Real earnings management in UK private and public firms

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Abstract: This paper analyses real earnings management among private versus public firms. Using accounting data of British firms, we find that public firms overall engage in more earnings management through real operating activities. Furthermore, when clear incentives to manage earnings in a specific direction are present, such as to beat earnings targets, we also find that public firms manage their earnings in the expected direction more than private firms. Additional tests reveal that higher analyst coverage may mitigate the level of abnormal operating behaviour in certain settings while quality auditing is not a limiting factor. We also find that high managerial ownership among private firms is associated with less real earnings management. Our study contributes to the emerging literature on non-accrual earnings management and to the broader understanding about the private vis-à-vis public firm reporting and operating behaviour.

Keywords: private firms, public versus private, real earnings management, opportunistic behaviour

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1. Introduction

The survey study of Graham, Harvey, and Rajgopal (2005) provides evidence that managers are willing to make value-destroying real economic decisions in order to reach various reporting objectives. For example, 80 percent of the surveyed CFOs were willing to cut down on R&D, advertising, and maintenance spending to avoid losses. Furthermore, 55 percent were also open to postponing new projects for the same reason. These types of actions are commonly referred to as real earnings management (hereafter REM). When REM is utilised to alter reported earnings, the underlying cash flow component is directly affected. Indirectly, it is also likely that REM will lead to long-term cash flow effects. Due to the cash flow effect, this will ultimately affect the intrinsic value of the firm.

Numerous studies document that REM is employed in various contexts. For example, the act has been found to occur in earnings target beating contexts (Roychowdhury 2006), around seasoned equity offerings (Cohen and Zarowin 2010), and prior to initial public offerings (Alhadab *et al*. 2015). In general, prior studies have largely focused on managerial decisions in listed public firms. In public firms, managerial ownership is typically low, potentially making the managers' incentives less aligned with those of the owners'. As an example, managers may have an incentive to manipulate earnings in order to beat various earnings targets because their compensation may be directly linked with such targets. If REM is applied in target beating contexts, the short-term gain for the manager might translate into a decreased intrinsic firm value due to the value-destroying nature of this form of earnings management.

While the REM literature has been largely focused on public firm actions, the vast majority of firms globally are, in fact, private. Private firms differ from public firms in various ways (Hope *et*

al. 2013). First, private firms generally have a higher level of managerial ownership and a shorter owner-manager distance than public firms. In addition, the shareholders are normally much lower in numbers and less geographically dispersed in private firms. Second, private firms do not face the same regulation concerning access to insider information as do public firms. Therefore, private firms may regularly communicate corporate information to outsiders. In contrast, public firms need to rely more on the financial statements when communicating externally. Finally, private firms are not under the same press from capital markets as public firms. For the managers of public firms, this may become evident when managers who are unable to satisfy the markets are forced to resign. Taken together, private firm characteristics make managers' incentives more aligned with those of the owners'. The innate differences between private and public firms imply a lower presence of REM among private firms. For instance, owner-managers of private firms have less incentives to achieve short-term gains by destroying future firm value. In the same manner, private firms are able to contract more based on inside information than public firms are able to. Therefore, private firms have weaker incentives to manage earnings to achieve a better bargaining position.

While private firm research has been scarce with respect to REM, researchers have investigated the occurrence of an alternative form of earnings management in private firms, namely, accrual-based earnings management (hereafter AEM). Researchers have also compared the extent of AEM among private versus public firms both in the US (Hope *et al*. 2013) and in Europe (Burgstahler *et al*. 2006). The concept of AEM is concerned with managerial discretion over the accrual component of earnings. In other words, AEM addresses with the way in which transactions are presented via accounting method choices and estimates. In contrast to REM, AEM does not affect the cash flow component because the underlying transactions are left unaltered. Based on the findings of Graham *et al.* (2005), REM is recognised as a more preferred earnings management

method among managers. The first reason for this is that auditors are more likely to challenge a firm's accounting choices than real economic actions. By engaging in AEM, firms jeopardise their reputation due to the risk of auditor and regulatory scrutiny. The second reason is that AEM is constrained by the underlying transactions in the current year and AEM of previous years (Barton and Simko 2002). Moreover, AEM occurs at the end of the fiscal period while REM may be applied continuously during the period. If a manager falls short of an earnings target at the end of the year, there is likely insufficient time to apply REM. In this situation, the AEM alternative may also be insufficient due to the constraint associated with AEM. Therefore, Roychowdhury (2006) argues that managers use REM throughout the reporting period to beat earnings targets.

Hope *et al*. (2013) and Burgstahler *et al*. (2006) both find more AEM overall in private than in public firms. In contrast, we expect more REM among public firms based on the differences in ownership characteristics, access to information, and capital market pressure. Furthermore, we also expect that public firms engage in more REM in certain settings, such as when they are close to earnings targets. This would be in line Hope *et al*. (2013) who show that more AEM occurs among public firms in settings where there is a reduced demand for their financial information or in the presence of strong incentives for earnings management. To date, no study to our knowledge has focused on the different engagements in REM among these two firm types. This study aims to provide empirical evidence on the different magnitudes of REM in private and public firms.

To compare the REM activities between public and private firms, we analyse six different measures of abnormal operational activities, primarily relying on the proxies of Roychowdhury (2006). We study a large sample of firms registered in the UK during the time period 2007 to 2013. The two groups of firms are compared after controlling for several variables known to be connected with earnings management and financial reporting. Our analyses cover both a general

view of the differing engagements in REM and a deeper analysis where different incentives for earnings management are investigated.

Briefly, the results of our empirical tests provide evidence that public firms generally engage in more REM than private firms. When we continue to analyse signed measures of REM and firms with specific incentives to manage earnings, for instance firms with earnings around different thresholds, we observe that public firms manage earnings through real activities in the expected directions to a larger extent than private firms do. We also show that public firms with higher analyst coverage engage in less upward manipulation in these instances. However, industry-expert or Big 4 auditors do not influence the extent of earnings inflating activities to any larger extent. Finally, and interestingly, private firms with owner-managers engage in less REM. In conclusion, our results suggest that firm type characteristics affect the engagement in REM.

We examine UK firms for three main reasons. First, the semi-annual reporting of listed firms in the UK offers an excellent research arena to compare private and public firms. In this setting, the two groups of firms report in a more similar fashion than in a quarterly reporting regime for listed firms. Second, even middle-sized firms are commonly listed on the London Stock Exchange which similarly increases the comparability between private and public firms. Third, the UK has a large number of both public and private firms which allows for a large-sample study. Finally, a single-country study gives a natural control for the legislative environment.

This study contributes to the literature by being the first to examine non-accrual earnings management activities in both public and private firms and by incorporating a simultaneous comparison between the two groups of firms. Thus, we contribute to the understanding about private versus public firm reporting and operating behaviour where prior studies have solely

focused on accrual manipulation and reporting behaviour (Hope *et al*. 2013, Burgstahler *et al*. 2006). Moreover, this study establishes a link between analyst coverage and REM, consistent with the finding in Yu (2008) that firms followed by more analysts manage their earnings through accruals less. Additionally, this study does not find any evidence that quality auditors restrict the extent of REM when specific incentives to manage earnings are present. However, we are able document that more REM is associated with a lower level of managerial ownership.

The next section provides a literature review and develops our hypotheses. In the third section, we describe our methodology and sample selection. Section four provides the results of empirical and additional tests while the last section concludes.

2. Theoretical framework, literature review and hypotheses development

The prior literature on REM has largely focused on the actions of public firms. These studies use the measures developed by Roychowdhury (2006) to investigate how firms manage earnings through real activities. These activities affect the underlying transactions of the firm and have a real cash flow effect, in contrast to earnings management through accruals. Previous studies show, for instance, that a significant increase in REM occurred after the passage of the Sarbanes-Oxley Act in 2002 while there was a simultaneous decrease in AEM (Cohen *et al*. 2008). Zang (2012) also notes that managers manage real activities and accruals interchangeably. Furthermore, Cohen and Zarowin (2010) show that seasoned equity offering firms engage in REM and that subsequent operating underperformance could be linked with the real consequences of operational decisions to manage earnings.

