The Relation between Internal Forecasting, Misreporting, and the Importance of Meeting Performance Benchmarks

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Abstract

We examine the relation between the importance for firms to meet external performance benchmarks and the role of internal forecasting and misreporting for increasing the likelihood of meeting benchmarks. Drawing on survey data from investment centers, we hypothesize and find that the importance of meeting benchmarks is positively associated with the sophistication of firms' internal forecasting, and misreporting. We next examine the relation between internal forecasting and misreporting, and find that one standard deviation increase in the sophistication of internal forecasting is associated with a 28% decrease in misreporting. The results suggest that firms with more sophisticated internal forecasting engage in less end-of-year misreporting. We contribute to the literature by studying attributes of firms' internal forecasting as part of firms' internal information environment. The paper specially speaks to the planning and coordination role of budgeting and forecasting, as opposed to the relatively more extensively studied evaluation and incentive role.

Keywords: Budgeting, internal forecasting, internal information quality, misreporting, performance benchmarks.

1. INTRODUCTION

Prior studies suggest that it is important for firms and managers to meet performance benchmarks, such as to report a profit, meet or beat last years' earnings or analyst forecasts, avoid debt covenant violation, and/or avoid credit rating downgrades (Graham, Harvey, and Rajgopal 2005). Respondents from executive surveys document experiencing outside and inside pressures to meet performance benchmarks and fear adverse career consequences when they fail to meet performance benchmarks (Dichev, Graham, Harvey, and Rajgopal 2013; Graham et al. 2005). Empirical evidence suggests that CEO turnover is more likely if firms report losses (Matejka, Merchant, and Van der Stede 2009), are financially distressed (Gilson 1989), miss analysts' forecasts (Farrell and Whidbee 2003), or miss their own earnings forecast (Lee, Matsunaga, and Park 2012). In sum, managers want to meet performance benchmarks. This paper first examines the association between the importance for firms to meet performance benchmarks[1] and the sophistication of firms' internal forecasting. Internal forecasting sophistication is described here as a set of attributes that is considered by prior literature to contribute to firms' internal information environment and the quality of managerial decision-making (Cassar and Gibson 2008; Ittner and Michels 2017). We use survey data to measure these attributes.[2]

Prior accounting literature on forecasting has predominantly focused on external management forecasts disclosed to capital market participants, despite the importance of internal forecasting (e.g., Libby and Rennekamp 2012). For example, Davila and Foster (2007) show that forecasts are primarily motivated by internal considerations by documenting that

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[1] We examine the importance of meeting performance benchmarks as opposed to *internal* performance targets for incentive contracting. We assume that the importance of these performance benchmarks is largely externally imposed (e.g., Dichev et al. 2013).

[2] The terms *internal forecasting,* instead of *internal forecasting sophistication* are used interchangeably for readability. We examine attributes of internal forecasting such as cross-functional participation and the degree firms take different environmental situations into account when they forecast. In general, internal forecasting contains beginning-of-the-year projections that form the basis of the (static) annual budget, as well as the supplementary forecasts that are typically made during the fiscal year.

financial planning systems (comprised of sales and cash flow projections, and operating budgets) are the first accounting systems of early stage firms. Also, the vice-chairman and former CFO of General Electric argues that: "The goal of forecasting, from our organization's point of view, is not to get the most accurate point estimates. […] What we really care about is the quality of the thinking and the dialogue among our managers that takes place." (Sherin 2010, p. 11).

We argue that more sophisticated internal forecasting contributes to the likelihood that firms will meet their performance benchmarks. First, more sophisticated internal forecasting helps firms to develop ex-ante realistic projections of future performance because of better information acquisition and internal information processing. Second, this may also enable them to swiftly and adequately assess the impact of unfolding contingencies on their future (financial) performance (Ittner and Michels 2017). Hence, firms may promptly adapt and adjust their operations (including allocation of resources) to avoid severe misalignment between performance benchmarks and business reality (Cassar and Gibson 2008). Recent studies document that the quality of externally disclosed management forecasts correlates with attributes of firms' internal information environment, like the integration of risk-related information in forecasting (Ittner & Michels 2017), the absence of internal control material weaknesses (Feng, Li, and McVay 2009), and the implementation of enterprise systems (Dorantes, Li, Peters, and Richardson 2013) Our measure of internal forecasting sophistication captures, amongst others, similar attributes of firms' internal information environment. Hence we assume that sophisticated internal forecasting increases, on average, the likelihood of achieving performance benchmarks. Therefore, we hypothesize a positive association between the importance of meeting performance benchmarks and firms' internal forecasting sophistication.

We allow for the possibility that information from internal forecasting is also used to inform internal performance targets in incentive contracting. Then, self-interested managers may have an incentive to increase proceeds from their incentive plans by not truthfully revealing their private information to higher levels (Brüggen, Grabner, and Sedatole 2016; Cassar and Gibson 2008). In many organizations though, internal forecasting has been largely decoupled from internal target setting because internal forecasting is a more continuous process (e.g., monthly rolling forecasts) relative to the annual target setting and performance evaluation cycle (Henttu-Aho and Järvinen 2013; Libby and Lindsay 2010). Nevertheless, we control for the extent to which information from internal forecasting is impounded in compensation targets, as well as for explicit incentives arising from compensation contracts.

Next, we examine the relation between the importance of meeting benchmarks and misreporting. In addition to the well-documented role of incentive compensation contracts in misreporting, recent studies have investigated executives' misreporting choices and the role of performance benchmarks (e.g., Badertscher, Collins, and Lys 2012). Graham et al. (2005) and Merchant (1990) show that pressure to meet financial benchmarks is associated with misreporting choices that include both accounting and real economic actions. We assess whether these finding can be replicated in our sample and hypothesize that the importance of meeting benchmarks is associated with misreporting.

Finally, we examine the relation between internal forecasting sophistication and misreporting. We assume that more sophisticated internal forecasting and misreporting are both costly practices to consider if it is important to meet performance benchmarks. Internal forecasting is costly because it requires acquisition, analysis and interpretation of large amounts of information from multiple sources. However, misreporting is also costly to firms and managers. Reporting choices that are motivated to opportunistically meet-and-beat benchmarks are likely to induce bias or noise in financial reporting (Badertscher et al. 2012). Misreporting

that encompasses real economic decisions can be costly, as such decisions represent deviations from normal business practice (Cohen, Dey, and Lys 2008). In addition, misreporting may be a 'first step on a slippery slope to fraud' (Schrand and Zechman 2012), with adverse consequences for firms and managers. We argue that firms with more sophisticated internal forecasting engage in less misreporting. That is, internal forecasting can increase the likelihood that realistic estimates are set, that unexpected events are quickly identified, that possible consequences for strategic and operational plans are assessed, and that internal operations are adjusted. This can help prevent significant misalignment between performance benchmarks and business reality. As a result, these firms may be less likely to misreport to achieve performance benchmarks.

On the other hand, misreporting may require decision-facilitating information that originates from firms' internal forecasts. Because of its costly nature, misreporting may only be feasible when the 'unmanaged performance' is sufficiently close to the performance benchmark. Projections of the financial implications of unfolding contingencies are required to determine the need for misreporting. In these cases, internal forecasting should positively relate to misreporting. Holding the importance of meeting benchmarks constant, the relation between internal forecasting sophistication and misreporting is an empirical question which we attempt to address in this paper.

While numerous studies examined the impact of important earnings benchmarks on reporting decisions, the effect of the importance of these benchmarks on the quality of internal decision making has received little attention (Cardinaels 2016). Given the inability to directly observe firms' internal information environment (Ittner and Michels 2016), we draw on a survey of financial executives at investment centers of Dutch public and private firms. It is targeted at investment centers because this level of analysis is consistent with our theory on forecasting and misreporting (Luft and Shields 2003). Our respondents have received

postgraduate finance & accounting education and have substantial working experience. Due to this, we regard them as being qualified to provide valid responses to questions about forecasting and reporting practices in their entity. Our final sample is composed of 112 observations.

We argue that internal forecasting is quasi-fixed in the short run, as improvements in internal forecasting requires considerable investments in collection, processing, and interpretation of information. It may be relatively easier for managers to adjust the level of misreporting in response to contingencies, which is consistent with empirical evidence that earnings management is concentrated at the end of reporting periods (Dechow and Shakespeare 2009; Kerstein and Rai 2007) (such as making sales at a discount at the end of the year or postponing positive NPV projects). Therefore, we address endogeneity concerns by using the quasi-fixed element of the organization (i.e., internal forecasting) as the explanatory variable in our main analysis (Hofmann and Van Lent 2015). As a robustness analysis, we relax this assumption and allow for simultaneity between internal forecasting and misreporting by using a 2SLS model. We find that the importance of meeting benchmarks is positively associated with both, internal forecasting sophistication and misreporting. We also find that internal forecasting sophistication is negatively and significantly associated with misreporting. Our supplemental findings from our 2SLS model corroborate our main findings.

