order to assess APM disclosure quality in a multidimensional way, we divided each requirement into two quality sub-requirements presented in the second column of Table 2. These sub-requirements have been derived from the detailed explanations of the ESMA APM guidelines on the six superordinate quality requirements. Consequently, we assessed the disclosure quality of each identified APM in each management report based on the compliance of the six quality requirements.

[insert Table 2 here]

We applied a dichotomous scoring system, implying that a value of 1 is assigned if a certain requirement is complied with, and a value of 0 is assigned if the requirement is not complied with. This scoring system implies that an individual disclosure requirement can only be completely satisfied if both sub-requirements are met. Further, there is no indication as to why certain requirements should be more important than others. Particularly, the ESMA APM guidelines prescribe no hierarchy. Therefore, our disclosure quality index is unweighted since, under these circumstances, a weighting would increase subjectivity of the analysis (Bini et al. 2017). For the final score, the number of complied requirements is divided by the total number of requirements, implying that the final score for an APM ranges from 0 to 1. In order to achieve an index for the APM disclosure quality on a company level, the arithmetic mean of the scores of all APMs disclosed by one company is computed. This is particularly relevant in order to reflect that a higher number of disclosed APMs is not

¹⁰ The seventh quality requirement outlined in the ESMA APM guidelines, *consistency*, is omitted as it could only be reasonably captured in a longitudinal study.

associated with higher quality per se (Afterman 2015). As a result, the DQI variable for each company can take the values from 0 (if no disclosed APM meets any requirement) to 1 (if all disclosed APMs meet all requirements). The following formula condenses the calculation of the DQI variable for any company i , where n reflects the number of APMs disclosed by the company and requirement kj reflects the k -th out of six requirements which is measured in the dichotomous logic for any APM j :

$$DQI_i = \frac{1}{n} \sum_{j=1}^n \frac{\sum_{k=1}^6 requirement_{kj}}{6}$$

Independent variables

Among other proxies, total book value of total assets has been the most frequently applied proxy in disclosure studies (e.g. Bini et. al 2017, Jennings & Marques 2011, Hossain & Mitra 2004, Ahmed and Courtis 1999, Raffournier 1995, Wallace et al.). Thus, this measurement is used by its natural logarithm to operationalize firm size. Leverage is measured by the debt ratio (calculated as total debt divided by total assets) (Bini et al. 2017, Guillaom-Saorin et al. 2017, Ahmed & Courtis 1999, Wallace et al. 1994). To measure firm's profitability, most prior research uses either ratios that relate net income to equity (return on equity) or income to total revenue (profit margin) (Ahmed & Courtis 1999). We use the latter in our baseline regression analysis (Wallace & Nasar 1995, Wallace et al. 1994). To measure ownership, different approaches have been applied in disclosure research. Several researchers measure the ownership portion of the "top x" shareholders (e.g., Aripin 2010, Cheung et al. 2010, Haniffa & Cooke 2002), block holder ownership or free float (Cormier et al. 2009, Daske & Gebhardt 2006, Eng & Mak 2003). As the definition of a particular "top x" is deemed arbitrary to a certain degree, we measure ownership by the percentage of free float shares of total shares, the so-called free float factor (Eng & Mak 2003). As argued by Ahmed and Courtis (1999), a very heterogeneous picture emerges for industry classifications used in disclosure studies. However, e.g., Bloomberg (2017), Thomson Reuters (2017) and Deutsche Börse (2017b) provide a gross classification which distinguishes nine to ten super sectors with only small differences. Thus, the association between type of industry and disclosure quality is measured by a categorial variable which divides companies into nine super sectors according to the methodology of Deutsche Börse (2017b), leaving us with eight super sectors after excluding the FIRE super sector. Further, we include control variables—existence of Big Four audit firms and audit committee—for which in some studies it was hypothesized

they have a certain degree of influence on the quality of disclosure (e.g., Abullah et al. 2015, Ebrahim & Fattah 2015, Ettredge et al. 2011, Aripin 2010, Barako 2006). Audit firm is reflected in the regression model by a binary indicator variable that distinguishes Big Four audit firms (1) from others audit firms (0). A binary indicator variable is applied in order to reflect if an audit committee is in place (1) or not (0). Table 3 provides definition and sources of variables. Table 4 summarizes the key financial characteristics of the sample companies.