Prior REM studies utilising the data of non-listed firms have mainly examined firms undergoing an IPO (Alhadab *et al*. 2015, Wongsunwai 2013). The results of these studies indicate that IPO

firms engage in earnings management both through accruals and real activities. Another study that specifically investigated private firms is Dierynck *et al*. (2012) who focus on the real actions of private firms with respect to labour cost behaviour. All in all, however, the REM literature primarily highlights public firms.

The AEM literature, on the other hand, has examined both private and public firms in a vast number of settings. This stream of the literature has also compared private and public firms with respect to the extent of AEM. Givoly *et al*. (2010) examined firms with publicly held equity versus publicly held debt and concluded that the former group engage in more earnings management than do firms in the latter group. They concluded that the management incentive to adjust reported earnings due to certain objectives is a dominant strategy among public firms. This is also in line with Graham *et al*. (2005) who indicated that managers are willing to manage earnings in order to achieve one or several earnings targets. In a study by Hope *et al*. (2013), the extent of AEM was compared between US private and public firms. They concluded that that public firms manage earnings to a larger extent in settings with strong incentives for earnings management. In our study, we aim to compare REM in private and public firms.

We build our hypotheses on the inherent differences between private and public firms. We are especially focusing on three major sets of differences. The first set of differences are concerned with ownership characteristics. Private firms are often characterized by having a high level of managerial ownership and short owner-manager distance whereas the opposite applies to public firms (Hope *et al*. 2013). Managers who have more wealth tied to the firm they manage will be more affected by the value-destroying nature of REM acts. Therefore, these managers are not as likely to engage in such activities as managers who act as pure agents for the firm. Based on this, we expect public firms who are generally not owned by managers to engage in more REM than

private firms. The second set of differences involves access to insider information. To begin with, major stakeholders of private firms frequently have access to insider corporate information and are typically involved in the actual management (Chen *et al*. 2011). Public firms, on the contrary, are not allowed to supply internal information to outsiders due to formal insider regulation (e.g. EU market abuse regulation). As a consequence, public firms must rely more on the financial statements when communicating with stakeholders, such as investors and creditors. The financial statements are also used as primary communication channels in public firms because their shareholders are often high in numbers and very geographically dispersed. Due to this, public firms may use REM to signal future performance (Bartov *et al*. 2002). The greater reliance on the financial statements in public firms leads to an expectation of more REM to occur among public firms. Finally, the third set of differences between private and public firms are associated with capital market related issues. Graham *et al*. (2005) noted that public firms are subject to capital market pressures, which increase their incentives to engage in earnings management to meet earnings targets. In the context of private firms, capital market pressure is negligible and thus, private firms should face weaker incentives to manage earnings. Instead of reporting for a broad audience, these private firms primarily report for purposes of taxation and dividend distribution (Ball and Shivakumar, 2005). Considering the impact of capital market pressure, we expect public firms to engage in more REM than private firms.

To summarise, studies have examined AEM in both public and private firms and provided comparisons between the two groups of firms and their reporting behaviour. A number of the motivations for these studies also apply for research regarding REM. To date, however, no study to our knowledge has explicitly examined REM activities in both private and public firms or provided any form of broad comparison. This is the aim of the current study. An addition to the

literature is made by providing large-sample UK evidence for several REM measures. We base our first hypothesis on the above discussion of differences in ownership characteristics, access to insider information, and capital market influences among private and public firms. We expect that there is a difference in the REM activities among private and public firms. Furthermore, we hypothesize that public firm managers employ more REM. Thus, our first hypothesis is formulated as:

H1: Relative to managers in private firms, public firm managers engage in more REM.

In contrast to our hypothesis on REM, studies focusing on AEM have attributed more earnings management to private firms overall. For instance, this was the conclusion in Burgstahler *et al*. (2006) who used the earnings management proxies in Leuz *et al*. (2003). Hope *et al*. (2013), in general, also contributed with similar findings. An important note is that these studies utilise AEM as a proxy for financial reporting quality. This is done in a similar fashion as Ball and Shivakumar (2005), who use accounting conservatism as an alternative proxy for reporting quality. The findings in these studies suggest that public firms report with higher quality overall in comparison to private firms. This is also expected due to the high demand for quality information in public firms. In the light of these studies, REM should not be considered as a proxy for financial reporting quality. Therefore, our first hypothesis does not stand in conflict with the prior findings regarding the extent of AEM as a financial reporting quality measure in private and public firms.

Besides an examination of the general engagement in REM, we also develop a second set of hypotheses where we examine such activities in the light of different incentives for earnings management that public and private firms and their managers face. In line with the first hypothesis,

we continue to presume that managers in public firms overall face stronger incentives to manage earnings than do private firm managers.

First, we observe whether public firms manage earnings more than private firms in order to reach reporting objectives. Prior literature document that public firms are pressed by the capital markets to meet earnings targets (Burgstahler and Dichev 1997, Graham *et al*. 2005, Roychowdhury 2006) whereas private firms do not face similar pressure since private firms are not publicly traded on a stock exchange. In addition, private firms tend to be characterized by an ownership structure that is associated with less opportunistic behaviour by the management. Empirically, Baber *et al*. (1991) and Bushee (1998) find that public firms spend less on R&D in situations when R&D spending could result in negative or decreasing earnings. Roychowdhury (2006) show that public firms avoid reporting annual losses with the help of REM. In a private firm context, there may also exist incentives to beat earnings targets. For instance, Dierynck *et al*. (2012) demonstrate that private firms utilise REM to avoid negative earnings to be able to distribute dividends. Even though the incentive to manage earnings around earnings targets may exist in both private and public firms, we expect a higher degree of REM in public firms due to stronger incentives associated with capital market press and ownership structure. Furthermore, non-owner managers also gain on a personal level from meeting or beating targets because a target met is often associated with an increase in wealth and a decrease in employment risk (Hope *et al*. 2013). Among private firms, however, the level of owner-managers tends to be high, lowering the incentives to engage in REM to beat earnings targets. Taken together, these factors propose that managers in public firms have greater incentives to manage real activities that increase earnings to meet or beat certain targets. Our second hypothesis is concerned with the zero earnings target and is formulated as follows:

H2a: Relative to managers in private firms, public firm managers engage in more income-increasing REM when earnings are close to zero.

We also formulate another hypothesis which concentrates on the incentive to beat prior year's earnings:

H2b: Relative to managers in private firms, public firm managers engage in more income-increasing REM when earnings are close to prior year's earnings.

Second, we test whether managers manipulate real activities to obtain external financing. Hope *et al*. (2013) argue that external capital providers are likely to rely on financial reports when providing capital for public companies based on the fact that owners of public firms are more geographically dispersed and have a larger number of shareholders. Public firms may also use the financial statements to signal future performance and REM may be used in this process (Bartov *et al*. 2002). The external capital providers of especially larger private firms can also arguably rely on the financial statements in their assessment of a potential investment. However, private firms may also grant outsiders access to insider information whereas public firms are not allowed to supply insider information to stakeholders due to formal insider regulation. In conclusion, we expect public firms to rely more on the financial statements in contracting situations, and thus, also engage in more REM. Hence, our next hypothesis is as follows:

H2c: Relative to managers in private firms, public firm managers engage in more income-increasing REM when capital is to be attracted.

Third, we consider the effect of leverage. In debt contracting, leverage has been identified as important (Shivakumar 2013). Prior literature also shows that leverage increases the potential for earnings management, and especially income-increasing behaviour (Sweeney 1994, Beatty and

Weber 2003). In line with the above discussion about access to insider information in private versus public firms, we argue that public firms contract more based on their financial statements than private ones when leverage is higher. Additionally, Hong and Sarkar (2007) show that the systematic risk of a public firm's equity is an increasing function of the firm's leverage ratio. An increase in systematic risk lowers the firm value, and hence, these firms have an incentive to lower the leverage ratio through REM. Based on these factors, we formulate the following hypothesis:

H2d: Relative to managers in private firms, public firm managers engage in more income-increasing REM when leverage is high.