Our study contributes as follows. First, while most of the prior accounting literature on forecasting has focused on disclosure of management forecasts to capital market participants, only a relatively small share of the U.S.-firms issue forecasts.[3] We contribute by examining the attributes of firms' internal forecasting. Second, we contribute to a nascent stream of literature on firms' internal information quality (IIQ), where IIQ is meant to capture managers' available

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[3] Chuck, Matsumoto, and Miller (2013) report that 34 percent of their sample of firms in Compustat issued at least one earnings forecast during 2007. They note how this percentage decreased over the years (e.g., they documented 45 percent in 2001).

decision facilitating information.[4] We show that internal forecasting is conducive to firms' IIQ. Third, our study contributes to management accounting studies on forecasting and budgeting. Most literature in this area focuses on the evaluation and incentive role of budgeting, though several authors find that the planning and coordination role of budgeting is important for firms (Hansen and Van der Stede 2004, Libby and Lindsay 2010). Our paper specifically speaks to the planning and coordination role (e.g., Becker, Mahlendorf, Schäffer, and Thaten 2016; Brüggen et al. 2016; Campbell, Epstein, and Martinez-Jerez 2011), as opposed to the, relatively more extensively studied, evaluation and incentive compensation role of budgeting.

Finally, prior research recognizes the importance of meeting benchmarks for firms, as well as the use of reporting choices to achieve those benchmarks (Badertscher et al. 2012; Dichev, Graham, Harvey, and Rajgopal 2013; Graham et al. 2005). We show how one potential negative effect of the importance of performance benchmarks (i.e., misreporting) can be mitigated by internal forecasting.

The remainder of the paper is structured as follows. Section 2 reviews prior literature and develops the hypothesis. Section 3 describes the sample and measures, and section 4 presents the results. The final section provides concluding comments.

2. LITERATURE REVIEW

2.1 Internal Forecasting

Forecasts are important for corporate decision making and the support of firm growth and profitability. Sales forecasts provide input for production planning, input acquisition, and investment planning (capacity). Subsequent cash flow forecasts are an important input for financing decisions, and in conjunction with the projected income statement and

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[4] Based on this premise, prior studies have examined the adoption of enterprise information systems and integration of risk-related information in forecasting as part of firms' IIQ (Dorantes et al. 2013; Ittner and Michels 2017). Another set of studies examine IIQ and real economic decisions. For example, Gallemore and Labro (2015) show that IIQ is positively associated with tax avoidance.

investment/divestment plans, ultimately give rise to estimated balance sheet positions. Inaccurate forecasts may lead to overly high costs due to excess capacity (e.g., inventory build-up) or may lead to high costs because of late adjustments to inventory, and potential stock-out costs (Cassar and Gibson 2008). Internal forecasting is usually done on a frequent or even continuous basis, and enables organizations to assess whether the firm's strategy and operations are in line with developing market realities. Internal forecasting may contribute to firms' internal information environment. Prior research describes IIQ in terms of the 'accessibility, usefulness, reliability, accuracy, and quantity' of the data and knowledge collected, generated, and consumed within an organization (Gallemore and Labro 2015). In capturing the quality of firms' decision facilitating information; the underlying assumption is that a high IIQ should lead to improved managerial decision-making (Horngren, Foster, and Datar 2012).

Internal forecasts contain (1) projections that are part of the (static) annual budget, as well as (2) supplementary forecasts that are made during the fiscal year. Internal forecasts form the basis of the beginning-of-the-year budgeting process that involves planning activities and resource allocation. Updating internal forecasts frequently reduces the time interval between planning and business reality, which should make organizations more competitive and responsive to change, especially when economic conditions change rapidly (Neely, Sufcliffe, and Haynes 2001). As beginning-of-the-year forecasts become quickly outdated, firms typically supplement them with updated forecasts to reflect the latest information available which, in turn, allows managers to adjust their strategies and operations, and revise their planning and allocation of resources (Cassar and Gibson 2008; Hansen, Otley, and Van der Stede 2003; Hansen and Van der Stede 2004; Libby and Lindsay 2010).

We emphasize the planning and coordination role of forecasting as opposed to the performance evaluation role, as only the prior role unambiguously enhances firms' internal information quality. Prior research suggests that there is tension between the planning and

coordination role versus the evaluation and incentive role of forecasting and budgeting (Hansen and Van der Stede 2004). In many, firms forecasting has been decoupled from target setting, because forecasting has over the last years increasingly become a more continuous process relative to the annual process of target setting and performance evaluation (Henttu-Aho and Järvinen 2013). Here, target setting is often informed by strategic objectives, which coincides with intuition that the role of forecasting is to strive for realism whereas the role of target setting is to provide effort-inducing incentives. While accurate numbers are needed for planning and coordination, using information from budgeting and forecasting for performance evaluation and incentive compensation purposes encourages strategic behavior of employees (Cassar and Gibson 2008).

Prior research suggests that initial forecasts embedded in the budgets are usually fixed throughout the year, while the subsequent forecasts provide managers with information that supports them in planning, coordination, and monitoring of their operations (Frow, Marginson, and Ogden 2010). This supportive role seems to be of major importance to firms. Davila and Foster (2007) show that firms in an early stage adopt financial planning systems, comprised of operating budgets and sales and cash flow projections, to facilitate the control of their operations and achieve benchmarks. Financial evaluation systems are typically adopted at a later stage. Brüggen et al. (2016) document the role of sales forecasts as a coordination device between sales and production. Some scholars emphasize that organizational learning is embedded in the periodic updating of budgets and forecasts (Campbell et al. 2011; Simons 1994). Overall, a survey of midsized and large Australian firms reveals that the use of budgets and forecasts for planning and control reasons are ranked as more important (e.g., cost control, monitoring of operations, and formulation of action plans) than for evaluation reasons (Sivabalan, Booth, Malmi, and Brown 2009).

We define the sophistication of a firm's internal forecasting as firm's capacity to deploy a combination of forecasting attributes (identified by prior literature) that foster firms' internal information environment. Generating internal forecasts requires firms to have recent information available from multiple sources and multiple perspectives, as well as the capacity to understand and interpret this information to enable updating of future projections (Cassar and Gibson 2008; Ittner and Michels 2017). Also, firms may benefit from incorporating uncertainty in their projections and evaluating alternative scenarios. For example, Ittner and Michels (2017) find that using forecasting methods that explicitly incorporate uncertainties, the development of more realistic estimates, and the development of contingency plans for meeting goals under different scenarios can improve firms' forecasting accuracy. Brüggen et al. (2016) show that explicit labeling of some part of the aggregate sales forecast as dependent on the unfolding of a contingent demand 'event' results in lower sales forecast errors and lower inventory 'buffer' stock.

In addition, developing high quality forecasts typically involves integration of inputs from many different participants and information sources within the firm (Cassar and Gibson 2008). Involving different functions within the organization (i.e., facilitating cross-functional communication) is perceived to benefit forecasting, due to the acquisition and dissemination of information as well as the shared interpretation of information (David and Mentzer 2007; Zotteri and Kalchschmidt 2007). Similarly, Dorantes et al. (2013) find that the integration of information from different business functions can be facilitated by adoption of information technology (i.e., enterprise information systems).

Furthermore, attention has been devoted to the degree of information exchange within the supply chain. External information from suppliers and customers can help firms to better comprehend the dynamics of input and output markets. Knowledge about plans of customers and suppliers allows companies to better forecast their own sales and production activities

(Kalchschmidt, 2012). Overall, improved information enables companies to develop better predictions and a better planning of activities on input and output markets, investments and hiring decisions, scheduling and processing, and financing decisions (Cassar and Gibson 2008). For example, accurate projections of future cash flows and working capital enable firms to adequately manage their liquidity. Accurate cash flow forecasts are also important for firms expanding activities and financing growth through internally generated cash flows (Wasley and Wu 2006).

2.2 Hypothesis development

We argue that internal forecasting contributes to firms' IIQ, and therefore increases the likelihood that firms meet their benchmarks. Prior literature documents that different proxies for internal information environment, such as risk-based forecasting, internal control quality, and enterprise systems lead to more accurate management forecasts (Dorantes et al. 2013; Feng et al. 2009; Ittner and Michels 2017). Thus, we expect that the importance of meeting benchmarks motivates firms to invest in, and improve their internal forecasting. For example, improvements in internal forecasting are expected to generate more realistic estimates of future benchmarks because of the greater information acquisition and processing capabilities. In addition, swift responses to external shocks may allow companies to adapt operations in a timely fashion (Ittner and Michels 2017) quickly decreasing the misalignment between performance benchmarks and business reality. Having access to a diverse set of internal and external information sources enables firms to develop a better understanding of the dynamics of the environments in which they operate. The vice-chairman and former CFO of General Electric states in this respect:

"We bring in outside parties to challenge our own assumptions about the industries we operate in and to develop multiple scenarios." (Sherin 2010, p. 9).

Contingency analyses can help companies in their assessment of the likelihood of potential external developments, the impact those developments may have on operations, strategy, and performance, and potentially adequate responses to those external developments. Ultimately, this acquired knowledge can be impounded in the operational planning process, allowing for an effective response to unfolding developments. For example, firms can decide to revise strategic and/or operational plans, as well as the allocation of internal resources during the year if market conditions require them to do so. In General Electric, an important feature of the forecasting process is:

> "[…] to identify risks to our business plan, and to come up with ways of managing them down to acceptable levels. […] One purpose of our planning is to ensure that we have anticipated these downwards risks and have either found a way to limit them, or have a plan to respond to them quickly if the materialize." (Sherin 2010, p. 10).