[insert Table 3 here]

[insert Table 4 here]

We constructed the following regression model to test our hypotheses:

$$DQI_i = \beta_0 + \beta_1 SIZE_i + \beta_2 LEV_i + \beta_3 PROFIT_i + \beta_4 OWNER_i + \sum_{s=5}^{11} \beta_s IND_i + \beta_{12} BIGFOUR_i + \beta_{13} COMMITTEE_i + \varepsilon_i$$

where i denotes the respective firm, β_0 the constant term (intercept), β_1 to β_{13} the estimated coefficient for each variable and ε the error term. We test for multicollinearity between the variables included in our analyses (not tabulated). High and statistically significant positive correlations exist between the variables SIZE, BIGFOUR and COMMITTEE. However, all Pearson correlation coefficients are below 0.6 and thus beneath any threshold generally considered as critical (Garson 2012). Though to further assess the potential for multicollinearity, we calculate variance inflation factors (VIFs). All VIFs are considerably below three and thus do not exceed the limit commonly regarded as critical (Garson 2012; Hocking 1996; Neter et al. 1990). We use tobit regression rather than OLS regression analysis, because the dependent variable, the DQI, can only take values in a truncated range between 0 and 1. Thus, the OLS regression assumption that the dependent variable is distributed normally may be violated (Cooke 1998). To limit this problem, we use a tobit regression model with left and right-censoring limits.

4 Empirical results / Findings

Descriptive statistics

Table 5 presents descriptive analyses of the quantity of APM disclosures from different point of views. According to Panel A all sample companies disclose APMs in their 2016 group management reports with a minimum of just two and a maximum of 20 disclosed APMs, while, on average, ten APMs are disclosed by each sample company. For all sample firms combined, we assess the disclosure quality based on the outlined ESMA APM quality

requirements of 1,323 disclosed APMs. Thus, our sample confirms an intense usage of APMs in company disclosures for German listed companies.

[insert Table 5 here]

The most commonly disclosed APMs are profitability and return measures. They represent approximately half of all identified APMs. Every sample company discloses at least one profitability APM in the management report. On average, companies make use of five profitability and return APMs. This result is supported by Panel B that reports the ten most commonly APMs. Thus, the predominance of profitability measures might be part of the explanation why APM literature, in most cases, is solely focused on profitability APMs (e.g., Isidro & Marques 2013, Marques 2010, Heflin & Hsu 2008). However, there is also a considerable number of APMs on asset and capital structure. 300 APMs in this category (mean = 2.24) imply that, on average, companies disclose more than two measures to depict their asset and capital structure. On the other end of the spectrum, there are measures of capital efficiency, which are only scarcely disclosed. In total, only 26 APMs on capital efficiency (mean = 0.19) have been identified so that, on average, only every fifth company discloses this category of APM. Further, stock market and valuation-related APMs are disclosed rather occasionally (mean = 0.54). One explanation could be that many companies include separate sections in their annual reports which are solely devoted to share and stock market performance and these sections are not included in the management report, and thus are not subject to the statutory audit.

Table 5, Panel C and Panel D provide descriptive statistics for the quantity of APM disclosures classified by stock market indices and by industries. As the mean values in Panel C show, the average use of APMs increases from General Standard over SDAX and TexDAX to MDAX and DAX companies. With regard to the heterogeneity among companies of the respective indices, the TecDAX stands out with a standard deviation of 5.01. Interestingly from an industry perspective (Panel D), companies assigned to the two super sectors basic materials (mean = 11.82) and pharma & healthcare (mean = 11.46) disclose the greatest number of APMs. It has been shown in several contexts that these companies tend to engage in more extensive disclosures (Brammer & Pavelin 2006, Watson et al. 2002). Further, it can be argued that these industries are under high public scrutiny, as the basic materials super sector includes the major German chemical companies. Although the same high public scrutiny applies to utility companies, interestingly, these companies

disclose fewest APMs (mean = 6.50). In addition, this industry sector shows high homogeneity among firms, having the lowest standard deviation (2.26).

With regard to the quality of the APM disclosures, it is deemed useful to view the total DQI as well as the different ESMA APM quality requirements that compose the overall quality index. Table 6 shows that the DQI ranges between 0.30 and 0.81 (mean = 0.57), which implies that no company can be characterized as being compliant with the APM guidelines, according to ESMA's understanding that compliance can only be achieved by complying to *all* requirements for *all* APMs.

[insert Table 6 here]

For the four APM quality requirements *disclosure principles*, *presentation*, *reconciliation* and *comparatives* (see Table 2) the descriptive statistics show similar means ranging from 0.53 to 0.59. Further, there are companies which have a compliance score of 1.00 for these specific APM quality requirements (implying that all disclosed APMs of a company comply with this specific requirement) as well as companies which have a compliance score of 0.00 (implying that no disclosed APM of a company complies with this specific requirement).

However, the two APM quality requirements *prominence* and *explanation on the use* depict a different picture. On the one hand, *prominence* has a considerably higher mean (0.86) which indicates that most APMs are not presented with more emphasis than those measures directly stemming from the financial statements. Further, the distribution is skewed considerably to the left, which implies that there is a large number of companies that have high scores for this specific quality requirement. On the other hand, *explanation on the use* is the APM quality requirement least complied with by the sample companies. The mean of 0.29 implies that, on average, companies do not even provide one third of its APMs with a sufficient explanation. Further, the maximum value of 0.78 shows that there is no company which explains the use of all its APMs satisfactorily. This picture seems in line with the descriptive analysis undertaken by Wühst and Rosner (2016) who find that, in the 2013 annual reports of DAX companies, the explanation of APM usage is, by far, the requirement least complied with.