Finally, we recognise REM as a potential tool for big baths. Zucca and Campbell (1992) show that large discretionary asset write-downs are used in one-time changes in income where losses are made even larger losses. Big baths have also been associated with CEO turnover (Wells, 2002). The reason behind these baths may be that incoming CEOs reduce their first year's profits and blame the negative earnings on their predecessors. Another reason is that managers want to increase their bonuses (Healy 1985). If these bonuses cannot be ensured within one period, the managers have incentives to maximise losses in one year and present higher earnings in coming periods. By doing so, the bonuses may be maximised. Prior literature has only examined AEM in this context and we test whether firms produce large losses with REM as well. The characteristics in private firms, including a higher level of managerial ownership and absence of capital market pressure, suggest that private firms are less likely to engage in downward REM to make large losses even larger. On the contrary, we expect public firms to engage in more REM in this setting because they have a stronger incentive to present a one-time large loss and a subsequent smoother line of earnings. Our final hypothesis is as follows:

H2e: Relative to managers in private firms, public firm managers engage in more income-decreasing REM when there is a big loss.

3. Methodology, data and sample restriction

3.1. *Methodology*

We examine the association between REM and the public or private firm status with panel regressions. At first, we estimate three separate abnormal activity measures based on Roychowdhury (2006) and construct three composite measures. Subsequent studies using the same methodology (e.g. Cohen *et al*. 2008, Cohen and Zarowin 2010, Zang 2012) provide evidence that these metrics effectively capture REM activities. As these measures can be considered standard models of REM, our methodology is further described in the Appendix. We focus on measures of sales manipulation (*ACFO*), overproduction (*APROD*) and discretionary expenses (*ADISEXP*). Finally, we also use comprehensive measures that measure the total effect of REM (*REM_1*, *REM_2* and *REM_SUM*). All measures are constructed so that a positive figure is associated with income-increasing REM, and vice versa with a negative number.

With the REM metrics estimated, we first test for general differences in REM between public and private firms (H1) using the following Equation (1):

$$|REM| = \alpha_0 + \beta_1 PUBLIC + \beta_2 CAPNEED + \beta_3 SIZE + \beta_4 ROE + \beta_5 LOSS + \beta_6 SD\_ROA + \beta_7 LEV + \beta_8 GROWTH + \beta_9 OPCYCLE + \beta_{10} INV + \varepsilon \quad (1)$$

where β_1 represents the differential engagement in REM activities for public and private firms and is our main test coefficient for the first hypothesis (H1). We use an absolute (unsigned) value as the dependent variable, in line with Francis *et al*. (Forthcoming). Following prior literature (e.g.

Ashbaugh-Skaife *et al*. 2008, Roychowdhury 2006, Cohen and Zarowin 2010, Hope *et al*. 2013), we include numerous control variables which have been shown to be associated with REM and earnings management in general, namely percentage change in stock and long-term debt in the following year (*CAPNEED*); log of total assets (*SIZE*); return on equity (ROE); loss years (*LOSS*); standard deviation of return on assets (*SD_ROA*); financial leverage (*LEV*); growth (*GROWTH*); operating cycle (OPCYCLE); and inventory (*INV*). Finally, industry and year fixed effects are included.

To examine the second set of hypotheses, we employ an alternative version of Equation (1):

$$REM = \alpha_0 + \beta_1 PUBLIC \times INCENTIVE + \beta_2 PUBLIC + \beta_3 INCENTIVE + CONTROLS + \varepsilon \qquad (2)$$

where the regression is run with a signed dependent variable to capture the direction of REM. Furthermore, the public firm variable is included both alone and in a two-way interaction term (*PUBLIC* × *INCENTIVE*). Here, *INCENTIVE* is an indicator variable that is set equal to one if firm-years belong to a suspect category of firms that are more likely to have employed REM due to an underlying incentive (e.g. in the case of earnings targets, *INCENTIVE* is set to one if the firm-year reports small earnings). The control variables correspond to those in Equation (1). White heteroskedacticity-consistent standard errors and covariance matrix are applied in all regressions.

3.2. *Sample selection*

We collect financial statement data for private and public limited liability firms registered in the UK for the years 2005 to 2013 using the Orbis database of Bureau van Dijk. The years of analysis comprise 2007 to 2013. We apply a number of restrictions to our sample. First, we exclude financial institutions (SIC codes 6000-6900) based on their unique reporting. Second, we exclude firms with total assets below £10 million due to the high frequency of missing data items among

smaller firms. After implementing a restriction for the minimum number of firms per industry for the REM estimation models, we end up with a sample of 61,756 firm-year observations. Our final sample consists of 851 public firms and 8,652 private firms. Table 1 presents the sample formation process.

[TABLE 1 HERE]

The UK private and public firm settings resemble that of many other countries. Private firms are denoted by being 'limited' whereas public firms must have 'public limited company' or 'plc' in their name. Private firms have no minimum share capital requirement whereas public firms must raise at least £50,000 in order to engage in business activities. When funds are to be attracted, a private firm cannot offer shares to the public whereas public firms are allowed to. Private firms must prepare and file their financial statements within ten months while this time limit is seven for public firms. Failure to file is a criminal offence for both firm types. Small private firms will not need an audit of their annual accounts if they qualify as a small company under the Companies Act of 2006, unless they are members of a group. The financial statements of larger private firms and all public companies must be audited which also applies for all firms in our sample. The financial statements are to be prepared in accordance with applicable UK accounting standards. Public firms listed on a stock exchange are additionally required to prepare financial statements in accordance with IFRS. This could affect our results and our estimation models. However, Doukakis (2014) provides evidence that IFRS adoption does not have any significant impact on the level of REM which support the continuation of our analysis. Furthermore, UK tax laws treat private and public firms as equal. All in all, we recognise that the UK regulatory environment for private and public firms does not differ in any larger extent.

3.3. *Descriptive statistics*

Panels A and B of Table 2 report descriptive statistics for the whole sample period of the main variables used in this study for our two company types, respectively. As expected, we observe that the public firms are larger in size. Otherwise, Table 2 shows that the means and medians for the control variables of the private and public firms in our sample are highly comparable. Furthermore, we also recognise that the means and medians for all REM variables, except *ACFO*, is more negative for our sample of public firms than for the private firms.

[TABLE 2 HERE]

In Table 3, a correlation matrix is presented for the full sample of private firms in Panel A and for public firms in Panel B. Generally, there are mostly significant correlations as expected in a sample of our magnitude. However, the correlations among the variables to be included in the same regression model are not very strong, which lowers the risk of impending correlation bias. In addition, we rule out multicollinearity based on the fact that the variance inflation factors of all regressors in the models under discussion are below 4.0. We note that *SIZE* is negatively correlated with all unsigned measures of REM in both panels, which suggests that larger firms engage in less REM overall in line with the expectations. *GROWTH*, on the other hand, is consistently positively correlated with the absolute amount of REM. Because the correlations do not control for differences in firm characteristics, we next apply a multivariate analysis.

[TABLE 3 HERE]

4. Results

4.1. *Overall differences in real earnings management between private and public firms*

Table 4 presents the regression results with a focus on analysing H1. For the full sample in Panel A, we observe that the coefficient on the *PUBLIC* variable is mostly positive and statistically significant. This indicates that public firms in general engage in more REM than private firms. The coefficient is negative only in the case of *ACFO*. Further, the sign of control variables such as *SIZE* and *LEV* are as expected in these regressions. Larger firms manage real activities less whereas the opposite applies to firms with higher leverage. The adjusted R^2 averages at 16 percent, which is a reasonable explanatory power in this research context. In Panel B, the sample is composed of matched private and public firms, based on size, industry, and fiscal year. We perform this matching procedure as the primary difference between private and public firms is firm size, and several reporting incentives can be attributed to the size of the firm. We continue to find higher amounts of earnings management for public firms across all measures but *ACFO*. In Panel C, we apply a stricter propensity score matching (PSM) procedure that creates a more closely matched sample. We match, without replacement, each private firm with a public firm that has the closest predicted value based on an estimated logit model that includes the variables *SIZE*, *ROE*, *LEV*, *GROWTH*, and fiscal year. Using the PSM-based matched sample and Equation (1), we find that the absolute magnitude of the dependent variable is higher in public firms. Thus, our previous results remain solid. In conclusion, we find general evidence of more REM in public firms across all sample compositions, which is in line with the first hypothesis (H1).