Overall, more sophisticated internal forecasting should enable firms to develop more realistic future estimates and to quickly intervene into business operations to achieve pre-set performance benchmarks. Prior literature recognized the importance for firms of meeting benchmarks.

Graham et al. (2005) show that, for public firms, meeting performance benchmarks is especially motivated by the need to maintain or increase stock price and reduce stock price volatility. Meeting benchmarks is particularly important for private firms to achieve or preserve a desired credit rating, avoid debt-covenant violation, and get better terms of trade by assuring suppliers and customers that business is stable. Therefore, we argue that internal forecasting can help firms to meet performance benchmarks.[5] We hypothesize that the importance of meeting external performance benchmarks leads to investments in internal forecasting:

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[5] We do not have data on the achievement of performance benchmarks. Instead of examining whether internal forecasting relates to the achievement of benchmarks, we examine whether a greater importance to meet

H1: The importance of meeting performance benchmarks is positively associated with internal forecasting sophistication.

Firms have alternative means to respond when it is important to meet benchmarks. Graham et al. (2005) show that firms take a mix of accounting and real actions, such as postponing positive NPV projects (e.g., R&D), incentivizing buyers to purchase products now by offering them discounts or more lenient credit terms, recording revenues now rather than next quarter (when justified in both quarters), and postponing to take an accounting charge to meet their benchmarks. Similarly, Merchant (1990) finds that firms manipulate performance measures and adjust operations (e.g., by delaying expenditures or accelerating sales) when it is important to meet financial benchmarks. Alissa, Bonsall IV, Koharki, and Penn Jr. (2013) document that firms engage in misreporting when they deviate from expected credit ratings. In line with this, in their survey among CFOs of public and private U.S.-firms, Dichev et al. (2013) find that at least 87% of respondents agree that meeting benchmarks is a main motive for them to manage earnings. We examine whether the relation between misreporting and the importance of meeting benchmarks, documented in prior literature, also holds in our sample and state our second hypothesis is as follows:

H2: The importance of meeting performance benchmarks is positively associated with misreporting.

We now turn to the question of the relation between firms' internal forecasting and misreporting, ceteris paribus. We argue that highly sophisticated internal forecasting and misreporting are costly. Internal forecasting may be costly as it requires the collection, analysis, and interpretation of large amounts of information that originate from multiple sources. Misreporting is also typically considered to be costly, since intervention in the reporting

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performance benchmarks is associated with investments in more sophisticated internal forecasting. In other words, we test demand equations instead of performance equations (Hoffman and van Lent, 2015).

process adds bias and noise to reported accounting numbers, which impairs their predictive usefulness and representational faithfulness (Badertscher et al. 2012). Real earnings management activities are costly because they represent deviations from normal business practice. For example, sales are recorded now at a discount while the full price could have been charged at a later point in time. Likewise, postponing planned R&D or advertising expenditures implies that long-term value is sacrificed (Cohen et al. 2008). Overall, manipulating performance measures can result in high misreporting costs for both firms (Dechow, Sloan, and Sweeney 1996) and managers (Desai, Hogan, and Wilkins 2006; Hennes, Leone, and Miller 2008). Given that investments in forecasting and misreporting are both costly, firms may trade-off one with the other to increase the likelihood of meeting performance benchmarks.

Highly sophisticated internal forecasting is expected to result in realistic (updates of) projections, and swift interventions in business operations to minimize adverse performance implications of external shocks. This can decrease misreporting as alternative for meeting performance benchmarks. That is, we expect that firms that invest in internal forecasting have less end-of-year misreporting. However, the decision-facilitating information that originates from internal forecasting may also act as a necessary condition for misreporting. Firms are restricted in the extent of misreporting due to its costly nature. For example, Surveyed CFOs state that the most common 'red flags' (signals that alert an outside user to misreporting) are (1) significant deviations of GAAP earnings from cash-flows, (2) deviations from industry norms/experience, or (3) large one-time or special item write-downs, or large changes in accruals (Dichev et al. 2013, p. 28). Therefore, the 'unmanaged' earnings must already be sufficiently close to the performance benchmark. Given the especially high costs of misreporting for CFOs and other finance professionals (Hennes, et al. 2008), they may be inclined to invest in internal forecasting to get more realistic financial projections of implications of unfolding contingencies, to determine the exact need for misreporting.

In sum, both internal forecasting and misreporting may be perceived as helpful to meet performance benchmarks. Whether they are positively or negatively associated represents an empirical question, hence we state our third hypothesis in a non-directional form:

H3: Internal forecasting sophistication is associated with misreporting.

3. RESEARCH METHOD

3.1 Survey design and sample

To test our hypothesis, we collect data from a survey of financial executives from investment centers that are either member of the Executive Master of Finance & Control (EMFC) association at the VU University Amsterdam or the University of Amsterdam,[6] or are members of the Certified Management Accountant (CMA) Chapter at the VU University Amsterdam, or are a member of the CFO panel associated with the VU University Amsterdam.[7] Surveys enable researchers to address relevant questions given the lack of publicly available data on management accounting practices (Ittner and Larcker 2001). Given the limited evidence on the quality of internal decision making, and the limited ability of researchers to directly observe a firm's internal information environment (Cardinaels 2016; Ittner and Michels 2017), we use a survey to, amongst others, examine the attributes of firms' internal forecasting. We target our survey at financial executives of investment centers as this level of analysis is consistent with our level of theory on internal forecasting and misreporting (Graham et al. 2005; Luft and Shields 2003). Because respondents have followed postgraduate accounting education and have substantial work experience, we expect them to be knowledgeable about forecasting and reporting practices within their entities and therefore

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[6] The EMFC is a Dutch two-year part-time postgraduate program and the CMA is a U.S. one-year part-time postgraduate program both aimed at accounting and control professionals. Current students and graduates can become member of the respective CMA and EMFC association.
[7] The CFO panel is a network of CFOs of the 100 largest organizations in the Netherlands where members meet annually at the Finance Transformation Forum. VU University is associated with this network as a knowledge partner.

qualified to provide valid responses to survey questions. To increase the quality of the survey, we ensured respondents that responses would be treated anonymously, we pre-tested the survey, and positioned our variables of interest in separate parts of the questionnaire (Van der Stede, Young, and Chen 2005). All members were invited by e-mail to participate in the online survey. The respondents had about eight weeks to participate. One reminder was sent after six weeks leaving respondents with another two weeks to participate before the online survey was closed.

This procedure yields an initial sample of 155 respondents who completed the questionnaire. We excluded 28 observations where the respondent's entity is not an investment center and removed 15 observations due to missing data. Our final sample consists of 112 observations.[8] We test for the presence of a response bias in two ways. First, we compare the target population and our final sample on demographic variables such as age and gender. We do not find significant differences in means.[9] Second, we compare the responses of early and late respondents because late respondents are more similar to non-participants. Using the date of the reminder email to distinguish between early and late respondents, we do not find significant differences of means or medians for demographic characteristics of the respondents, their education and tenure, the dependent and independent variables of interest, and general firm characteristics such as firm size, sales, and growth (non-tabulated).

In Table 1, we report descriptive statistics of respondents' profiles (Panel A) and respondents' entities profiles (Panel B). Our respondents are relatively senior as they are, on average, 40 years old. 51% have a CMA or equivalent (EMFC) qualification and 11% have a

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[8] We have an aggregate response rate of 5.6%. This is comparable to earlier studies such as Abernethy, Bouwens, and Kroos (2017), Dichev et al., (2013), and Indjejikian and Matejka (2009). This aggregate response rate can be further broken down into a 13% response rate for members of the CFO panel, a 4.8% response rate for members of the EMFC associations, and a 8.4% for the members of the CMA Chapter. What is most important for survey research is not the response rate, but rather the representativeness of the responses (Van der Stede et al. 2005). That is, whether respondents systematically differ from non-respondents. We, therefore, assess the presence of a response bias.

[9] We only have data on population demographics for the EMFC and CMA target population.

CPA qualification. We collected data on the current job title of the respondents. Most respondents have the title of CFO/financial director (29%), Business Controller (25%), Group Controller (13%), Finance Manager (10%), and Financial Controller (8%).

3.2 Variable measurement

We describe the measurement of our dependent and independent variables of interest, as well as the measurement of our control variables. For the variables that are measured using Likert scales, we assess the convergent validity by examining the correlations with alternative measures (Lattin and Green 2003). If possible, we rely on more objective data instead of perceptual measures to evaluate convergent validity (Ittner and Larcker 2001).