Table 7 shows that several tendencies which have been observed with regard to the quantity of APM disclosure are also present with regard to APM disclosure quality: The mean DQI increases from the General Standard to the DAX. Further, TecDAX companies again show the highest standard deviation and thus is characterized by heterogeneity among

its firms. With regard to the industry dimension, the utilities super sector stands out with the highest mean DQI (0.70) as well as with the highest minimum (0.50) and maximum (0.81) values in the sample. Even if this is reasonable as utility companies underlie more stringent legal regulation, it seems particularly interesting, as concurrently utility companies have the lowest mean of disclosed APMs per management report.

[insert Table 7 here]

An interesting view on quality is also offered on the APM category level. Table 8 presents the differences for the APM disclosure quality of the defined APM categories. Most APM categories are in a rather narrow range with a mean DQI between 0.58 and 0.65 per APM category, so that no substantial differences in disclosure quality between these APM categories can be observed. Capital efficiency APMs and volume and growth APMs have a lower mean DQI of 0.52, and 0.42, respectively. A corresponding picture emerges when we consider the share of fully compliant APMs with the ESMA guidelines, in that sense that the shares are the lowest for volume and growth APMs (2.9%) as well as for capital efficiency APMs (0.0%). With regard to volume and growth measures in particular, the data collection has shown that companies tend to neglect statements on how they derive and define growth APMs, as well as order intake and backlog APMs. In total, out of the 1,323 APMs identified and assessed, only 126 (9.5%) comply with all six ESMA APM quality requirements which would be regarded as being in full compliance with the guidelines.

[insert Table 8 here]

Tobit regression analysis

Table 9 presents the results of the tobit regression analysis and shows that the coefficients for SIZE, and OWNER have the expected positive signs and statistically significant p-values¹¹ (p-values = .000, and = .022, respectively). Hence, we find support for H1 and H4 that the quality of APM disclosures is positively associated with firm size, and ownership diffusion. Especially, our finding that firm size has predictive power for APM disclosure quality of German listed companies is in line with most prior disclosure quality research. Our results do not support H2 (leverage) as we do not obtain a statistically significant result for LEV (p-value = .205). However, this is in line with prior research studies that focus on the quality of APM disclosures as they have produced only insignificant results so far (Bini et al. 2017, Agyei-Mensah 2015, Aripin 2010). Additionally, German

¹¹ All p-values are two-tailed.

companies are characterized by comparably high bank loan financing which is reflected in high average debt levels (La Porta et al. 1997). Thus, most of companies are subject to restrictions and monitoring measures that stem from debt instruments. Higher than average debt ratios might not significantly increase these restrictions and concomitant costs, which is why there might not be significant effects on APM disclosure quality.

[insert Table 9 here]

Our findings do not support our hypothesis that firms' profitability is positively associated with APM disclosure quality (H3). The coefficient for PROFIT has a negative sign of -0.013 (p-value = .054), implying that higher profitability is associated with *lower* APM disclosure quality. Previous studies report inconsistent results with regard to the association of disclosure quantity or quality and firms' profitability. Some other disclosure studies also document a negative association with regard to profitability (e.g., Ahmed & Courtis 1999). Inchausti (1997) argues that less profitable companies may make more detailed disclosures in order to use (additional) accounting information to explain "bad news". This explanation could also apply to APM disclosure in that high qualitative disclosures are particularly relevant to loss generating companies in order to make investors better understand the low profitability. Another explanation may be that less profitable companies have an incentive to manage their earnings more extensively and to appear more profitable by disclosing APMs with a higher quality. Still, it opposes our theoretical arguments with regard to bias and selectivity that have been used to derive H3.

With regard to the INDUSTRY variables only the utilities coefficient differs from the other industry sectors (p-value = .025). Thus, the results provide limited support for an association between APM disclosure quality and firms' industry sector (H5). 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.¹² Additionally, two companies have only been de-merged from two other sample companies in 2016, with those companies still holding major stakes. Thus, the independence of the observations may be questionable. Second, Watson et al. (2002) discuss several aspects that could help to explain industry variations in disclosure, such as historical and bandwagon effects, public scrutiny, regulation and legitimization. Especially the utility sector is subject to stringent regulations. However, several of these arguments seem a lot more relevant in areas like,

¹² However, in total, this sector comprises just eight companies in Germany due to the specific characteristic of utility companies. Thus, our sample covers almost the entire sector population.

for example, environmental disclosures and the relation to APMs is not evident per se (Aripin 2010, Watson et al. 2002, Cooke 1992). Also, the results from previous studies have obtained inconsistent results with regard to the association between industry and APM disclosure quality (Bini et al. 2017, Aripin 2010). Notwithstanding, the result is still interesting, as the utilities sector is characterized by a very low number of disclosed APMs (see Table 5). Therefore, the findings lend support to the notion that there might be a negative association between the quantity of APM disclosures and the quality of respective disclosures.