[TABLE 4 HERE]

4.2. *Analyses of incentive-based real earnings management*

We now examine our second set of hypotheses. The engagement in REM is expected to vary between private and public firms in settings with strong incentives for earnings management. Here,

we use a signed dependent variable that allows for the analysis of the earnings management direction. The results are reported in Table 5.

The regression results in Table 5 include main effects and an interaction effect for public and suspect firms according to Equation (2), where suspect firms are those public and private firms that have a proposedly stronger incentive to manage earnings. Here, the coefficient on the *PUBLIC* variable represents the differential engagement in REM of public versus private firms that are not affected by the incentive. We test the second set of hypotheses with the interaction term (*PUBLIC* × *INCENTIVE*) coefficient that represents the incremental difference in REM between public vis-à-vis private firms with the incentive.

In Panel A and B of Table 5, we consider firms that report a small profit or small earnings increases and are suspects of upward earnings management. H2a and H2b predicts that the interaction effect will be positive because the upward REM of public firms relative to private firms increases for *TARGET_1* and *TARGET_2* firms. Consistent with the hypothesis, Panel A of Table 5 reports a positive and statistically significant coefficient on the interaction term, which suggests that public firms manage their earnings more upwards to beat the zero earnings target. Furthermore, the positive coefficient on *TARGET_1* suggests that private firms classified as suspect firms also have more upward REM than non-suspect private firms. Moreover, similar results are presented in Panel B regarding firms that just meet or slightly beat prior year's earnings, but with a lower level of significance on the interaction effect and with an insignificant effect on the *ACFO* measure. Taken together, the results are consistent with H2a and H2b and the notion that public firms employ greater magnitudes of upward REM in these target beating contexts.

Panel C of Table 5 explores firms with a capital need above the sample median. Here the interaction coefficient is not suggesting that public firms engage in more upward REM than private firms. Instead, the interaction coefficient is mostly negative and significant which suggests that suspect public firms engage in more downward REM than suspect private firms. Simultaneously, private firms with the incentive do not seem to engage in any statistically significant REM action either. In summary, we find no support for H2c that proposes that firms engage in income-increasing REM when capital need is high.

However, when a variable indicating high leverage (*DLEV*) is interacted with *PUBLIC* in Panel D of Table 5, the results across all measures but *ACFO* indicate that public firms with high leverage engage in significantly more income-increasing REM than private firms. Nonetheless, private firms also engage in upward REM based on the coefficient on *DLEV*. We conclude that both firm groups manage earnings upwards in contexts where leverage is high, for instance to decrease leverage, but public firms are ultimately seen to engage in more income-increasing REM. Hence, these results are in line with H2d.

Finally, we consider big loss firms in Panel E of Table 5. The rationale behind this incentive is that firms with large negative earnings on the horizon are expected to engage in income-decreasing activities to further decrease earnings to clear the decks. In the future, higher earnings can then be presented. With respect to H2e, we find very weak evidence of such income-decreasing behaviour to be larger in public firms. Our results also suggest that suspect private firms engage in statistically significant downward REM in this setting.

[TABLE 5 HERE]

In conclusion, our analyses of clear incentive settings for earnings management report that public firms engage in more income-increasing REM than private firms in situations where earnings are close to earnings targets and when leverage is high. Moreover, we find very weak evidence suggesting that public firms engage in more income-decreasing REM than private firms in big loss contexts. However, we do not find any clear evidence that REM is employed when capital is to be attracted.

4.3. *Additional tests*

Next, we perform a number of additional tests. First, we analyse the impact of analyst coverage on REM because analysts may be considered acting as an additional governance mechanism in firms with analyst following. For instance, analysts may mitigate the manager misuse of firm resources (Healy and Palepu 2001) and research has shown that firms followed by more analysts manage their accruals less (Yu, 2008). We expect that public firms that are not covered by a high number of analysts engage in more REM. In Table 6, we present the impact of analyst coverage on REM in the previously presented settings with strong incentives for earnings management. Here, we use a reduced sample of public firms only and interact the *INCENTIVE* variable with a rank variable that indicates no (0), below median (1), or above median analyst coverage (2). The data on analyst coverage was obtained from the Orbis database. Panel A and B of Table 6 present the impact of analyst coverage on REM in settings where earnings targets are beaten. Based on the interaction term, we recognise that more analyst coverage overall is associated with less REM in the presence of the incentive to avoid losses. Meanwhile, the results in Panel B show similar but insignificant results, that analysts mitigate the manipulation of real activities in contexts where prior year's earnings are beaten. On the contrary, no clear effect is observed when capital is to be attracted or in the case of big loss years. However, Panel D reveal that the impact of analysts is strong in the

case in the case of high leveraged firms where all measures show a significantly negative coefficient on the interaction term. All in all, high analyst coverage is observed to have significant mitigating effects on upward REM when earnings are close to the zero earnings target and when leverage is high.

[TABLE 6 HERE]

Second, we also assess the effect of auditors on REM in public firms. This is motivated by Nelson *et al.* (2002), who document that auditors constrain earnings management. Furthermore, Kim and Park (2014) propose a link between auditors and REM by showing that auditors are more likely to resign if their clients have engaged in aggressive opportunistic operating decisions. With respect to AEM, Krishnan (2003) finds that specialist auditors mitigate earnings management. This finding is linked with the intuition that large audit firms have the resources and expertise needed to effectively conduct audits which act as a limiting factor with respect to discretionary reporting. Alternatively, firms with high agency costs may signal higher accrual quality with the help of a quality auditor that is the market leader in the segment. When it comes to REM, however, we do not postulate any effect rising from the auditor because auditors are not connected with real activity decisions in the same way as they are with accruals choices because REM is concerned with real operating activities and not financial reporting per se. This is in line with Cohen and Zarowin (2010). In addition, Graham *et al*. (2005) also note that REM is less susceptible to the scrutiny of auditors and that auditors are more likely to detect AEM. Table 7 reports the results when the impact of an industry-expert auditor is taken into consideration in the form of a dummy variable indicating an *EXPERT* auditor. Here, industry expertise is measured in terms of auditor market share for each two-digit SIC industry group and the market leader in each industry is recognised as an *EXPERT*. In our results, the interaction terms are insignificant in the most majority of all

instances. These findings suggest that industry-expert auditors do not have any statistically significant impact on the level of REM with respect to the specific incentives of earnings management. Moreover, Hope *et al*. (2013) find that public firms with a non-Big 4 auditor engage in more AEM than private firms. In addition, Cohen and Zarowin (2010) find that Big 8 auditors do not restrict REM. Therefore, we also test the impact of a BIG 4 auditor on REM as an alternative proxy for quality auditors by replacing *EXPERT* with an indicator variable for firms audited by a BIG 4 firm (PricewaterhouseCoopers, Deloitte Touche Tohmatsu, E&Y or KPMG). The inferences, however, remain the same with this alternative specification (untabulated).

[TABLE 7 HERE]

Third, we test the impact of the level of managerial ownership on the engagement in REM. This is done solely for private firms because the variation in managerial ownership among public firms is lower. Our sample of private firms include both firms with controlling shareholders acting as managers and firms with non-owner managers. Based on the discussion on ownership structures and that a high level of managerial ownership is associated with less REM, we examine how managerial ownership affects the willingness to employ REM in situations where there are clear incentives to manipulate earnings. We expect that managers who own a larger portion of the firm they manage will engage in less REM since their wealth could potentially be affected by the value-destroying nature of the REM activities. Our measure of high managerial ownership (*MANOWN*) is an indicator variable that indicates whether managers of a firm also are controlling shareholders. The results in Table 8 overall show that high managerial ownership decrease the managers' willingness to engage in REM. In the cases of beating earnings targets and high leverage we recognise that private firms with high managerial ownership are associated with less income-

increasing REM. In addition, the results in Panel E of Table 8 suggest that owner-managers are less prone to make large losses even larger losses.

