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Stock market listing status and real earnings management

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ABSTRACT

This study analyzes real earnings management among privately held versus publicly listed firms. Our first finding is that public firms engage in more earnings management through operating activities. When a clear incentive to manage earnings in a specific direction is present we continue to find that public firms manage their earnings more than private firms. We reason that capital market pressure and ownership characteristics drive our results. Additional analyses reveal that public firms employ more real earnings management as a proportion of the total earnings management strategy. Furthermore, we find that mitigating factors of real earnings management have stronger impact in public firms. This study contributes to literature on non-accrual earnings management and to the broader understanding about the private vis-à-vis public firm reporting and operating behavior. Finally, we contribute by identifying an important societal cost of stock market listing, which is the increase in potentially value-destroying real earnings management.

1. Introduction

In this study, we investigate differences between privately held and publicly listed firms regarding the extent of value-destroying real earnings management (hereafter REM), such as cutting R&D or advertising spending to avoid losses. A number of prior studies document that firms employ REM, which affects the cash flow component of earnings, in various settings. For example, researchers find REM in earnings target beating contexts (Roychowdhury, 2006), around seasoned equity offerings (Cohen and Zarowin, 2010), prior to initial public offerings (Alhadab et al., 2015), and for credit rating concerns (Brown et al., 2015). Most prior studies generally focus on public firms while the vast majority of firms globally are, in fact, private. Meanwhile, researchers have investigated the occurrence of an alternative form of earnings management, accrual-based earnings management (hereafter AEM), in both private and public firms. In contrast to REM, the concept of AEM is concerned with managerial discretion over the accrual component of earnings. When comparing the extent of AEM among private versus public firms, Burgstahler et al. (2006) and Hope et al. (2013) find lower financial reporting quality or more absolute AEM among private firms in Europe and the US, respectively. Hope et al. (2013) furthermore show that more AEM occurs among public firms in settings where there is a reduced demand for financial information or in the presence of strong incentives for earnings management. In addition, Givoly et al. (2010) conclude that firms with publicly held equity engage in more AEM than firms with publicly held debt. To date, no study to our knowledge focus on whether private and public firms engage differently in REM. As such, we aim to provide empirical evidence on this matter.

We reason that two major sets of inherent differences between private and public firms lead to differences in REM. First, Graham et al. (2005) note that public firms are subject to capital market pressure, which increases their incentives to engage in REM for earnings target

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beating purposes. In the context of private firms, capital market pressure is negligible and thus, private firms could face weaker incentives to manage earnings. On the other hand, considering the number of financial intermediaries (e.g., venture capital firms, banks, investment and pension funds, and insurance firms) and information intermediaries (e.g., auditors, equity analysts, credit-rating agencies, and financial press) of high quality that are involved in public firms and scrutinize their operations and reporting, public firms might have less flexibility to engage in REM. More exposure to external monitors, such as analysts, also have a documented constraining effect on earnings management (Yu, 2008). In the context of private firms, the role of the intermediaries is different and analyst following is absent, which decreases the external monitoring and increases the possibilities for earnings management. Furthermore, the survey of Graham et al. (2005) conveys that private firms prefer smooth earnings and are willing to sacrifice value to achieve smoothness. One of the most important motivations behind private firms' earnings management is that they are concerned with the perceptions of creditors and want to signal high quality to influence future borrowing (Graham et al., 2005; Mafrolla and D'Amico, 2017).

The second set of differences relates to differences in ownership characteristics. Private firms often have a high level of managerial ownership (i.e., owner-managers) and smaller agency problems than typical public firms, where control and ownership are separated (Jensen and Meckling, 1976). High managerial ownership makes managers' incentives more aligned with those of the owners' and the value-destroying nature of REM will have clear negative consequences for owner-managers, which should reduce their willingness to engage in REM activities in relation to agent-managers (Di Meo et al., 2017). Furthermore, Stein (1989) argues that agent-managers act myopically to create impressions that the firm's profitability is greater than in reality, hoping this will increase the share price. In other words, the capital market pressure discussed above works as a catalyst amplifying this type of opportunistic behavior of agent-managers. Based on these arguments, we would expect public firms who are generally not owned by managers to engage in more REM than private firms. Meanwhile, there is another line of arguments that changes this prediction since private firms primarily report for purposes of taxation and dividend distribution instead of reporting for a broad audience (Ball and Shivakumar, 2005). Thus, the managerial ownership characteristic creates information asymmetries between owner-managers and the tax authorities, which generates tax incentives for REM. Namely, owner-managers are typically interested in maximizing their own wealth, for instance by minimizing tax payments. Coppens and Peek (2005) outline a general tax incentive for earnings management where firms manage book income downwards to decrease taxable income, which results in lower corporate taxes. Based on the general tax incentive, Coppens and Peek (2005) provide evidence that private firms manage earnings more than public firms. With a specific tax incentive, Lin et al. (2014) and Sundvik (2017) show how private firms manage earnings more than public firms in response to an upcoming corporate tax rate cut. These studies are consistent with the notion that the nontax costs of reducing book income is significantly higher for public firms due to capital market pressure (Mills and Newberry, 2001). Auditors may not prevent tax-minimizing behavior because they primarily prevent earnings from being overstated (Nelson et al., 2002). Owner-mangers can also gain wealth by distributing dividends to themselves, and Dierynck et al. (2012) provide evidence of dividend-induced REM in private firms.