Our control variable, the coefficient for BIGFOUR is negative (p -value = .078). This finding is in contrast with several other studies that document higher disclosure quality and compliance with regulations by companies that engage large (Big Four) audit firms (Juhmani 2017, Aripin 2010, Hasan et al. 2008, Ahmed & Courtis 1999, Singhvi & Desai 1971). Our contradicting finding might be due to our measure of APM disclosure quality, which is fully based on the ESMA APM guidelines. As discussed, the guidelines only gained effectiveness in 2016 and there is no experience whether and/or to which extent national enforcement implementation and rigor take place (van Rijsbergen 2014). This ambiguity may result in the fact that auditing practices with regard to APMs still need (further) implementation activities, and that, especially for Big Four firms, APM disclosures are, if at all, of secondary priority in the auditing process.

Further, we find no impact of an audit COMMITTEE (p -value = .340). Several reasons why no positive association is found are conceivable. The sample companies are subject to the common German two-tier board system in which the supervisory board is engaged with the distinct task of supervising the management board and in which audit committees are built out of the supervisory board as a sub-committee. The supervisory board has ultimate authority in audit matters. It may be argued that, in such a dual system, the incremental effects of an audit committee on the company's governance and control environment could be insignificant (Ruhnke & Schmidt 2014). Additionally, some sample companies explain the non-existence of an audit committee with the fact that their supervisory board is composed of three persons only (e.g., Sixt SE) and the formation of an additional subcommittee does not appear reasonable, given the small supervisory board.

5 Sensitivity analyses and additional tests

To check the robustness of our findings, we conduct several supplementary tests (not tabulated). First, we fit our model using an ordinary OLS regression instead of the tobit regression used in the baseline analysis. We obtain qualitatively identical results, although p -

values are slightly larger. This is plausible given the properties of our dependent variable (which can only take values between 0 and 1).¹³ With an adjusted R² of 0.414, the explanatory power of the OLS regression is comparable to prior studies that focus on determinants of disclosure quality (e.g., Bini et al 2017: 0.261, Aripin 2010: 0.469, Heflin & Hsu 2008: 0.321). The F-statistics yield a value of 8.23 with a corresponding p-value of 0.000 which shows that the fit of the model is statistically highly significant.

Second, it has been argued that our multidimensional disclosure quality index based on the disclosure quality requirements stated in the ESMA APM guidelines is suitable to reflect a multidimensional view on disclosure quality (Beattie et al. 2004) as we distinguish two layers, namely six main requirements and twelve sub-requirements (see Table 2). However, partial compliance of sub-requirements is not considered for the calculation of our DQI. Alternatively, the compliance of each identified sub-requirement of the ESMA guidelines could be taken into account, arguing that disclosure quality increases with each compliance of a sub-requirement, independently of the total compliance of a main requirement. This is captured by an alternative disclosure quality index (DQI2) in which all twelve quality sub-requirements are aggregated on a company level and calculated by the arithmetic mean of all APMs (accordingly to DQI). The results with DQI2 support those obtained for our main dependent variable. Again, we find a positive association between APM disclosure quality and SIZE (p-value = .000). Further, OWNER as well as the coefficient for the utilities sector remain positive and significant (OWNER p-value = .033, utilities p-value = .068). However, simultaneously the super sector consumer goods becomes marginally significant (p-value = .095). Thus, this alternative dependent variable provides further moderate support for our hypothesis H5. PROFIT still shows a negative coefficient (p-value = .046). Besides, no other coefficients are significant at the 5% or 10% level, which is consistent with the results obtained with main dependent variable.

Additionally, ESMA stresses the fact that compliance with the APM guidelines can only be reached by complying with *all* stated quality requirements. Therefore, we test another alternative dependent variable to measure APM disclosure quality, in which APMs are only assigned a score of 1 if *all* six quality requirements are complied with (and a score of 0 if at least one requirement is not entirely complied with). The aggregation on a company level is

¹³ We also perform the OLS regression using the log of the odds ratios as dependent variable instead of the actual disclosure quality index in order to address the possible violation of the normality assumption (Abdullah et al. 2015, Al-Shammari et al. 2004, Cooke 1998, Inchausti 1997). We obtain qualitatively identical results with an adjusted R² of 0.423.

done by calculating the arithmetic mean of all APMs on a company level resulting in DQI3 (accordingly to DQI and DQI2). The results obtained are only partly in line with those for the main dependent variable. The positive SIZE coefficient remains significant (p-value = .000). Further, the coefficient for the utilities super sector remains significant (p-value = .040). Additionally, the super sectors basic material (p-value = .069) and again consumer goods (p-value = .097) become marginally significant. Thus, this model provides further support for hypotheses H1 and H5. In contrast, no support is found for H3 and H4, since the PROFIT and OWNER coefficient are insignificant (p-value = .784, = .470, respectively) and no other coefficients are significant. However, as we discussed in the research design, the total compliance approach (DQI3) may not adequately measure APM disclosure quality which is supported by the fact that the maximum DQI3 is just = .462 among all sample companies.