[TABLE 8 HERE]

Three robustness tests were run to analyse the sensitivity of the results, incorporating analyses of AEM, correlated omitted variables, and firms reporting IFRS financial statements. First, we recognise that prior research has shown that firms use accruals and real activities as substitutes in managing earnings (Zang 2012). Therefore, we also examine the effect of AEM in our REM regressions. Following prior research (Peasnell *et al*. 2000), we estimate current discretionary accruals cross-sectionally as a proxy for AEM. The inclusion of a discretionary accruals variable does not affect our regression results. In the augmented version of Equation (1), the coefficient of absolute and signed discretionary accruals is negative and statistically significant, which is aligned with the Zang (2012) who also finds a negative correlation. Neither Equation (2) is affected by an AEM control.

Second, we assess how strong the effect of an omitted correlated variable would have to be in order to overturn our results. In this test, we follow Larcker and Rusticus (2010) and calculate the Impact Threshold for a Confounding Variable (ITCV). The ITCV is defined as the lowest product of the partial correlation between the dependent variable and the confounding variable and the partial correlation between the independent variable of interest and the confounding variable that would lead to a statistically insignificant relation between the dependent variable (*REM*) and the variable of interest (*PUBLIC*). For the Table 4 results, the ITCV value average around 0.004. The correlation between our REM metrics and *PUBLIC* would thus each need to be around 0.066 to render the coefficient on *PUBLIC* insignificant. With this information, we evaluate whether the

ITCV is large enough for the results to be robust to omitted variables by calculating the impact for each control variable. Impact is here defined as the product of the partial correlation between the dependent variable and the control variable and the correlation between the variable of interest and the control variable (partialling the effect of the other control variables out). However, none of the included control variables have an impact with larger magnitude than the ITCV. Any unobserved confounding variable must be more correlated with the *REM* variable and the *PUBLIC* variable than any of the existing control variables to overturn the results. Assuming that we have an adequate set of control variables, it is unlikely that there is an omitted variable that would overrun our results. We conclude that the main results are robust to potential correlated omitted variables.

Finally, we recognise the fact that IFRS could have an impact on our results because most public firms report under IFRS and a large part of the UK private firms report under local accounting standards. Even though Doukakis (2014) provided evidence that IFRS adoption does not have any significant impact on the level of REM, we perform an additional robustness test to rule out any uncertainty in our setting. The accounting practice data is retrieved from the Orbis database and the main regressions are run by first including and secondly excluding firms that report under IFRS. The conclusion that public firms engage in more REM, no matter the applied accounting practice, is confirmed in these tests.

5. Conclusions

In this study, we examine whether the extent of REM differs between private and public firms in the UK. We do this both in general and in certain settings where clear incentives for earnings management exist.

We contribute to the growing literature on non-accrual earnings management by providing the following evidence. Our first finding is that public firms generally engage in more REM than private firms. While there has been research examining differences in accrual manipulation between private and public firms (Hope *et al*. 2013, Burgstahler *et al*. 2006), our study is the first to investigate non-accrual manipulation between private and public firms. Second, we find that managers of public firms manage real operating activities to achieve higher earnings more than private firm managers in settings where there is a clear and strong incentive for such behaviour. These settings comprise situations when earnings targets are to be beaten and situations where firm leverage is high. Third, additional tests suggest that analysts mitigate opportunistic behaviour in public firms while quality auditors do not. Moreover, private firms with a high level of managerial ownership are associated with less REM. Our findings remain robust after controlling for accrual earnings management, correlated omitted variables, and IFRS reporting.

Our study focuses on firms within the UK. This allows for a comprehensive analysis with a natural control for the legislative environment which is not possible with a multi-country approach. In addition, private and public firms in the UK are comparable for reasons associated with the reporting frequency regime and the size of listed firms.

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Appendix

Estimation of real earnings management (REM) metrics

In undertaking our estimates of REM, we largely follow Roychowdhury (2006) for the separate measures and Cohen *et al*. (2008) and Cohen and Zarowin (2010) for the composite measures. We examine three REM activities; sales manipulation, abnormal production and managing discretionary expenses. Sales manipulation is involved with offering more price discounts and lighter credit terms which lowers the cash flows from operations. Abnormal production is often overproduction which leads to fixed overhead costs spreading over a larger number of units that lowers the cost of goods sold (COGS) and increases earnings. Firms may also underproduce to temporarily deflate earnings. Reducing discretionary expenses, such as cutting R&D, will boost reported earnings while an increase in these expenses leads to lower earnings. The discretionary expenses include earnings management through R&D expenses, advertising expenses and SG&A expenses. All measures are estimated with cross-sectional regressions for each industry (2-digit level) with at least 15 observations and year.

For the first measure, normal cash flow from operations (CFO) is expressed as a linear function of sales and change in sales in the current period:

$$\frac{CFO_t}{A_{t-1}} = \propto_0 + \propto_1 \left(\frac{1}{A_{t-1}}\right) + \beta_1 \left(\frac{S_t}{A_{t-1}}\right) + \beta_2 \left(\frac{\Delta S_t}{A_{t-1}}\right) + \varepsilon_t \qquad (1)$$

where A_{t-1} is the lagged total assets at the end of period *t*, S_t the sales during period t, ΔS_t is the change in sales from period *t-1* to *t*, and ε_t is the error term. *CFO* is not available for most of the private firms in our sample and is therefore calculated with the balance sheet approach even though Hribar and Collins (2002) recognise that it may bias the results in some contexts. For this measure,

the abnormal level (*ACFO*) is calculated by subtracting the normal *CFO*, calculated using estimated coefficients from the corresponding industry-year model, from the actual *CFO*. Thus, the error term represents the abnormal level of *CFO*. *ACFO* is multiplied by negative one so that a positive number is associated with income-increasing REM.

The second REM measure, abnormal production costs, consists of two separate estimates including cost of goods sold (*COGS*) and change in inventory (*ΔINV*). Normal production costs (*PROD* = *COGS* + *ΔINV*) is expressed as a linear function of sales, change in sales, and the one-year lagged change in sales:

$$\frac{PROD_t}{A_{t-1}} = \propto_0 + \propto_1 \left(\frac{1}{A_{t-1}}\right) + \beta_1 \left(\frac{S_t}{A_{t-1}}\right) + \beta_2 \left(\frac{\Delta S_t}{A_{t-1}}\right) + \beta_3 \left(\frac{\Delta S_{t-1}}{A_{t-1}}\right) + \varepsilon_t \quad (2)$$

In the third measure, *DISEXP* is defined as the sum of R&D expenses, advertising expenses, and SG&A expenses. The following regression estimates the normal level of *DISEXP*:

$$\frac{DISEXP_t}{A_{t-1}} = \propto_0 + \propto_1 \left(\frac{1}{A_{t-1}}\right) + \beta_1 \left(\frac{S_{t-1}}{A_{t-1}}\right) + \varepsilon_t \quad (3)$$

Again, the error term represents the abnormal level of *DISEXP* (*ADISEXP*). This measure is multiplied by negative one so that a positive number is associated with income-increasing REM.

In accordance with Cohen *et al*. (2008) and Cohen and Zarowin (2010), we construct three composite measures. First, *REM_1* is the sum of the standardised *APROD* and *ADISEXP*. Second, *REM_2* is the sum of the standardised *ACFO* and *ADISEXP*. Third, we aggregate all three measures into one REM metric, *REM_SUM*, to measure the total effect of REM. Finally, we winsorize all variables at 1% and 99% to control for outliers in the data.