Overall, we expect the separate differences and the interplay between these differences to drive REM behavior in private and public firms. However, we are not able to develop a directional hypothesis. Public firms are driven by capital market incentives, but simultaneously fairly constrained by the capital market players. Private firms might be constrained by managerial ownership while they also have incentives arising from borrowing, dividends, and taxation to manage earnings both upwards and downwards, which causes the extent of earnings management to increase. Thus, it remains an empirical issue whether REM is positively or negatively associated with listing status.

To compare the REM activities between private and public firms, we analyze six different measures of abnormal operational activities, primarily relying on the proxies of Roychowdhury (2006) that encompass manipulations in sales strategies, discretionary expenses, and production levels. We study a large sample of firms registered in the UK from 2008 to 2014, controlling for several variables connected with earnings management and financial reporting. Briefly, the results of our empirical tests provide evidence that public firms generally engage in more REM than private firms do. We also find that the incremental difference in REM between public vis-à-vis private firms that slightly avoid losses is positive and repeatedly statistically significant. We interpret these results as evidence that public firms manage earnings through real activities overall and in the expected directions more than private firms. Consistent with Hope et al. (2013), we also provide evidence that the engagement in AEM is more prominent among public firms than among private firms in the UK setting. Next, we construct a ratio of REM in relation to the total earnings management strategy. Interestingly, public firms that report small profits have a higher ratio than loss avoiding private firms. Finally, additional tests reveal that several factors such as managerial ownership and audit quality constrain REM in general and public firm REM in particular. In conclusion, our results suggest that there is a clear association between listing status and the engagement in REM.

We examine UK firms for a number of reasons. First, we argue that the UK offers an excellent research arena to compare private and public firms since several characteristics, such as filing and auditing requirements, are associated with legal form rather than listing status. In contrast to the US regulatory setting, both private and public UK firms are required to disclose their financial statements and only smaller private firms remain unaudited (Minnis and Shroff, 2017). Likewise, private and public firms are subject to the same tax laws (Ball and Shivakumar, 2005). Furthermore, the London Stock Exchange includes even middle-sized firms, which increases the comparability between private and public firms. In addition, Atieh and Hussain (2012) document that dividend payments are much more prevalent among public UK firms than, for instance, among US firms. These UK-specific features among public firms combined with the size-based regulation regime for private firms makes the UK a suitable setting for our research question. Second, Ball et al. (2000) recognize the UK to have low litigation costs, low political involvement in accounting, and firms with mostly private debt. Together, these characteristics provide both private and public firm managers with flexibility to manage earnings. Finally, there is a large number of both private and public firms in the UK which allows for a large-sample investigation, and a single-country study simultaneously gives us a natural control for the legislative environment. Private firm data quality in other large economies, such as the US, is unfortunately poor.

This study contributes to the literature by examining non-accrual earnings management activities in both private and public 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 behavior where prior studies have solely focused on accrual manipulation and financial reporting quality (Burgstahler et al., 2006; Hope et al., 2013). Previously, only survey findings (Ahearne et al., 2016) indicate that public firms have a higher REM propensity than private firms. Our study contributes to this result by providing robust archival evidence. Moreover, our study builds on previous research examining the interplay between AEM and REM (Zang, 2012) by showing that public firm managers are more eager to rely on potentially value-destroying earnings management tactics than managers of private firms. At the same time, we provide evidence that public firms' REM activities are more sensitive to mitigating factors. Finally, we identify an important societal cost of stock market listing, which is the increase in REM. In a related study, Asker et al. (2014) show how listing status affects investment decisions of firms and that managers surrender to stock price pressures at the expense of long-term firm value.

The next section describes our earnings management measures, sample selection, and descriptive statistics. Section 3 provides the main empirical results and Section 4 considers additional tests while the last section concludes.

2. Estimation of earnings management, data and descriptive statistics

2.1. Measuring earnings management

We largely follow Roychowdhury (2006) for the separate measures of REM and Cohen et al. (2008) and Cohen and Zarowin (2010) for the composite measures. We examine the following three REM activities: sales manipulation, managing discretionary expenses, and abnormal production. Sales manipulation is involved with offering more price discounts and lighter credit terms, which lowers the cash flows from operations. Reducing discretionary expenses, such as cutting R&D, will boost reported earnings while an increase in these expenses leads to lower earnings. 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.