Third, we re-run our main analysis using other operational measures. In a first step, we replace the variable SIZE with the number of analyst following (ANALYST; operationalized by log of the number of earnings estimates in 2016).¹⁴ This variable is a further reasonable determinant of APM disclosure quality as previous studies show that the presence of professional users can influence APM disclosure (Isidro & Marques 2015, 2013). All other variables remain unchanged. The results of the regression analysis using ANALYST instead of SIZE (n = 120) show a highly positive significance for analyst following (p-value = .002) and that three industry sector coefficients (basic material, information technology and utilities) differ significantly at the 5% level from the other industry sectors. Contrarily to the results of our main model, we find a positive association for LEV (p-value = .017) and BIG-FOUR becomes insignificant (p-value = .254). For all remaining variables, we obtain qualitatively identical results.

Further, the decision for a specific variable measurement implies room for discretion. Thus, in a second step, it seems reasonable to re-run the regression by using alternative measures to operationalize the hypothesized disclosure quality determinants. Particularly, several disclosure studies operationalize firm size by the natural logarithm of total revenue (instead of total assets) (e.g., Aripin 2010, Hossain et al. 1995) and leverage by the ratio of total debt to equity (instead of debt ratio) (Ahmed & Courtis 1999). Further, the distinction between profit and loss companies may be more relevant to the profitability perspective than a continuous measure like profit margin. This supports the use of a binary indicator variable

¹⁴ As the natural logarithm of total assets and the number of earnings estimates show a high multicollinearity (0.821) we did not include this variable in our baseline regression model.

(LOSS) which assigned the value of 1 if the company has generated losses (IFRS) in the reporting year. Consequently, we re-run our main analysis using other operational measures for SIZE, LEV, and PROFIT. All other variables remain unchanged. The results of this model largely reaffirm the findings of the main model. The coefficients of SIZE stay highly significant (p-value = .000) and LEV still is insignificant. Also, as hypothesized, the distinction between profit and loss generating companies seems to be a critical threshold, since LOSS is positively significant (p-value = .035) implying that less profitable companies have an incentive to disclose APMs with better quality in order to reduce information asymmetry and increase the investors' trust in the company. For all remaining variables, we obtain qualitatively identical results.

Fourth, we add two additional variables to our baseline regression model based on our conclusions that stem from the statistical analysis undertaken so far. First, within the descriptive statistics, the remark has been made that the utilities sector is characterized by the highest APM disclosure quality and the lowest quantity of APM disclosures at the same time. This fuels the idea that there could be a negative association between disclosure quantity and disclosure quality of APMs. So far, this association has only been statistically investigated by Dainelli and Bini (2011) who, however, only find a weak negative relation when regressing APM disclosure quality against APM disclosure quantity. The authors infer that, for companies 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, companies with fewer disclosed APMs may be able to pay more attention to the quality of each.

Second, as presented in the descriptive statistics, General Standard companies have the lowest average DQI in the sample compared to Prime indices, implying that there is a difference in APM disclosure quality between the General and the Prime Standard. Though it should be considered that company specific factors considerably differ between Prime and General Standard (e.g., firm size and ownership diffusion), there are also reasons why there could be a distinct stock-market listing tier effect. First, Prime Standard companies are subject to higher overall transparency requirements (e.g., analysts' conferences at least once a year). Second, several studies have found a positive association between a company's stocks being listed on a stock exchange on the one hand, and disclosure quantity as well as quality on the other hand (Ahmed & Courtis 1999, Malone et al. 1993, Singhvi & Desai 1971). Mainly, the arguments go along the lines of information asymmetry and agency costs which are assumed to be higher for listed companies (Watson et al. 2002). Further, transparency

requirements of the respective stock exchanges cause disclosure differences compared to non-listed companies (Singhvi & Desai 1971). In our sample, all companies are listed. However, due to the different transparency standards, results could be analogous to a study that compares listed to non-listed companies, implying that the specific type of listing affects APM disclosure quality.

Consequently, we add the independent variable QUANT to the model which captures the number of disclosed APMs in the sample management reports as well as the binary indicator variable PRIME, which takes on the value of 1 if a company is listed in the Prime Standard, and 0 otherwise. However, with p-values of .376 for QUANT and .981 for PRIME, the coefficients are far from being significant. Thus, no support is found for an association between quantity of APM disclosures or stock-market listing tier and APM disclosure quality. Also, the VIFs are considerably higher than in the baseline model. Particularly, the VIFs for SIZE and PRIME are above three while no variable overstepped this threshold in the main model. This indicates that multicollinearity becomes a greater issue in the amended model.

6 Conclusion

Firms intensively use APMs in their disclosures and in recent years a proliferation has been perceived. Concurrently, a double-edged role is attributed to APMs. On the one hand, they may enhance investors' understanding of a firm's financial performance and economic position. On the other hand, they can affect investors adversely if they are used opaquely to draw a biased picture (Kabureck 2017, Afterman 2015). Therefore, this paper analyses APM disclosure quality in management reports and the relationship between several firm determinants and APM disclosure quality. The study is based on the 2016 group management reports of 134 listed German companies.