Dependent and independent variables of interest

The variable data misreporting (MISREP) is measured using an adapted five-item survey instrument that reflects accounting and real economic actions to influence reporting (Graham et al. 2005; Maas and Matejka 2009; Merchant 1990). Respondents indicated how often they took the following actions to influence performance: (i) change accounting estimates (e.g., estimation of uncollectible accounts expense, write-offs and impairments), (ii) re-label line items, (iii) record transactions early or late (when justified), (iv) provide or refuse price discounts or more/less lenient credit terms to influence sales levels, and (v) postpone or accelerate discretionary expenditures (investments in R&D, advertising, maintenance, etc.). The survey uses a five-point Likert scale (1 = never occurs, 3 = occurs sometimes, 5 = occurs very frequently). We establish convergent validity by examining the correlations with two objective measures. As expected, we find that respondents with CPA qualification are less likely to misreport (-0.24, $p<0.01$) (Bamber, Jiang, and Wang 2010; Ge, Matsumoto, and Zhang 2011). Further, respondents' current job tenure (-0.19, $p<0.05$) is negatively associated with misreporting, which is in line with the intuition that managers try to favorably influence the

perception of their ability in their early years of service (Ali and Zhang 2015; Dikolli, Mayew, and Nanda 2014).

Next, internal forecasting sophistication (FORECAST), is measured using a five-item instrument that reflects distinct attributes of firms' internal forecasting. By measuring the sophistication of firms' internal forecasting, we aim to capture the investments in attributes of internal forecasting. We asked respondents whether they agreed with the following statements about the attributes of their entity's forecasting: (i) on top of P&L, we forecast many other items (e.g., cash flow or balance sheet items), (ii) we use different management information systems from the same vendor when making our forecasts, (iii) we take into account different environmental situations when forecasting, (iv) people from different business functions are involved in forecasting, and (v) we use external support like market research and involve supply chain firms to forecast demand. To evaluate convergent validity, we examine the correlations with three objective measures. The positive correlations with the number of FTE committed to the forecasting (0.40, $p<0.01$), the number of business functions involved in the forecasting (e.g., sales, operations, finance, logistics) (0.32, $p<0.01$), and the use of scenario planning (0.37, $p<0.01$) are all indicative of a satisfactory convergent validity.

Our third variable of interest, the importance to meet performance benchmarks (IMPOR_BENCHM), should capture the importance of achieving benchmarks and is measured using a four-item instrument. Respondents have been asked to indicate whether they agree on the following statements: (1) In the eyes of the hierarchical superiors, achieving the performance benchmarks is an accurate reflection of whether the entity is succeeding in business, (2) The entity is constantly reminded by hierarchical superiors of the need to meet the performance benchmarks, (3) The organization achieves control over the entity principally by monitoring whether they are going to meet the performance benchmarks, and (4) In the eyes of the hierarchical superiors, not achieving the performance benchmarks reflects poor

performance of the entity (Libby and Lindsay 2010; Van der Stede 2001).[10] We establish convergent validity by examining the correlation between whether firms are publicly traded and the importance to meet benchmarks. The correlation between these two variables is positive (0.33, $p<0.01$) consistent with the intuition that for publicly traded firms it is in general important to meet performance benchmarks (Ahearne, Boichuk, Chapman, and Steenburgh 2016).

Other variables

We include unique determinants of internal forecasting and misreporting, as well as a set of common controls for each of the dependent variables (together labeled as CONTROLS in model 1 and model 2). Information management (INFO_MAN) and mergers and acquisitions (M&A) are the unique determinants of FORECAST. We measure the degree of information management using an adapted instrument used by Chang, Ittner, and Paz (2014). We measure, amongst others, the degree of adoption of common data definitions, process ownership, standardized common processes, standard information architecture, and the reduction of stand-alone applications. Chang et al. (2014) find that better information management is positively associated with increased perceived effectiveness by the finance function of its activities on financial planning, budgeting, and reporting, because it facilitates the integration of financial and operational information. We posit that sophisticated internal forecasting relies on information management as the degree to which firms reap benefits from internal forecasting depends on the quality of information management. Next, M&A captures discontinuous growth, and hereby situations in which internal forecasting may prove difficult since the prediction of future values depends on the degree in which expected synergies

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[10] Given that authority is the defining feature of hierarchy, the hierarchical superior may be the firm-level executive for divisional executives or shareholder(s) for the firm-level executive. Essentially, tracing the chain of authority up in the hierarchy leaves us with the person or group who can be thought of as owning all decision rights in the firm (Baker, Gibbons, and Murphy 1999). Since we have data on the corporate level or on the entity level, external benchmarks and their importance can also be set by the corporate level or mother company.

materialize. More importantly, internal forecasting after M&As may be more challenging and require more effort because of the lack of comparability in the accounting across acquiring and acquired entities and subsequent effort directed towards integration of accounting systems of multiple entities. M&A is an indicator taking the value of one if an entity was involved as purchasing entity in major mergers or acquisitions within the last three years, zero otherwise. We expect INFO_MAN to be positively and M&A to be negatively related to FORECAST.

We employ job-specific tenure and CEO power as unique determinants of MISREP. We measure the years that the respondent is in his or her current position (JOB_TENURE); previous research suggests that the likelihood of earnings management decreases over job tenure (Ali and Zhang 2015; Dikolli et al. 2014). Next, POWER is an indicator variable equal to one if respondents have a longer reporting relation with their line manager (divisional or firm-level CEO) than with the functional supervisor (corporate CFO, audit committee), zero otherwise. Maas and Matejka (2009) show for business unit controllers how a stronger relation with their business unit manager (relative to corporate control) increases the likelihood of misreporting. We expect JOB_TENURE to be negatively and POWER to be positively related to MISREP.

We include a vector of common controls to address heterogeneity across firms. GROWTH represents growth options and is measured by sales growth relative to the prior year. We include an indicator variable for loss-making entities (LOSS) equal to one if net income was smaller than zero, zero otherwise. SIZE captures firm size and measures entities' revenues. SIZE ranges between one and nine dependent on whether revenue is up to 10 million, from 10 to 50 million, from 50 to 100 million, 100 to 250 million, from 250 to 500 million, from 500 million to 1 billion, from 1 to 5 billion, from 5 to 15 billion, or higher than 15 billion Euro. The ratio of debt to assets denotes leverage. LEVERAGE is equal to one if the debt-to-assets ratio is smaller than 20%, two if the ratio is between 20% and 40%, three if it is between 40% and

60%, four if it is between 60% and 80%, and five if the ratio is higher than 80%. Environmental volatility (ENV_VOL) is measured using the five-item instrument that asks the respondents rate of change in their environment on categories such as buying patterns and requirements of customers, competitor strategies, technological developments, etc. (Khandwalla 1972). The survey measure for environmental volatility has been used repeatedly in prior studies (e.g., Abernethy, Bouwens, and van Lent 2004, Abernethy et al. 2017).

We further control for explicit incentives from compensation contracts. Prior research shows that managers misreport earnings not only to meet or beat external performance benchmarks but also to increase the proceeds from their explicit compensation contracts (Badertscher et al. 2012). In addition, respondents may invest in internal forecasting to attain the performance targets specified in their compensation contracts. To capture the extent misreporting and internal forecasting is driven by explicit incentives from compensation contracts, we control for INCENTIVES, which is equal to one if a respondent is eligible for a bonus contingent on financial performance targets (e.g., earnings) and option compensation, and zero otherwise. Next, as knowledge from different decision makers throughout the organization must be reflected in the forecasts, if information from internal forecasting also informs performance targets in compensation contracts, managers may then transmit biased information; and internal forecasting becomes less useful for planning and coordination purposes. We consider this by controlling for INFO_TARG_SET, which is measured on a Likert scale ranging from one to five, where five indicates the information from internal forecasting is also used for setting targets in compensation contracts. Finally, we include industry-indicators as classified in Table 1, and we control for AGE and GENDER of the respective respondent. All variables and the survey constructs are described in Appendices A and B.

3.3 Factor analysis

We use exploratory factor analysis to develop our latent variables. We perform factor analysis on all independent variables separately and jointly. In the latter case, we use factor analysis with orthogonal rotation and retain factors with an eigenvalue greater than unity (Nunnally and Bernstein 1994). We construct our composite variables using factor scores. Results are reported in Appendix B. For MISREP [FORECASTING], the average factor loading is 0.57 [0.47] and the reliability of our survey instruments seems to be satisfactory given a Cronbach alpha of 0.71 [0.61]. In Appendix B, also summary statistics and cross-loadings for our explanatory variables the importance to meet performance benchmarks (IMPOR_BENCHM), environmental volatility (ENV_VOL), and information management (INFO_MAN) are described. The results show a clean factor structure as the loadings of the item on the constructs that they are theoretically associated with markedly exceed the loadings on other constructs. The average factor loadings for IMPOR_BENCHM, INF_ASYM and ENV_VOL, and INFO_MAN are 0.74, 0.60, and 0.64 respectively, and all exceed the lower bound of 0.30 as the minimum level for interpretation of factor structure (Hair et al. 2014). The discriminant validity seems satisfactory given the small cross-loadings. The Cronbach alpha of our instruments is 0.84 (IMPOR_BENCHM), and 0.77 (ENV_VOL), and 0.81 (INFO_MAN).

To further substantiate the reliability of our factor analysis outcomes, we perform confirmatory factor analyses. First, the results indicate that all factor loadings are significant. Subsequently, we compute the composite reliability for each of the constructs. It is defined as the squared sum of the standardized loadings divided by the squared sum of the standardized loadings and the sum of the error variances. The composite reliability ranges between 0.60 for FORECAST to 0.85 for IMPOR_BENCHM. We also examine the average amount of variance in the items captured by the construct, i.e., the variance extracted. The variance extracted varies

between 0.33 for MISREP and 0.44 for ENV_VOL.[11] Finally, we also examine the discriminant validity of our constructs, i.e., whether constructs are unique and capture something not captured by other constructs. We examine for each construct whether the average variance extracted exceeds the squared correlation between two constructs (Fornell and Larcker 1981). The results suggest adequate discriminant validity as for each pair of two constructs, the average variance of each of the two constructs strongly exceed the squared correlation between the two constructs.