Variable definitions

ACFO	Abnormal cash flow from operations.
ADISEXP	Abnormal discretionary expenses.
ANALYST	Ranked variable for the extent of analyst coverage (0 if no coverage, 1 if below median coverage, 2 if above median coverage).
APROD	Abnormal production costs.
BIGLOSS	Indicator variable for firm-years with big losses (ROA below 10^{th} percentile).
CAPNEED	Percentage change in stock and long-term debt in the following year.
DCAPNEED	Indicator variable for firm-years with large capital need (above median of CAPNEED).
DLEV	Indicator variable for firm-years with high leverage (above median of LEV).
EXPERT	Indicator variable for hiring an industry-expert auditor, defined as the market leader in every two-digit SIC industry group.
GROWTH	Growth in total assets.
INV	Inventory scaled by total assets.
LEV	Financial leverage, total debt divided by total assets.
LOSS	Indicator variable for loss years.
MANOWN	Indicator variable for firms with firm managers as controlling shareholders.
OPCYCLE	Operating cycle, defined as [Inventory/(COGS/365)] + [Receivables/(Sales/365)].
PUBLIC	Indicator variable for public firms.
REM_1	Composite measure of REM (APROD+ADISEXP).
REM_2	Composite measure of REM (ACFO+ADISEXP).
REM_SUM	Composite measure of REM (APROD+ACFO+ADISEXP).
ROE	Return on equity.
SD_ROA	Standard deviation of return on assets for at least three annual observations.
SIZE	Natural logarithm of total assets.
TARGET_1	Indicator variable for firm-years with small earnings (more than 0.5 percent of total assets).

TARGET_2 Indicator variable for firm-years with small earnings increases (more than 0.5 percent of total assets).

Tables

Table 1. Sample formation.

Criteria	Private firms	Public firms
# of firms in Orbis database	177 773	5 007
Non-financial industries	154 616	3 842
Total assets > £10 mill.	19 957	1 405
Available data	11 455	1 050
> 14 obs. per industry	8 652	851
# of firm-years	56 112	5 644

Note: This table reports the sample formation process.

Table 2. Descriptive statistics for sample firms during 2007-2013.

Panel A: Private firms

Variable	Mean	Std.dev.	25 %	Median	75 %
ACFO	0.001	0.102	-0.043	0.008	0.050
ADISEXP	0.009	0.230	-0.075	0.042	0.146
APROD	0.006	0.238	-0.096	0.031	0.144
REM_1	0.014	0.445	-0.159	0.073	0.278
REM_2	0.009	0.254	-0.091	0.042	0.161
REM_SUM	0.014	0.477	-0.179	0.074	0.299
CAPNEED	0.064	0.563	-0.062	0.028	0.153
SIZE	10.521	1.233	9.596	10.239	11.144
ROE	0.208	0.663	0.031	0.140	0.318
LOSS	0.201	0.401	0.000	0.000	0.000
SD_ROA	0.058	0.096	0.012	0.049	0.099
LEV	0.620	0.305	0.403	0.617	0.809
GROWTH	0.060	0.211	-0.038	0.035	0.130
OPCYCLE	131.998	246.116	42.339	80.463	130.543
INV	0.145	0.179	0.004	0.078	0.223

Panel B: Public firms

Variable	Mean	Std.dev.	25 %	Median	75 %
ACFO	0.001	0.092	-0.040	0.006	0.045
ADISEXP	-0.055	0.232	-0.154	-0.006	0.079
APROD	-0.050	0.235	-0.160	-0.015	0.088
REM_1	-0.107	0.451	-0.309	-0.022	0.161
REM_2	-0.054	0.256	-0.168	-0.008	0.099
REM_SUM	-0.105	0.479	-0.322	-0.028	0.184
CAPNEED	0.076	0.426	-0.054	0.035	0.146
SIZE	11.666	1.833	10.163	11.284	13.094
ROE	0.168	0.508	0.036	0.140	0.261
LOSS	0.185	0.388	0.000	0.000	0.000
SD_ROA	0.059	0.089	0.018	0.055	0.100
LEV	0.557	0.246	0.392	0.556	0.707
GROWTH	0.069	0.212	-0.033	0.039	0.128
OPCYCLE	183.898	326.399	55.994	100.038	164.680
INV	0.134	0.169	0.006	0.072	0.198

Notes : This table reports descriptive statistics for private and public firms, respectively. See Appendix for variable definitions.

Table 3. Pearson correlations.

Panel A: Private firms

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. |ACFO|	1.000													
2. |ADISEXP|	0.184 ***	1.000												
3. |APROD|	0.246 ***	0.720 ***	1.000											
4. |REM_1|	0.181 ***	0.907 ***	0.906 ***	1.000										
5. |REM_2|	0.325 ***	0.840 ***	0.794 ***	0.880 ***	1.000									
6. |REM_SUM|	0.287 ***	0.812 ***	0.927 ***	0.945 ***	0.942 ***	1.000								
7. CAPNEED	0.021 ***	0.034 ***	0.039 ***	0.036 ***	0.031 ***	0.037 ***	1.000							
8. SIZE	-0.030 ***	-0.127 ***	-0.119 ***	-0.125 ***	-0.095 ***	-0.110 ***	-0.024 ***	1.000						
9. ROE	0.070 ***	0.039 ***	0.083 ***	0.056 ***	0.054 ***	0.072 ***	0.124 ***	0.001	1.000					
10. LOSS	0.238 ***	0.020 ***	0.009 **	0.008 *	0.034 ***	0.019 ***	-0.066 ***	0.036 ***	-0.223 ***	1.000				
11. SD_ROA	0.071 ***	0.002	0.098 ***	0.038 ***	0.039 ***	0.075 ***	0.084 ***	-0.034 ***	0.315 ***	-0.460 ***	1.000			
12. LEV	0.128 ***	0.112 ***	0.104 ***	0.108 ***	0.106 ***	0.103 ***	0.011 ***	0.061 ***	0.101 ***	0.281 ***	-0.295 ***	1.000		
13. GROWTH	0.128 ***	0.086 ***	0.145 ***	0.117 ***	0.122 ***	0.141 ***	0.056 ***	-0.063 ***	0.086 ***	-0.172 ***	0.174 ***	0.004	1.000	
14. OPCYCLE	-0.048 ***	-0.094 ***	-0.044 ***	-0.069 ***	-0.081 ***	-0.067 ***	-0.019 ***	0.030 ***	-0.037 ***	0.062 ***	-0.065 ***	-0.024 ***	0.010 **	1.000
15. INV	-0.074 ***	-0.016 ***	0.059 ***	0.023 ***	-0.020 ***	0.012 ***	-0.004	-0.104 ***	-0.015 ***	-0.002	-0.015 ***	0.023 ***	-0.021 ***	0.384 ***

Panel B: Public firms

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. |ACFO|	1.000													
2. |ADISEXP|	0.160 ***	1.000												
3. |APROD|	0.171 ***	0.760 ***	1.000											
4. |REM_1|	0.140 ***	0.926 ***	0.922 ***	1.000										
5. |REM_2|	0.309 ***	0.895 ***	0.811 ***	0.903 ***	1.000									
6. |REM_SUM|	0.229 ***	0.864 ***	0.941 ***	0.965 ***	0.945 ***	1.000								
7. CAPNEED	0.055 ***	0.013	0.022	0.019	0.017	0.023 *	1.000							
8. SIZE	-0.059 ***	-0.080 ***	-0.045 ***	-0.058 ***	-0.050 ***	-0.044 ***	-0.001	1.000						
9. ROE	-0.029 **	0.005	0.113 ***	0.074 ***	0.044 ***	0.091 ***	0.018	0.091 ***	1.000					
10. LOSS	0.277 ***	0.016	-0.088 ***	-0.051 ***	-0.006	-0.055 ***	-0.085 ***	-0.074 ***	-0.259 ***	1.000				
11. SD_ROA	-0.051 ***	0.015	0.223 ***	0.135 ***	0.095 ***	0.174 ***	0.078 ***	0.172 ***	0.358 ***	-0.484 ***	1.000			
12. LEV	-0.039 ***	0.076 ***	0.073 ***	0.082 ***	0.051 ***	0.062 ***	-0.008	0.165 ***	0.133 ***	0.036 ***	-0.035 ***	1.000		
13. GROWTH	0.084 ***	0.118 ***	0.165 ***	0.138 ***	0.144 ***	0.157 ***	0.082 ***	-0.012	0.127 ***	-0.217 ***	0.234 ***	-0.015	1.000	
14. OPCYCLE	-0.014	-0.071 ***	-0.056 ***	-0.068 ***	-0.068 ***	-0.065 ***	-0.027 **	-0.082 ***	-0.037 ***	0.073 ***	-0.095 ***	-0.077 ***	-0.014	1.000
15. INV	-0.080 ***	-0.016	0.038 ***	0.014	-0.026 *	0.002	-0.013	-0.161 ***	0.004	-0.024 *	0.015	0.036 ***	-0.068 ***	0.377 ***

Notes: This table reports Pearson correlations for the full sample. See Appendix for variable definitions.