Our findings show that German listed companies make intense use of APMs in their management reports. On average, ten APMs are disclosed in each report. Five out of these are profitability APMs, which demonstrates their relevance in firm disclosures. From a disclosure quality perspective, our findings reveal that there is considerable room for improvement in APM disclosures, which is exemplified by an average disclosure quality index of 0.57 and a maximum DQI of 0.81. Referring to the ESMA guidelines, this implies that, currently, no company reaches full compliance for all its APMs and, thus, for its entire management report.

Using tobit regressions, we find strong support that firm size and ownership diffusion are positively associated with APM disclosure quality. Further, we show that lower profitability

is associated with higher APM disclosure quality which runs against theoretically derived expectations and most prior research. The results for an association between industry and APM disclosure quality are weak and we find no effect for leverage. Several additional tests support our results. Additionally, we find no support for a specific stock-market listing tier effect (Prime Standard/General Standard) on APM disclosure quality or an association between the quantity of disclosed APMs and disclosure quality but we find that the number of analyst following a firm is associated with APM disclosure quality.

Our study contributes to the ongoing APM debate and extant literature in several ways. First, in general, only scarce research has been conducted in the area of disclosure quality with an APM focus. This especially holds true for studies with a multidimensional quality operationalization and investigations on determinants of disclosure quality. Further, most prior studies are exclusively limited to earnings measures. Our study takes a more broader perspective and examines disclosure quality for all categories of APMs. Second, we provide new empirical evidence about factors determining APM disclosure quality. Particularly, with regard to the positive effects on disclosure quality that are attributed to firm size and diffused ownership as well as with regard to the insignificant impact of capital structure, we support findings of the existing literature (Bini et al. 2017, Agyei-Mensah 2015, Dainelli & Bini 2011, Aripin 2010). Further, we complement the extant research by showing that such associations are also of relevance in the German setting. Third, our results establish an association between lacking profitability and higher APM disclosure quality. Thus, this study does not support the commonly articulated perception that a strategic use of APMs is made by low profitability firms at the expense of transparency and quality (e.g., Afterman 2015, Young 2014). Fourth, the German as well as the current regulatory setting of ESMA APM guidelines have not been investigated so far.

This study has several implications for regulatory and enforcement bodies, auditors and firms. First, the substantial variance in the APM disclosure quality between the different APM categories show that numerous sample companies do interpret several measures (e.g., certain volume and growth figures) not as separate APMs for which the specific ESMA APM disclosure quality requirements are to be complied with. The challenges faced in the research with regard to the identification of APMs support this explanation. Thus, it shows that further clarification, guidance and interpretations (e.g., for the identification of APMs) by the regulatory bodies might be necessary in order to let the regulatory initiatives unfold their intended effect. Second, the discussed ambiguity regarding legal status and material scope of

the guidelines should also be taken into consideration. Given the sub-standard overall quality of disclosed APMs, it is evident that greater actions need to be taken by regulatory and enforcement bodies. Our results also show that Big Four companies do not particularly focus on APM disclosure quality and the ESMA requirements. However so far, the ESMA APM guidelines do not require external verification as they are not subject to the standard auditing process unless national regulations indicate otherwise. In order to effectively increase APM disclosure quality, the European and national regulatory and enforcement bodies have to implement the ESMA APM guidelines as auditing standards and amend prevalent auditing practices. Finally, the results imply that particularly for small companies and companies with high ownership concentration, the resources and incentives seem especially adverse to high quality APM disclosures, while no indication is given for obscuring APM disclosure activities of low profitability firms. Accordingly, since the ESMA APM guidelines are already in effect, the overall mediocre quality results reaffirm the view that effective consideration will strongly depend on the compliance awareness by firms as well as subsequent actions by the enforcement bodies .

This study is to be interpreted in the light of several limitations. First, we examined data from management reports of German listed companies. Though German management reports build a good foundation for a comprehensive cross-company investigation, we cannot generalize our results for non-listed companies, other regulatory settings or other financial information published together with financial statements in the annual report. Further, the dependent and independent variables employed are not without limitations. Other approaches to measure APM disclosure quality as well as to operationalize the independent variables might be justifiable and could yield different results. Further, there could be additional determinants which might be possible to capture by other research designs.

This study opens up several avenues for future research. Subsequent longitudinal studies could investigate changes in APM disclosure quality which would be particularly relevant considering the recent and still ongoing changes in the regulatory environment. Finally, it may be worthwhile to dive deeper into the association between different firm determinants and disclosure quality. Particularly, future research can conduct further analyses on companies' profitability characteristics and their relation to disclosure quality, since the results of this study run against expectations about the alleged strategic and opportunistic usage of APMs.