Lastly, we assess whether the results are susceptible to common method bias. As a first step, we perform an exploratory factor analysis with all items and find no indication that one factor accounts for most of the variance in the items.[12] Subsequently, we assess whether a five-factor model provides a better fit to the data relative to a one-factor model. We find that the five latent factors provide a better fit to the data compared to a one-factor model (chi-square =789.68, $p<0.01$).[13]

3.4 Empirical model

We test our hypotheses by means of the following two regression models estimating firms' demand for internal forecasting and misreporting. Following Leone, Minutti-Meza, and Wasley (2015) we estimate robust regressions as they are less sensitive to outliers and so-called influential observations.[14] We test our first hypothesis with the following model:

$$\text{FORECAST}_i = \beta_1 \text{ IMPOR\_BENCHM}_i + \sum \beta_k \text{ CONTROLS}_i + \varepsilon_i \qquad (1),$$

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[11] The composite reliability (variance extracted) for MISREP, FORECAST, IMPOR_BENCHM, ENV_VOL, and INFO_MAN is 0.71 (0.33), 0.60 (0.37), 0.85 (0.43), 0.77 (0.44), and 0.81 (0.43), respectively.
[12] We find that the first factor accounts for 22% of the variance and all five factors account for more than 90% of the variance.
[13] Reductions in the chi-square statistic indicate a better fit with the data as each model is tested against the null that the proposed model fits as well as a perfect model.
[14] In robust regressions observations with Cook's D>1 are excluded and the potential impact of remaining influential observations is addressed by means of downward weighting of these observations in an iterative process to avoid bias of regression estimates (Leone et al. 2015). For an implementation in Stata see Verardi and Cox (2009).

where β_1 represents the relation between the importance to meet performance benchmarks and internal forecasting sophistication. Based on our hypothesis, we expect $\beta_1 > 0$. Our second model tests our second and third hypothesis and is specified as follows:

$$\text{MISREP}_i = \delta_1 \text{ IMPOR\_BENCHM}_i + \delta_2 \text{ FORECAST}_i + \sum \delta_k \text{ CONTROLS}_i + \varepsilon_i \qquad (2),$$

where δ_1 represents the relation between the importance to meet performance benchmarks and misreporting, and δ_2 reflects the relation between internal forecasting sophistication and misreporting. Based on our second hypothesis, we expect $\delta_1 > 0$. Given our opposing predictions on the relation between internal forecasting and misreporting, we do not have a directional expectation regarding δ_2. Industry effects are included in both models.

Note that in examining the relationship between internal forecasting and misreporting, we assume that internal forecasting precedes misreporting. That is, the sophistication of firms' internal forecasting is quasi-fixed in the short-run following the intuition that considerable resources must be expended to increase the acquisition, and quality of analysis and interpretation of large amounts of information. On the other hand, misreporting choices are more adaptive, consistent with prior research that documents that earnings management activities are concentrated at the end of the accounting period (Dechow and Shakespeare 2009; Kerstein and Rai 2007).[15] Our regression specification is consistent with Hoffmann and van Lent (2015), who argue that more slow-moving elements of organizational design can be exploited as explanatory variables in empirical specifications. We later relax this assumption and allow for the possibility that internal forecasting and misreporting are jointly determined.

4. EMPIRICAL RESULTS

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[15] Specifically, the types of misreporting we inquire are inspired by prior studies who find that these activities take place mainly at the end of the accounting period. For example, Ahern et al. (2016) show that real earnings management is conducted at the end of the year. There is also survey evidence of earnings management to meet quarterly earnings benchmarks (Graham et al. 2005), or to achieve (more generally) performance benchmarks (Maas and Matejka 2009; Merchant 1990).

4.1 Descriptive statistics

Table 1 and 2 report descriptive statistics of our final sample. The average entity in our sample has revenues between 250 and 500 million Euro (as captured by SIZE). The mean growth in sales is 3.7%, 14% report a loss, and the average debt-to-assets ratio is between 20% and 40%. In around half of all cases entities were involved recently in a M&A. Our sample is fairly balanced between publicly held versus private firms and is reasonably balanced across industries. The largest number of observations are in traditional manufacturing and non-financial services. About 45% of the respondents have a firm-level position while the remaining respondents work at the divisional or business-unit level. The average respondent is 41 years of age, has a postgraduate qualification and works for three years in its current position.

[INSERT TABLE 1 AND 2 ABOUT HERE]

Table 3 presents the bivariate relations between our variables (significant correlations on a 10% level are reported in bold). The importance to meet benchmarks (IMPOR_BENCHM) is positively and significantly correlated with internal forecasting sophistication (FORECAST) ($p<0.1$) and positively but insignificantly correlated with misreporting ($p=0.23$). We also find that internal forecasting sophistication is (weakly) inversely related to misreporting (MISREP) ($p<0.15$). As expected, internal forecasting is positively correlated with information management (INFO_MAN) ($p<0.01$) and (weakly) negatively correlated with M&A ($p<0.11$). Further, firms with more sophisticated internal forecasting seem to be larger as measured by sales ($p<0.01$), and have lower leverage ($p<0.05$). In line with prior research we find that misreporting is significantly negatively correlated with job-specific tenure ($p<0.05$) and positively correlated with CEO power ($p<0.02$) and incentives ($p<0.1$).

[INSERT TABLE 3 ABOUT HERE]

4.2 Main analyses

Table 4 shows the robust regression estimates of the models described by equation (1) and (2). Consistent with our first hypothesis, we find that the importance to meet benchmarks is positively associated with internal forecasting sophistication ($p<0.01$). This suggests that firms have higher internal forecasting sophistication when the importance to meet performance benchmarks is higher. Further, firm size and information management are positively associated with internal forecasting ($p<0.02$ and $p<0.05$, respectively). Firms with higher internal forecasting sophistication seem to, on average, exploit some of this information also for evaluation and compensation purposes ($p<0.01$). In short, our findings support our first hypothesis regarding the positive relation between the importance to meet performance benchmarks and internal forecasting.

Consistent with prior research, and in line with our second hypothesis, we find evidence that increasing importance to meet performance benchmarks is associated with increased misreporting. That is, the coefficient on the importance to meet benchmarks is positive and significant ($p<0.06$) (although only marginally significant). Regarding our third hypothesis, our empirical results suggest that internal forecasting sophistication is negatively associated with misreporting. That is, δ_2 is negative and statistically significant ($p<0.05$). With respect to the economic magnitude, we find that one standard deviation increase in internal forecasting (evaluated at the mean of misreporting) is associated with a decrease in misreporting by about 28%.[16] In sum, these results indicate that firms with more sophisticated internal forecasting engage in less misreporting, which suggests that firms that have (ex-ante) more sophisticated internal forecasting may not need to engage in potentially costly misreporting (ex-post). With

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[16] The mean of MISREP is 0.008, the standard deviation of FORECAST is 0.84, and the coefficient for FORECAST is -0.271. This leads to the following computation: (0.84*0.27) / 0.008=0.2835.

respect to the control variables, we find that INCENTIVES ($p<0.05$) and POWER ($p<0.01$) are positively associated with misreporting. The relation between job-specific tenure and misreporting is insignificant, but that may be due to a significant negative relation between age and misreporting ($p<0.05$). Overall, we find that the importance to meet performance benchmarks is positively associated with both internal forecasting and misreporting, while internal forecasting is negatively associated with misreporting.

[INSERT TABLE 4 ABOUT HERE]

We perform a range of non-tabulated robustness analyses. First, given that our respondents vary in terms of response group (EMFC, CMA, or CFO panel), we repeat our analyses but include two indicator variables to control for differences in response groups. The magnitude and significance of our coefficients of interest are qualitatively not affected. Subsequently, given that our respondents vary in terms of their position in the organization hierarchy, we repeat our analyses and include an indicator variable equal to one when the respondent is situated at the organization/firm level, zero otherwise. In addition, we control for listing status. Again, the magnitude and significance of our main coefficients of interest are qualitatively similar.

4.3 Two Stage Least Square analyses

In this section, we relax the assumption of a time-line of events where internal forecasting is perceived to be quasi-fixed in the short-run and therefore precedes misreporting. We allow for the possibility that internal forecasting and misreporting are determined jointly (i.e., simultaneously) and test our third hypothesis in two-stage least squares (2SLS) specifications, in which we instrument first for FORECAST and then for MISREP.[17]

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[17] The method to treat potential outliers we apply throughout the papers is to drop observations with high Cooks D and/or downward weight them as implemented in *robust regression* procedures, and outlined in Leone et al.