*** Significantly different from zero at the 1% level.

** Significantly different from zero at the 5% level.

* Significantly different from zero at the 10% level.

Table 4. Real earnings management (REM) for private versus public firms.

Panel A: Full sample

Variables	|ACFO|	|ADISEXP|	|APROD|	|REM_1|	|REM_2|	|REM_SUM|
Intercept	0.081 ***	0.363 ***	0.288 ***	0.622 ***	0.321 ***	0.595 ***
PUBLIC	-0.005 ***	0.019 ***	0.016 ***	0.039 ***	0.017 ***	0.036 ***
CAPNEED	0.001 **	0.005 ***	0.004 ***	0.008 ***	0.004 **	0.008 ***
SIZE	-0.003 ***	-0.015 ***	-0.013 ***	-0.026 ***	-0.012 ***	-0.024 ***
ROE	0.006 ***	0.003 **	0.007 ***	0.008 ***	0.005 ***	0.013 ***
LOSS	0.063 ***	0.012 ***	0.029 ***	0.029 ***	0.031 ***	0.060 ***
SD_ROA	0.136 ***	0.002	0.208 ***	0.152 ***	0.099 ***	0.323 ***
LEV	0.019 ***	0.049 ***	0.054 ***	0.098 ***	0.050 ***	0.101 ***
GROWTH	0.045 ***	0.053 ***	0.089 ***	0.138 ***	0.086 ***	0.178 ***
OPCYCLE	0.000 **	0.000 ***	0.000 ***	0.000 ***	0.000 ***	0.000 **
INV	-0.013 ***	-0.006	0.065 ***	0.051 ***	-0.005	0.041 ***
Industry	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
n	61756	61756	61756	61756	61756	61756
Adj. R^2	0.178	0.157	0.147	0.155	0.140	0.151

Panel B: Matched sample based on size, industry, and year

Variables	|ACFO|	|ADISEXP|	|APROD|	|REM_1|	|REM_2|	|REM_SUM|
Intercept	0.082 ***	0.290 ***	0.207 ***	0.459 ***	0.250 ***	0.438 ***
PUBLIC	-0.005 ***	0.017 ***	0.014 ***	0.035 ***	0.015 ***	0.030 ***
CAPNEED	0.004 **	0.007 *	0.004	0.012 *	0.005	0.011
SIZE	-0.003 ***	-0.009 ***	-0.007 ***	-0.014 ***	-0.006 ***	-0.012 ***
ROE	0.006 ***	0.002	0.008 **	0.008	0.004	0.012 *
LOSS	0.059 ***	0.023 ***	0.027 ***	0.040 ***	0.042 ***	0.068 ***
SD_ROA	0.089 ***	0.011	0.285 ***	0.282 ***	0.135 ***	0.452 ***
LEV	0.008 **	0.050 ***	0.059 ***	0.109 ***	0.048 ***	0.105 ***
GROWTH	0.035 ***	0.060 ***	0.079 ***	0.128 ***	0.082 ***	0.163 ***
OPCYCLE	0.000	0.000	0.000	0.000	0.000	0.000
INV	-0.007 *	-0.005	0.062 ***	0.055 ***	-0.001	0.047 **
Industry	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
n	11128	11128	11128	11128	11128	11128
Adj. R^2	0.156	0.150	0.156	0.157	0.135	0.152

Panel C: Matched sample based on propensity score matching

Variables	|ACFO|	|ADISEXP|	|APROD|	|REM_1|	|REM_2|	|REM_SUM|
Intercept	0.096 ***	0.286 ***	0.204 ***	0.452 ***	0.254 ***	0.439 ***
PUBLIC	-0.006 ***	0.014 ***	0.014 ***	0.033 ***	0.012 ***	0.029 ***
CAPNEED	0.002	0.000	-0.004	-0.004	-0.003	-0.008
SIZE	-0.003 ***	-0.008 ***	-0.007 ***	-0.013 ***	-0.005 ***	-0.011 ***
ROE	0.004 *	-0.004	0.008 **	0.007	0.007	0.020 **
LOSS	0.059 ***	0.017 ***	0.025 ***	0.032 ***	0.038 ***	0.063 ***
SD_ROA	0.138 ***	0.055 **	0.342 ***	0.348 ***	0.161 ***	0.518 ***
LEV	-0.005	0.035 ***	0.045 ***	0.078 ***	0.023 ***	0.062 ***
GROWTH	0.041 ***	0.075 ***	0.092 ***	0.159 ***	0.108 ***	0.204 ***
OPCYCLE	0.000	0.000	0.000	0.000	0.000	0.000
INV	-0.010 **	-0.021 **	0.041 ***	0.021	-0.020 *	0.007
Industry	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
n	11290	11290	11290	11290	11290	11290
Adj. R^2	0.152	0.144	0.158	0.152	0.125	0.148

Notes: This table reports the regression results of Equation (1). See Appendix for variable definitions.

*** Significantly different from zero at the 1% level.

** Significantly different from zero at the 5% level.

* Significantly different from zero at the 10% level.

Table 5. Incentive-based analyses for real earnings management (REM).

PANEL A: Earnings target (earnings just above zero)

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
PUBLIC × TARGET_1	0.011 *	0.065 ***	0.073 ***	0.138 ***	0.078 ***	0.153 ***
PUBLIC	0.006 ***	-0.078 ***	-0.068 ***	-0.148 ***	-0.071 ***	-0.140 ***
TARGET_1	0.003	0.040 ***	0.033 ***	0.074 ***	0.039 ***	0.072 ***
n	61756	61756	61756	61756	61756	61756

PANEL B: Earnings target (earnings just above prior year's earnings)

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
PUBLIC × TARGET_2	0.002	0.022 **	0.023 **	0.047 **	0.024 **	0.049 **
PUBLIC	0.006 ***	-0.079 ***	-0.069 ***	-0.150 ***	-0.072 ***	-0.141 ***
TARGET_2	0.015 ***	0.035 ***	0.039 ***	0.074 ***	0.050 ***	0.089 ***
n	61756	61756	61756	61756	61756	61756

PANEL C: Large capital need

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
PUBLIC × DCAPNEED	0.000	-0.012 *	-0.013 **	-0.027 **	-0.011	-0.027 **
PUBLIC	0.006 ***	-0.071 ***	-0.060 ***	-0.132 ***	-0.064 ***	-0.123 ***
DCAPNEED	0.001	0.000	0.002	0.002	0.002	0.005
n	61756	61756	61756	61756	61756	61756

PANEL D: High leverage

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
PUBLIC × DLEV	0.001	0.038 ***	0.031 ***	0.068 ***	0.039 ***	0.070 ***
PUBLIC	0.006 ***	-0.092 ***	-0.078 ***	-0.172 ***	-0.085 ***	-0.164 ***
DLEV	0.011 ***	0.027 ***	0.033 ***	0.061 ***	0.035 ***	0.069 ***
n	61756	61756	61756	61756	61756	61756

PANEL E: Big loss

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
PUBLIC × BIGLOSS	-0.019 ***	-0.008	0.007	-0.002	-0.028 **	-0.017
PUBLIC	0.008 ***	-0.077 ***	-0.068 ***	-0.146 ***	-0.068 ***	-0.136 ***
BIGLOSS	0.006 ***	-0.114 ***	-0.052 ***	-0.170 ***	-0.107 ***	-0.164 ***
n	61756	61756	61756	61756	61756	61756

Notes: This table reports regression results of Equation (2). See Appendix for variable definitions.