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Table 1
Sample Composition

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	13	5	47
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	25	25	134
Big Four auditor	12	24	24	21	21	102
Audit committee	11	24	23	21	21	100

Table 2
ESMA guidelines - Definition of the disclosure quality index variable

APM disclosure 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 (in particular, 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

The table gives an overview of the items which are contained in the composite disclosure quality index (DQI) that is applied in the regression model as the dependent variable. The six requirements in the first column reflect the requirements set out in the ESMA guidelines. This system implies that a disclosure requirement can only be completely satisfied if all sub-requirements presented in the second column of Table 2 are met. The outlined sub-requirements have been derived from the detailed explanations of the ESMA guidelines which elaborate on the superordinate requirements.

Table 3
Variable Definitions

Dependent variable	Description and measure	Source
Disclosure quality index	Quality score of APMs for each company 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 variable	Description	Source
SIZE	Firm size measured by the natural logarithm of the book value of total assets at the end of the fiscal year	Compustat
LEV	Firm leverage measured by debt ratio as total liabilities divided by total assets at the end of the fiscal year	Compustat
PROFIT	Firm profitability measured by profit margin as net income divided by total revenue for the financial year	Compustat
OWNER	Firm ownership structure measured by free float factor (free float number of shares divided by total number of shares)	Deutsche Börse
INDUSTRY	Firm super sector: Set of dummy variables representing the eight super sectors (w/o FIRE) according to Deutsche Börse (Consumer goods, Basic materials, Industrials, Consumer services, Pharma & healthcare, Information technology, Telecommunication, Utilities)	Deutsche Börse
Control variables	Description	Source
BIGFOUR	Firm audit company measured by a binary indicator variable that is assigned the value of 1 if the auditor belongs to the Big Four and 0 otherwise	Company annual report
COMMITTEE	Existence of an audit committee measured by a binary indicator variable that is assigned the value of 1 if the company has an audit committee in place and 0 otherwise	Company annual report

Table 4
Summary data on sample firms (n=134)

	Minimum	Maximum	Mean	Standard deviation	Skewness
Total assets	9,203	409,732,000	16,500,028	48,168,098	5.58
Total revenue	4,101	217,267,000	11,376,501	28,053,346	4.59
Total equity	3,333	92,910,000	4,814,514	12,107,576	4.49
Total debt	2,651	316,822,000	11,685,514	36,647,395	5.81
Debt ratio	10.4%	98.0%	56.2%	17.7%	-0.40
Net income	-5,710,000	8,526,000	483,672	1,522,692	2.13
Return on equity	-107.3%	63.9%	9.8%	18.4%	-2.24
Profit Margin	-1,309.6%	25.2%	-7.4%	115.9%	-10.76
Free float factor	2.5%	100.0%	56.5%	28.9%	-0.02

The large range of firm size, either measured by total assets or total revenue, reflects that a comprehensive coverage of the German stock market has been achieved through the stratified random sample. The positive skewness further shows that the distribution of German listed companies is characterized by few very large companies and a considerably higher number of smaller companies. On average, companies are financed up to 56.2% by debt. This reflects that German companies tend to strongly rely on bank loan financing (La Porta et al. 1997). However, it is to be considered that companies' debt ratios might also be high due to substantial liabilities toward suppliers and other non-financial institutions, since all balance sheet liabilities go into the applied calculation. On average, companies generate a negative profit margin of -7.4%, which shows that several firms generate substantial losses. In total, 17 out of 134 companies make losses; ten out of those are listed in the Prime Standard, seven in the General Standard. Free float factors vary in a range from 2.5% to 100%. The lowest factors are found in the General Standard. This reflects that several firms in the General Standard are dominated by large shareholders (e.g., due to family ownership) while only a small percentage of shares is de facto tradable for the general public.

Table 5
Quantity of APM disclosures

Panel A: Quantity of APM disclosures by APM categories

APM category	Minimum APMs per company	Maximum APMs per company	Mean APMs per company	Standard deviation	Number of APMs in sample	Share of APMs in sample
Asset/capital structure	0	8	2.24	1.58	300	22.7%
Capital efficiency	0	2	0.19	0.47	26	2.0%
Liquidity/cash flow	0	4	0.87	0.84	116	8.8%
Profitability/return	1	10	5.02	1.99	673	50.9%
Stock market/valuation	0	6	0.54	0.98	72	5.4%
Volume/growth	0	6	1.01	1.24	136	10.3%
Total	2	20	9.87	4.28	1,323	100.0%

Panel B: Ten most commonly reported APMs

	n	Share of APM used in company sample
EBIT	124	92.54%
Equity Ratio	120	89.55%
EBITDA	74	55.22%
EBT	67	50.00%
EBIT-Marge	49	36.57%
Net Debt	48	35.82%
Free Cash Flow	43	32.90%
ROCE	37	27.61%
Adjusted EBIT	36	26.87%
EBITDA-Marge	34	25.37%

Panel C: Quantity of APM disclosures by indices

Index	Number of companies	Minimum APMs per company	Maximum APMs per company	Mean APMs per company	Standard deviation
General Standard	35	3	13	6.49	2.33
DAX	24	8	20	13.42	3.08
MDAX	25	5	18	11.32	3.68
SDAX	25	3	18	9.32	3.75
TecDAX	25	2	20	10.32	5.01
Total	134	2	20		