First, we re-estimate model 2 explaining MISREP where we instrument for FORECAST with information management (INFO_MAN) and mergers and acquisitions (M&A). In section 3 we discussed the economic theory behind the instruments, and now discuss the relevance and exogeneity of the proposed instruments (Larcker and Rusticus 2010). With respect to relevance, we find that INFO_MAN is significantly correlated with FORECAST (p=0.06) after partialling out the effect of the exogenous control variables. Regarding exogeneity, we find that INFO_MAN is weakly correlated with MISREP (p=0.13) after netting out the effect of exogenous controls.[18] Inspecting our second instrument, we find that M&A is weakly correlated with FORECAST (p=0.16) but clearly exogeneous given the correlation with MISREP (p=0.84) after partialling out the effect of the exogenous control variables. In line with this, the first stage regression results show that INFO_MAN is positively (p<0.03) and M&A negatively (p<0.08) related to FORECAST. Further, the Sargan test for over-identifying restrictions fails to reject the null hypothesis that instruments are exogenous (p=0.78). With respect to the relevance, the two instruments are reasonably relevant indicated by a partial R^2 of 6% relative to the full-model R^2 of 17%. The F-test of joint significant of the instruments is significant at a 10% level. Taken together, these results suggest that INFO_MAN and M&A are suitable instruments for FORECAST in our 2SLS estimation. We report findings of the second-stage estimation in the left-column of Table 5. The results corroborate our earlier findings. That is, we find a significant negative coefficient on FORECAST (p<0.05), and a significant positive coefficient for IMPOR_BENCHM (p<0.05).

(2015), and Verardi and Croux (2008). In the 2SLS calculation we replicate this procedure and drop one observation in each second stage least square estimation due to a relatively high Cooks' D.

[18] In this procedure, we partial out the effect of the (exogenous) control variables by regressing the suspected endogenous variables (X), the respective dependent variables (Y), and the proposed instruments (Z) on the vector of controls and take the residuals. See Larcker and Rusticus (2010), p. 190.

Second, we define model 3 in which we now allow MISREP to determine FORECAST (i.e., we allow for simultaneity), and instrument for MISREP. The second-stage model in our 2SLS model is defined as follows:

$$FORECAST_i = \alpha_1 \, IMPOR\_BENCHM_i + \alpha_2 \, MISREP_i + \sum \alpha_k \, CONTROLS_i + \varepsilon_i \qquad (3).$$

The vector of controls includes the same controls as used when estimating equation (1) with robust regressions (see Table 4). We instrument for MISREP by means of POWER and JOB_TENURE. Based on the same methodology as discussed before, we assess the relevance and exogeneity of our instruments. POWER is highly relevant ($p<0.01$) and exogenous ($p=0.95$), while JOB_TENURE is only moderately relevant ($p=0.14$) but clearly exogeneous ($p=0.33$). The results (non-tabulated) of the first-stage estimation show that POWER is positively ($p<0.01$), but JOB_TENURE is not significantly associated with MISREP. A Sargan test fails to reject the null hypothesis that instruments are exogenous ($p=0.13$).[19] With respect to the relevance, both two instruments have reasonable explanatory power (partial R^2 is 9% relative to a full-model R^2 of 12%), and the null hypothesis that instruments are jointly zero is strongly rejected ($p<0.01$). The second-stage results reported in the right-column of Table 5 present a positive and significant association between the importance to meet benchmarks and internal forecasting sophistication ($p<0.1$), in line with our prior results. Our findings do not suggest simultaneity. That is, we do not find evidence that suggests that misreporting choices affect internal forecasting sophistication, as the coefficient on MISREP explaining FORECAST is insignificant ($p=0.60$).[20]

For both 2SLS analyses, we test for the sensitivity of our results under the assumption of weak instruments. Weak instruments can increase the bias that originates from semi-

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[19] We alternatively test for the appropriateness of the instruments by regression the second-stage residual on all exogenous variables and the IVs, and find that the coefficients of the instruments are highly insignificant, which indicates that the instruments are exogenous (Larcker and Rusticus 2010, p. 192).
[20] Because JOB_TENURE is insignificant in the first stage estimation, we estimate a just identified model using POWER as only exclusion restriction, and find qualitatively similar results.

endogenous instruments, therefore we recalculate the 2SLS models with confidence regions and p-values for the coefficients on the endogenous variable based on the conditional likelihood approach developed by Moreira (2003) and recommended by Larcker & Rusticus (2010). In this approach, critical values of test statistics are adjusted through simulation of the conditional distribution of the test statistic. The resulting test statistic has correct size even in the presence of weak instruments.[21] These analyses (non-tabulated) confirm our 2SLS analyses. That is, the coefficient on FORECAST in explaining MISREP is negative and significant ($p<0.08$) while the coefficient on MISREP in explaining FORECAST is insignificant ($p=0.65$).

In sum, the 2SLS findings support our intuition that internal forecasting is negatively associated with misreporting. The results of the 2SLS estimations are in line with our earlier findings and provide us with some confidence that the timeline of events that we assume throughout our study accurately reflects the sequence of managerial choices.

4.4 Potential impact of confounding variables

In the prior section, we addressed endogeneity concerns that arise due to simultaneity. Here, we take a more general approach regarding concerns about endogeneity and focus on the sensitivity of our main results to omitted variables. That is, we examine the potential impact of unobserved confounding variables, as recommended by Larcker & Rusticus (2010) and Frank (2000). We use the Impact Threshold for a Confounding Variable (ITCV) approach; this captures how strong an omitted variable must be correlated with the dependent and independent variables in a regression, conditional on including controls, to turn a (significant) coefficient of interest insignificant.

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[21] See Larcker & Rusticus (2010), page 192. Semi-endogenous instrument lead to 2SLS estimates not being consistent. The bias in the regression estimates when there is correlation between the instruments and the error term in the second-stage regression is inflated when instruments are weakly correlated with the suspected endogenous variable (Larcker and Rusticus 2010).

Based on the robust regression estimates of H1 to H3 reported in Table 4, we calculate ITCVs. For example, for the test of H1 the ITCV is 0.2064, which indicates that if the partial correlation of an omitted variable with FORECAST times the partial correlation of the same omitted variable with IMPOR_BENCHM is greater than 0.2064, the coefficient on IMPOR_BENCHM would no longer be statistically significant if the omitted variable were included in the regression. The ITCVs for tests of H2 (0.0408) and H3 (-0.044) are analogously estimated. To assess the likelihood that such an omitted variable exists, we develop a benchmark by calculating partial correlations of the dependent variables of tests of H1 (FORECAST), H2 (MISREP), and H3 (MISREP) with the included control variables, as well as of the independent variables of interest (IMPOR_BENCHM in tests of H1 and H2, and FORECAST in the test of H3) with the respective control variables. The product of these partial correlation denotes the *impact* (reported in Table 6). Impact scores serve as a useful benchmark given that the controls are selected based on prior research and, therefore, represent a reasonable comprehensive overview of the variables that may correlate with the dependent and independent variable of interest. Overall, we find the ICTV to exceed any of the impact scores for all three relations examined. This indicates that to invalidate the conclusions, an omitted variable must be stronger correlated with the respective dependent and independent variable, conditional on the other control variables, than any of the control variables that are selected based on prior research.[22]

5. CONCLUSION

In this study, we are specifically interested in attributes of firms' internal forecasting, that (at least partly) define the quality of firms' internal forecasting, which we label as internal

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[22] That is, to invalidate conclusions on tests of H1 (H3), an omitted variable must be much stronger correlated with FORECAST (MISREP) and IMPOR_BENCHM (FORECAST), conditional on the other controls, than any of the included control variables. To invalidate the conclusions on tests of H2, an omitted variable should have a marginally greater impact than INCENTIVES, but a much higher impact than any other control in the model.

forecasting sophistication. We position internal forecasting as a driver of firms' internal information environment. While prior accounting literature on forecasting mainly focused on management forecasts as a means of disseminating information towards capital market participants, empirical evidence suggests that forecasting is in the first place motivated by internal purposes.

We find that firms' internal forecasting sophistication is associated with the importance to achieve performance benchmarks. Next, we turn towards the role of misreporting to achieve performance benchmarks as established by prior literature. In our data we find that misreporting relates to the importance for firms to achieve performance benchmarks. Finally, we examine the relation between internal forecasting and misreporting to achieve performance benchmarks. Consistent with the intuition that internal forecasting can be an alternative to misreporting to meet performance benchmarks, our results suggest that firms with more sophisticated internal forecasting engage in less misreporting.

We contribute to literature on forecasting with a focus on the internal role of forecasting (as part of firms' internal information environment), as opposed to the more extensively studied external role (i.e., voluntary disclosure). We also add to an upcoming stream of literature that examines attributes and consequences of firms' internal information environment. Further, we contribute to management accounting literature on the planning and coordination role of budgeting, while prior literature largely examined the evaluation and incentive role of budgeting. Finally, a large set of papers examines the importance of meeting external benchmarks, and reporting choices to do so; we emphasize an alternative way of meeting performance benchmarks and its' relation to misreporting.

As every other study, this study has limitations. As we employ a survey method we run the risk of response biases. We attempt to address them and, amongst others, validate subjects' responses by means of objective measures. Also, respondents self-select into our sample by

participating into the survey. We compare our sample with the population on demographic variables and do not find significant differences. Further, as with many archival and field studies, the inability to conduct a randomized natural experiment limits our ability in making causal inferences. We attempt to develop some insight into causality by carefully developing the underlying mechanism on the basis of prior literature, and distinguishing between the more versus less adaptive elements of organizational design.