*** Significantly different from zero at the 1% level.

** Significantly different from zero at the 5% level.

* Significantly different from zero at the 10% level.

Table 6. Additional test: Impact of analyst coverage among public firms

PANEL A: Earnings target (earnings just above zero) beating and impact of analyst coverage

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
TARGET_1 × ANALYST	-0.016	-0.076 *	-0.054	-0.125	-0.093 **	-0.144 *
TARGET_1	0.016 **	0.086 ***	0.083 ***	0.170 ***	0.101 ***	0.184 ***
ANALYST	-0.005 **	-0.149 ***	-0.128 ***	-0.280 ***	-0.152 ***	-0.281 ***
n	5644	5644	5644	5644	5644	5644

PANEL B: Earnings target (earnings just above prior year's earnings) beating and impact of analyst coverage

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
TARGET_2 × ANALYST	-0.007	0.004	-0.008	-0.009	-0.003	-0.015
TARGET_2	0.018 ***	0.032 ***	0.047 ***	0.083 ***	0.050 ***	0.101 ***
ANALYST	-0.005 *	-0.151 ***	-0.129 ***	-0.282 ***	-0.154 ***	-0.284 ***
n	5644	5644	5644	5644	5644	5644

PANEL C: Large capital need and impact of analyst coverage

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
DCAPNEED × ANALYST	-0.009 **	0.008	0.000	0.008	-0.001	-0.002
DCAPNEED	0.004	-0.010	-0.004	-0.016	-0.006	-0.011
ANALYST	-0.001	-0.155 ***	-0.130 ***	-0.288 ***	-0.154 ***	-0.285 ***
n	5644	5644	5644	5644	5644	5644

PANEL D: High leverage and impact of analyst coverage

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
DLEV × ANALYST	-0.006 **	-0.026 ***	-0.026 ***	-0.050 ***	-0.033 ***	-0.057 ***
DLEV	0.006 *	0.048 ***	0.042 ***	0.091 ***	0.054 ***	0.096 ***
ANALYST	-0.002	-0.081 ***	-0.070 ***	-0.154 ***	-0.081 ***	-0.153 ***
n	5644	5644	5644	5644	5644	5644

PANEL E: Big loss and impact of analyst coverage

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
BIGLOSS × ANALYST	-0.011	-0.033	0.004	-0.038	-0.059 **	-0.056
BIGLOSS	0.001	-0.084 ***	-0.046 ***	-0.132 ***	-0.072 ***	-0.119 ***
ANALYST	-0.004 *	-0.144 ***	-0.128 ***	-0.274 ***	-0.145 ***	-0.274 ***
n	5644	5644	5644	5644	5644	5644

Notes: This table reports regression results of an modified Equation (2), with an incentive variable instead of PUBLIC and ANALYST instead of the incentive variable. See Appendix for variable definitions.

*** Significantly different from zero at the 1% level.

** Significantly different from zero at the 5% level.

* Significantly different from zero at the 10% level.

Table 7. Additional test: Impact of industry-expert auditor among public firms

PANEL A: Earnings target (earnings just above zero) beating and impact of industry expert auditor

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
TARGET_1 × EXPERT	0.009	0.001	-0.010	-0.005	0.013	0.006
TARGET_1	0.011 *	0.092 ***	0.093 ***	0.186 ***	0.101 ***	0.194 ***
EXPERT	-0.002	-0.003	0.002	-0.002	-0.007	-0.005
n	5644	5644	5644	5644	5644	5644

PANEL B: Earnings target (earnings just above prior year's earnings) beating and impact of industry expert auditor

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
TARGET_2 × EXPERT	0.004	0.031 *	0.008	0.034	0.036 *	0.039
TARGET_2	0.014 ***	0.033 ***	0.047 ***	0.083 ***	0.048 ***	0.097 ***
EXPERT	-0.003	-0.006	0.001	-0.005	-0.009	-0.008
n	5644	5644	5644	5644	5644	5644

PANEL C: Large capital need and impact of industry expert auditor

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
DCAPNEED × EXPERT	0.001	-0.002	-0.003	-0.005	-0.003	-0.006
DCAPNEED	0.000	-0.012	-0.008	-0.022	-0.012	-0.021
EXPERT	-0.002	-0.002	0.004	0.001	-0.005	-0.001
n	5644	5644	5644	5644	5644	5644

PANEL D: High leverage and impact of industry expert auditor

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
DLEV × EXPERT	-0.002	-0.007	-0.013	-0.017	-0.008	-0.020
DLEV	0.003	0.044 ***	0.039 ***	0.085 ***	0.046 ***	0.087 ***
EXPERT	-0.001	-0.001	0.008	0.005	-0.003	0.004
n	5644	5644	5644	5644	5644	5644

PANEL E: Big loss and impact of industry expert auditor

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
BIGLOSS × EXPERT	0.016	-0.014	0.018	0.004	-0.005	0.012
BIGLOSS	-0.007	-0.120 ***	-0.069 ***	-0.195 ***	-0.121 ***	-0.192 ***
EXPERT	-0.004	0.000	0.002	0.002	-0.003	-0.002
n	5644	5644	5644	5644	5644	5644

Notes: This table reports regression results of an modified Equation (2), with an incentive variable instead of PUBLIC and EXPERT instead of the incentive variable. See Appendix for variable definitions.

*** Significantly different from zero at the 1% level.

** Significantly different from zero at the 5% level.

* Significantly different from zero at the 10% level.

Table 8. Additional test: Impact of managerial ownership among private firms

PANEL A: Earnings target (earnings just above zero) beating and impact of managerial ownership

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
TARGET_1 × MANOWN	-0.003	-0.029 *	-0.008	-0.037	-0.030 *	-0.036
TARGET_1	0.005 **	0.048 ***	0.037 ***	0.086 ***	0.049 ***	0.086 ***
MANOWN	0.007 ***	0.003	0.007 **	0.009	0.009 ***	0.017 ***
n	48835	48835	48835	48835	48835	48835

PANEL B: Earnings target (earnings just above prior year's earnings) beating and impact of managerial ownership

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
TARGET_2 × MANOWN	-0.005 **	-0.022 **	-0.017 *	-0.043 **	-0.028 ***	-0.049 **
TARGET_2	0.017 ***	0.042 ***	0.044 ***	0.087 ***	0.060 ***	0.105 ***
MANOWN	0.007 ***	0.003	0.007 **	0.011 *	0.010 ***	0.018 ***
n	48835	48835	48835	48835	48835	48835

PANEL C: Large capital need and impact of managerial ownership

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
DCAPNEED × MANOWN	0.002	0.002	0.005	0.008	0.004	0.010
DCAPNEED	0.001	0.002	0.003	0.005	0.005 *	0.009 *
MANOWN	0.005 ***	0.001	0.004	0.004	0.006	0.011
n	48835	48835	48835	48835	48835	48835

PANEL D: High leverage and impact of managerial ownership

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
DLEV × MANOWN	-0.011 ***	-0.011 *	-0.008	-0.019 *	-0.023 ***	-0.032 ***
DLEV	0.015 ***	0.030 ***	0.036 ***	0.068 ***	0.041 ***	0.079 ***
MANOWN	0.012 ***	0.007 *	0.010 ***	0.018 **	0.020 ***	0.031 ***
n	48835	48835	48835	48835	48835	48835

PANEL E: Big loss and impact of managerial ownership

Variables	ACFO	ADISEXP	APROD	REM_1	REM_2	REM_SUM
BIGLOSS × MANOWN	-0.019 ***	0.058 ***	0.022 *	0.085 ***	0.035 ***	0.061 **
BIGLOSS	0.008 ***	-0.123 ***	-0.052 ***	-0.180 ***	-0.114 ***	-0.172 ***
MANOWN	0.008 ***	-0.005	0.004	-0.002	0.004	0.008
n	48835	48835	48835	48835	48835	48835

Notes: This table reports regression results of an modified Equation (2), with an incentive variable instead of PUBLIC and MANOWN instead of the incentive variable. See Appendix for variable definitions.

*** Significantly different from zero at the 1% level.

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* Significantly different from zero at the 10% level.