Panel D: Quantity of APM disclosures by industries

Industry Super Sector	Number of companies	Minimum APMs per company	Maximum APMs per company	Mean APMs per company	Standard deviation
Basic materials	11	7	18	11.82	3.79
Consumer goods	18	4	17	10.17	3.65
Consumer services	13	4	18	8.15	3.72
Industrials	47	3	17	10.04	3.71
Information technology	21	2	20	9.48	5.52
Pharma & healthcare	13	4	20	11.46	5.58
Telecommunication	5	4	13	9.00	4.06
Utilities	6	3	9	6.50	2.26
Total	134	2	20		

Table 6
Disclosure quality index by ESMA APM quality requirements

ESMA APM quality requirement	p25	Median	p75	Minimum compliance per company	Maximum compliance per company	Mean compliance per company	Standard deviation	Skewness
Disclosure principles	0.44	0.60	0.73	0.00	1.00	0.59	0.20	-0.47
Presentation	0.40	0.55	0.70	0.00	1.00	0.53	0.22	-0.35
Reconciliation	0.42	0.60	0.73	0.00	1.00	0.58	0.21	-0.13
Explanation on the use	0.14	0.26	0.47	0.00	0.78	0.29	0.21	0.27
Prominence	0.77	0.92	1.00	0.14	1.00	0.86	0.17	-1.52
Comparatives	0.40	0.57	0.71	0.00	1.00	0.55	0.21	-0.13
DQI	0.49	0.57	0.64	0.30	0.81	0.57	0.11	0.05

Table 7
Disclosure quality index by indices and industries (n=134)

Index	Number of companies	p25	Median	p75	DQI minimum	DQI maximum	DQI mean	DQI standard deviation
General Standard	35	0.45	0.50	0.56	0.31	0.76	0.50	0.08
DAX	24	0.60	0.68	0.75	0.52	0.81	0.67	0.08
MDAX	25	0.54	0.60	0.70	0.43	0.78	0.61	0.10
SDAX	25	0.50	0.57	0.62	0.40	0.73	0.56	0.09
TecDAX	25	0.45	0.52	0.60	0.30	0.76	0.52	0.12
Industry Super Sector								
Basic materials	11	0.57	0.62	0.74	0.38	0.77	0.63	0.13
Consumer goods	18	0.57	0.60	0.68	0.40	0.76	0.61	0.10
Consumer services	13	0.47	0.56	0.60	0.42	0.70	0.54	0.09
Industrials	47	0.47	0.54	0.61	0.31	0.74	0.55	0.10
Information technology	21	0.46	0.52	0.57	0.30	0.71	0.51	0.12
Pharma & healthcare	13	0.52	0.57	0.63	0.40	0.71	0.57	0.09
Telecommunication	5	0.50	0.67	0.76	0.39	0.76	0.61	0.16
Utilities	6	0.60	0.75	0.78	0.50	0.81	0.70	0.12

Table 8
Compliance with disclosure requirements by APM categories

APM category	Number of APMs	Fully compliant AMPs	Share of fully compliant APMs	Mean DQI
Asset/capital structure	300	39	13.0%	0.60
Capital efficiency	26	0	0.0%	0.52
Liquidity/cash flow	116	19	16.4%	0.65
Profitability/return	673	58	8.6%	0.60
Stock market/valuation	72	6	8.3%	0.58
Volume/growth	136	4	2.9%	0.42
Total	1,323	136	9.5%	

Table 9
Baseline tobit regression analysis (n=134)

Model	Coeff.	Standard error	t-stat	p-value (2-tailed)	VIF
(Constant)	0.158	0.050	3.128	0.002	
SIZE	0.026	0.005	5.676	0.000	2.43
LEV	0.062	0.049	1.274	0.205	1.50
PROFIT	-0.013	0.007	-1.946	0.054	1.14
OWNER	0.067	0.029	2.318	0.030	1.41
IND=Basic materials	0.041	0.028	1.470	0.144	1.20
IND=Consumer goods	0.031	0.023	1.347	0.180	1.27
IND=Consumer services	0.014	0.027	0.527	0.599	1.31
IND=Information technology	-0.035	0.023	-1.525	0.130	1.38
IND=Pharma & healthcare	0.019	0.028	0.667	0.506	1.36
IND=Telecommunication	0.035	0.039	0.884	0.378	1.10
IND=Utilities	0.085	0.037	2.274	0.025	1.19
Control variables					
BIGFOUR=YES	-0.038	0.021	-1.778	0.078	1.69
COMMITTEE=YES	-0.021	0.022	-0.957	0.340	1.83

LR Chi2: 85.39
Log likelihood-Value: 145.67
Prob > Chi2: 0.0000

Results of the tobit regression analysis for the dependent variable DQI. See Table 3 for variable definitions.