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Appendix A: Variable Description

IMPOR_BENCHM	Importance of performance benchmarks, measured using a four-item instrument described in Appendix B.
FORECAST	Firms' internal forecasting sophistication, measured using a five-item instrument described in Appendix B.
MISREP	Misreporting, measured using an five-item survey instrument that reflects accounting and real economic actions to influence reporting and is described in Appendix B.
INFO_MAN	Firms' information management system, measured using a six-item instrument described in Appendix B.
M&A	Indicator taking the value of one if an entity was as purchasing entity involved in major mergers or acquisitions within the last 3 years, zero otherwise.
JOB_TENURE	Years that the respondent is in his or her current position.
POWER	Indicator variable equal to one if the respondent has a longer reporting relation with their line manager (divisional or firm-level CEO) than with the functional supervisor (corporate CFO, audit committee), zero otherwise.
AGE	Age of the respondent.
ENV_VOL	Environmental volatility measured using a six-item instrument specified in Appendix B.
GENDER	Indicator equal to one if the respondent is male, zero otherwise.
GROWTH	Sales growth relative to the prior year.
INCENTIVES	Indicator variable that is one if the respondent is eligible for option awards and bonuses based on financial performance, and 0 otherwise.
INFO_TARGET_SET	The extent to which information from the internal forecasting system is used for target setting, performance evaluation, or incentive compensation. Ranges from 1 (not at all), to 5 (entirely).
LEVERAGE	Measures firms' debt-to-assets ratio and ranges between one and four.
LOSS	Indicator variable for loss-making entities equal to one if net income was smaller than zero, zero otherwise.
SIZE	Measures entities' revenues and ranges between one and nine.

Appendix B: Description and Statistical Properties of Latent Constructs

Panel A reports summary statistics and factor loadings on misreporting (MISREP) and internal forecasting sophistication (FORECAST). In this table summary statistics of responses to the following question are presented: How frequently took your entity the following actions to influence performance? Items are measured on a scale from 1 (never occurs) to 5 (occurs very frequently); and please indicate whether you agree with the following statements on your entity's organizational forecasting system. Items are measured on a scale from 1 (completely disagree) to 5 (completely agree), respectively.

Misreporting (MISREP)	Mean	Std. Dev.	Min.	Max.	Factor pattern
Change accounting estimates to shift profits between periods (e.g., estimation of uncollectible accounts expense, write-offs, impairments)	2.29	1.04	1	5	0.59
Re-label line items	1.78	0.81	1	4	0.60
Record transactions early or late (if justified)	1.87	0.87	1	4	0.65
Provide/refuse price discounts or more/less lenient credit terms to influence sales levels	2.20	1.13	1	5	0.56
Postpone/accelerate discretionary expenditures (investments in R&D, advertising, maintenance, etc.)	2.27	1.07	1	5	0.47

Cronbach alpha: 0.71

Internal Forecasting Sophistication (FORECAST)	Mean	Std. Dev.	Min.	Max.	Factor pattern
On top of P&L, we forecast many cash flow and balance sheet items.	3.72	1.25	1	5	0.42
We use different management information systems from the same vendor when making our forecasts.	2.74	1.40	1	5	0.43
We take into account different environmental situations when we forecast.	3.89	1.09	1	5	0.58
People from different business functions are involved in our forecasts.	3.89	1.16	1	5	0.59
We use external support like market research or involve supply chain firms to forecast demand.	2.49	1.49	1	5	0.34

Cronbach alpha: 0.61

Panel B reports summary statistics and cross loadings on latent independent variables. Items for the importance of benchmarks (IMPOR_BENCHM) are measured on a scale from 1 (completely disagree) to 5 (completely agree), items for environmental volatility (ENV_VOL) are measured on a scale from 1 (highly stable, infrequent change) to 5 (highly volatile, constant change). Items for information management (INFO_MAN) are measured on a scale from 1 to 4 (where 1 = no plans to adopt, 2 = started (\$<\$25%), 3 = partly achieved (25%-75%), 4 = entity-wide adoption).

	Summary statistics		Cross-loadings		
	Mean	Std.Dev.	1	2	3
1. Importance of benchmarks (IMPOR_BENCHM)					
In the eyes of the hierarchical superiors, achieving the performance benchmarks is an accurate reflection of whether the entity is succeeding in business.	3.72	0.89	0.082	**0.684**	0.093
The entity is constantly reminded by hierarchical superiors of the need to meet the performance benchmarks.	3.65	1.08	0.053	**0.702**	0.158
The organization achieves control over the entity principally by monitoring whether they are going to meet the performance benchmarks.	3.72	0.90	0.004	**0.760**	0.1035
In the eyes of the hierarchical superiors, not achieving the performance benchmarks reflects poor performance of the entity.	3.49	0.95	0.036	**0.816**	0.147
Cronbach alpha: 0.84					
2. Environmental volatility (ENV_VOL)					
What is the rate of change in the buying patterns and requirements of customers?	3.38	1.11	0.110	0.095	**0.671**
What is the rate of change in distributors' attitudes?	2.55	1.11	0.029	0.232	**0.520**
What is the rate of change in industry buying patterns?	3.08	1.07	0.136	0.011	**0.721**
What is the rate of change in competitor strategies?	3.00	1.09	0.050	0.149	**0.530**
What is the rate of change in technical developments relevant to your entity's business?	3.22	1.15	0.026	0.081	**0.601**
What is the rate of change of the changes in the (service) production process?	2.98	0.96	0.072	-0.023	**0.492**

Cronbach alpha: 0.77

3. Information management (INFO_MAN)					
Does your entity have a strict adherence to common data definitions?	2.91	0.88	**0.694**	-0.11	0.69
Does your entity have a definition of business process owners?	2.86	0.93	**0.650**	0.25	0.55
Does your entity use standardized common processes?	3.33	0.86	**0.636**	-0.05	0.76
Does your entity use standard chart of accounts / standard information architecture?	2.87	0.85	**0.561**	0.07	0.54
Does your entity reduce the number of stand-alone applications?	2.72	0.79	**0.714**	0.00	0.59
Does your entity rationalize the use of data warehouses?	2.59	0.88	**-0.622**	0.01	0.46

Cronbach alpha: 0.81

Table 1: Characteristics of the final sample

Panel A: Respondent profile	N	%	Cumulated %
Position			
CFO/Financial Director	32	28.57	28.57
Finance Manager	11	9.82	38.39
Group Controller	14	12.50	50.89
Business Controller	28	25.00	75.89
Financial Controller	9	8.04	83.93
Other	18	16.07	100
Job level			
Organization/firm level	50	44.64	44.64
Division or lower level	62	55.36	100
Panel B: Respondent's entity profile			
Sales in million Euros			
0 - 10	9	8.04	8.04
20 - 50	15	13.39	21.43
50 - 100	9	8.04	29.46
100 - 250	16	14.29	43.75
250 - 500	13	11.61	55.36
500 - 1,000	15	13.39	68.75
1,000 - 5,000	15	13.39	82.14
5,000 - 15,000	14	12.5	94.64
>15,000	6	5.36	100
Listing status			
Publicy listed	55	49.11	49.11
Private	57	50.89	100
Industry			
Extraction	5	4.46	4.46
Traditional manufacturing	23	20.54	25.00
High-tech manufacturing	5	4.46	29.46
Electricity, gas and water	6	5.36	34.82
Construction and building	5	4.46	39.29
Non-financial services	22	19.64	58.93
Communication and tourism	11	9.82	68.75
Transportation, warehousing, logistics	9	8.04	76.79
Financial institutions	13	11.61	88.39
Social security and cultural activities	5	4.46	92.86
Education	2	1.79	94.64
Health care	6	5.36	100

Table 2: Summary Statistics

	Mean	St. dev.	10%	25%	Median	75%	90%
IMPOR_BENCHM	0.038	0.849	-1.17	-0.57	0.15	0.51	0.95
FORECAST	0.017	0.722	-0.89	-0.48	0.02	0.54	0.98
MISREP	0.008	0.844	-1.10	-0.70	-0.04	0.56	1.14
INFO_MAN	0.009	0.904	-1.24	-0.56	-0.02	0.79	1.10
M&A	0.49	0.50	0	0	0	1	1
JOB_TENURE	3.03	2.91	1.00	1.00	2.00	4.00	6.00
POWER	0.125	0.332	0	0	0	0	1
AGE	40	8.83	28	33	41	48	53
ENV_VOL	0.023	0.857	-1.10	-0.43	0.02	0.48	1.14
GENDER	0.821	0.385	0	1	1	1	1
GROWTH	3.735	12.08	-3.70	0.00	3.00	5.00	10.0
INCENTIVES	0.28	0.45	0	0	0	1	1
INFO_TARGET_SET	3.44	1.11	2	3	4	4	5
LEVERAGE	2.330	1.245	1	1	2	3	4
LOSS	0.142	0.352	0	0	0	0	1
SIZE	4.964	2.378	2	3	5	7	8

Table 3: Pearson correlations.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1)	FORECAST	1.00															
(2)	MISREP	-0.14	1.00														
(3)	IMPOR_BENCHM	**0.16**	0.11	1.00													
(4)	INFO_MAN	**0.32**	**-0.17**	0.08	1.00												
(5)	M&A	-0.15	0.08	-0.07	0.06	1.00											
(6)	POWER	-0.01	**0.23**	-0.05	0.05	0.01	1.00										
(7)	JOB_TENURE	-0.13	**-0.19**	-0.12	-0.07	-0.13	**0.25**	1.00									
(8)	SIZE	**0.32**	0.13	0.12	0.15	0.08	0.05	**-0.19**	1.00								
(9)	GROWTH	-0.13	0.01	-0.15	0.01	**0.22**	-0.04	-0.15	**-0.20**	1.00							
(10)	LOSS	-0.09	0.02	0.03	**-0.16**	-0.09	0.15	**0.23**	-0.11	**-0.27**	1.00						
(11)	ENV_VOL	0.02	-0.03	**0.24**	**0.21**	0.03	-0.05	-0.10	0.04	-0.15	0.01	1.00					
(12)	INCENTIVES	**0.22**	**0.15**	**0.21**	**0.26**	0.03	0.01	-0.07	**0.19**	0.14	-0.08	0.11	1.00				
(13)	LEVERAGE	**-0.19**	0.13	**-0.16**	-0.10	**0.17**	**0.18**	0.06	0.06	-0.04	**0.28**	**-0.21**	-0.08	1.00			
(14)	GENDER	0.05	-0.12	0.12	0.03	-0.01	-0.11	-0.03	-0.10	-0.00	-0.01	-0.07	0.03	-0.06	1.00		
(15)	AGE	0.00	**-0.26**	0.01	0.12	-0.06	0.06	**0.44**	-0.13	-0.14	0.14	-0.02	0.11	-0.09	0.04	1.00	
(16)	INFO_TARGET_SET	**0.25**	-0.05	0.06	0.15	-0.02	-0.10	0.04	0.06	-0.03	0.00	-0.15	**0.26**	0.03	**0.18**	-0.05	1.00

Variable definitions are reported in Appendix A. Correlations that are significant at the 10% level (two-sided) are reported in bold.

Table 4: The relation between internal forecasting sophistication, misreporting and importance of benchmarks.

Dependent variable	Pred.	FORECAST		MISREP	
		Coeff.	p-value	Coeff.	p-value
IMPOR_BENCHM	+	0.245***	0.002	0.189*	0.053
FORECAST	?	--	--	-0.272**	0.047
INFO_MAN		0.158**	0.026	--	--
M&A		-0.119	0.341	--	--
JOB_TENURE		--	--	-0.031	0.383
POWER		--	--	0.819***	0.004
AGE		0.008	0.235	-0.023**	0.038
ENV_VOL		0.002	0.977	-0.139	0.206
GENDER		-0.030	0.846	-0.183	0.419
GROWTH		0.001	0.807	-0.006	0.442
INCENTIVES		-0.008	0.959	0.444**	0.040
INFO_TARGET_SET		0.214***	0.001	-0.043	0.621
LEVERAGE		0.041	0.447	0.051	0.525
LOSS		-0.225	0.257	0.008	0.978
SIZE		0.072**	0.013	0.003	0.948
Industry effects incl.		Yes		Yes	
F-Statistic		3.20***		2.11***	
Adjusted R-squared		0.31		0.19	
N		112		112	

Table 4 reports regression estimates from robust regressions of the following two models:

$$\text{FORECAST}_i = \beta_1 \text{ IMPOR\_BENCHM}_i + \sum \beta_k \text{ CONTROLS}_i + \varepsilon_i \quad (1)$$

and

$$\text{MISREP}_i = \delta_1 \text{ IMPOR\_BENCHM}_i + \delta_2 \text{ FORECAST}_i + \sum \delta_k \text{ CONTROLS}_i + \varepsilon_i \quad (2)$$

P-values are based on robust regressions. ***, **, * corresponds to 1%, 5%, and 10% significance levels (one-tailed when the coefficient sign is predicted, two-tailed otherwise). No observation was dropped during the estimation of the regression coefficients via robust regressions. Variables are defined in Appendix A.

Table 5: 2SLS estimations of the relation between internal forecasting sophistication, misreporting and importance of benchmarks.

Dependent variable	Pred.	MISREP		FORECAST	
		Coeff.	p-value	Coeff.	p-value
IMPOR_BENCHM	+	0.190**	0.048	0.110*	0.085
FORECAST	?	-1.076**	0.042	--	--
MISREP	?	--	--	0.130	0.602
INFO_MAN		--	--	0.176**	0.024
M&A		--	--	-0.177	0.154
JOB_TENURE		-0.071*	0.078	--	--
POWER		1.034***	0.001	--	--
AGE		-0.016	0.128	0.004	0.616
ENV_VOL		-0.100	0.342	-0.085	0.284
GENDER		-0.165	0.453	-0.095	0.555
GROWTH		-0.010	0.220	-0.004	0.477
INCENTIVES		0.499**	0.019	0.008	0.966
INFO_TARGET_SET		0.102	0.377	0.094	0.106
LEVERAGE		-0.085	0.435	-0.077	0.173
LOSS		0.054	0.851	-0.134	0.497
SIZE		0.040	0.441	0.065**	0.019
Industry effects incl.		Yes		Yes	
Wald chi-sq.		45.77***		56.25***	
R-squared		0.06		0.31	
N		111		111	

Table 5 reports regression estimates from 2SLS of the following two models:

$$MISREP_i = \delta_1 \, IMPOR\_BENCHM_i + \delta_2 \, FORECAST_i + \sum \delta_k \, CONTROLS_i + \varepsilon_i \qquad (2)$$

and

$$FORECAST_i = \alpha_1 \, IMPOR\_BENCHM_i + \alpha_2 \, MISREP_i + \sum \alpha_k \, CONTROLS_i + \varepsilon_i \qquad (3)$$

P-values are based on least square estimations. ***, **, * corresponds to 1%, 5%, and 10% significance levels (one-tailed when the coefficient sign is predicted, two-tailed otherwise). One observation in each estimation was dropped due to relatively high Cooks D. The instruments for FORECAST are INFO_MAN and M&A and the instruments for MISREP are JOB_TENURE and POWER. Variables are defined in Appendix A.

Table 6: Potential impact of confounding variables on the results of the relation between internal forecasting sophistication and misreporting

	Test H1 (model 1) Dep. Var. = FORECAST			Test H2 (model 2) Dep. Var. = MISREP			Test H3 (model 2) Dep. Var. = MISREP		
	Partial correlation with FORECAST	Partial correlation with IMPOR_BENCHM	Impact	Partial correlation with MISREP	Partial correlation with IMPOR_BENCHM	Impact	Partial correlation with MISREP	Partial correlation with FORECAST	Impact
FORECAST	--	--	--	-0.215	0.045	-0.010	ITCV = -0.044		
IMPOR_BENCHM	ITCV = 0.2064			ITCV = 0.0408			0.114	0.045	0.005
INFO_MAN	0.256	-0.028	-0.007	--	--	--	--	--	--
M&A	-0.158	-0.037	0.006	--	--	--	--	--	--
JOB_TENURE	--	--	--	-0.173	-0.087	0.015	-0.134	-0.119	0.016
POWER	--	--	--	0.267	-0.001	0.000	0.249	0.070	0.017
AGE	-0.027	-0.041	0.001	-0.218	-0.006	0.001	-0.226	0.059	-0.013
ENV_VOL	-0.068	0.177	-0.012	-0.097	0.166	-0.016	-0.105	-0.041	0.004
GENDER	0.028	0.138	0.004	-0.083	0.128	-0.011	-0.100	0.017	-0.002
GROWTH	-0.066	-0.120	0.008	-0.091	-0.136	0.012	-0.050	-0.097	0.005
INCENTIVES	0.066	0.189	0.013	0.237	0.177	0.042	0.193	0.082	0.016
INFO_TARGET_SET	0.181	0.005	0.001	-0.048	-0.001	0.000	-0.099	0.226	-0.023
LEVERAGE	-0.184	-0.112	0.021	0.008	-0.106	-0.001	0.069	-0.208	-0.014
LOSS	0.013	0.047	0.001	0.032	0.066	0.002	0.025	-0.006	-0.001
SIZE	0.282	0.072	0.020	0.065	0.037	0.002	0.001	0.261	0.001

Table 6 provides the calculation of ITCV (impact threshold for a confounding variable) for robust regression estimations of the tests of H1 (model 1), H2 (model 2), and H3 (model 3), as specified in Table 4. The ITCV indicates the threshold at which an omitted variable would make the coefficient of interest (IMPOR_BENCHM in tests of H1 and H2, and FORECAST in the test of H3) insignificant at $p<0.10$ (one-sided if sign is predicted and two-sided otherwise). If the partial correlation of an omitted variable with the dependent variable times the partial correlation of the same omitted variable with the independent variable of interest is greater than the ICTV, the coefficient on the independent variable of interest would no longer be statistically significant if the omitted variable were included in the regression. Impact is the partial correlation of each control variable with the dependent variable times the partial correlation of the same variable with the independent variable of interest. Variables are defined in Appendix A.