Abnormal cash flow from operations is our first measure of REM. Following Roychowdhury (2006), we express normal cash flow from operations (*CFO*) as a linear function of sales and change in sales in the current period:

$$\frac{CFO_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1\left(\frac{1}{A_{i,t-1}}\right) + \beta_1\left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \beta_2\left(\frac{\Delta S_{i,t}}{A_{i,t-1}}\right) + \varepsilon_{i,t} \tag{1}$$

where A_{t-1} is the lagged total assets at the end of period t, S_t is 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 we therefore calculate it with the balance sheet approach even though Hribar and Collins (2002) recognize that it may bias the results in some contexts. For the first REM measure, we calculate the abnormal level (*ACFO*) by subtracting the normal *CFO*, calculated using estimated coefficients from the corresponding model, from the actual *CFO*. Thus, the error term represents the abnormal level.

For the second measure, we define *DISEXP* as the sum of R&D expenses, advertising expenses, and SG&A expenses. The following regression estimates the normal level of *DISEXP* and we use the error term as the abnormal level (*ADISEXP*) arising from REM:

$$\frac{DISEXP_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1\left(\frac{1}{A_{i,t-1}}\right) + \beta_1\left(\frac{S_{i,t-1}}{A_{i,t-1}}\right) + \varepsilon_{i,t} \tag{2}$$

The third REM measure, abnormal production costs (*APROD*), is the error term from the regressions where normal production costs (*PROD* = *COGS* + change in inventory) is expressed as a linear function of sales, change in sales, and the one-year lagged change in sales:

$$\frac{PROD_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1\left(\frac{1}{A_{i,t-1}}\right) + \beta_1\left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \beta_2\left(\frac{\Delta S_{i,t}}{A_{i,t-1}}\right) + \beta_3\left(\frac{\Delta S_{i,t-1}}{A_{i,t-1}}\right) + \varepsilon_{i,t} \tag{3}$$

We estimate these measures with the approach described in Roychowdhury (2006) by running separate regressions (Eqs. (1)–(3)) for each year and industry (2-digit SIC level). All measures are constructed so that a positive figure is associated with income-increasing REM, and vice versa with a negative number. In other words, we multiply *ACFO* and *ADISEXP* by minus one. 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 standardized *APROD* and *ADISEXP*. Second, REM_2 is the sum of the standardized *ACFO* and *ADISEXP*. Third, we aggregate all three measures into one REM metric, REM_{SUM}, to measure the total effect of REM. We winsorize all variables at 1% and 99% to control for outliers in the data.

Furthermore, we include a measure of AEM in order to check whether the results in Hope et al. (2013) hold in a UK setting. Following prior research (Peasnell et al., 2000; Kothari et al., 2005), we estimate discretionary accruals cross-sectionally as a proxy for AEM according to the following regression:

$$\frac{TACC_{i,t}}{A_{i,t-1}} = \beta_0\left(\frac{1}{A_{i,t-1}}\right) + \beta_1\left(\frac{\Delta S_{i,t}}{A_{i,t-1}}\right) + \beta_2\left(\frac{PPE_{i,t}}{A_{i,t-1}}\right) + \beta_3(ROA_{i,t-1}) + \varepsilon_{i,t} \tag{4}$$

Table 1
Sample formation.

Criteria	Private firms	Public firms
Firm-year observations in Orbis 2008–2014	1,383,788	11,977
Total assets > £10 mill	254,121	8347
Non-regulated and non-financial industries	167,168	5365
Available data	90,594	3688

This table reports the sample formation process for our sample of private and public firms.

where $TACC_{i,t}$ is the total accruals at time t for firm i, $PPE_{i,t}$ is the gross property, plant and equipment, and $ROA_{i,t-1}$ is the return on assets. Similarly as with the REM measures, the error term corresponds to the abnormal *TACC*, which we refer to as *AEM*. As a final step, we construct a measure of total earnings management (hereafter *TEM*), which is the sum of standardized REM_{SUM} and *AEM*.

2.2. Data

We collect financial statement data for private and public limited liability firms registered in the UK for the years 2006–2014 using the Orbis database of Bureau van Dijk. The years of analysis comprise 2008–2014. We apply a number of restrictions to our sample. First, we exclude regulated industries and financial institutions (SIC codes 4400–5000 and 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 availability of the required variables, we end up with a sample of 94,282 firm-year observations. Our final sample consists of 90,594 private firm-years and 3688 public firm-years. Table 1 presents the sample formation process.

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. Importantly, the financial statements of larger private firms and all public firms must be audited which also applies for all firms in our sample.[1] 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. Furthermore, UK tax laws treat private and public firms as equal. All in all, we recognize that the UK regulatory environment for private and public firms does not differ in any larger extent. Previous studies comparing private and public firms using UK data have largely investigated other issues than earnings management. For example, Saunders and Steffen (2011) show that private firms face higher borrowing costs. Michaely and Roberts (2012) provide evidence that private firms smooth the stream of dividends less than public firms. Finally, Brav (2009) find that private firms rely almost exclusively on debt financing, in contrast to public firms.

2.3. Control variables

Following prior literature (e.g., Ashbaugh-Skaife et al., 2008; Roychowdhury, 2006; Cohen and Zarowin, 2010; Zang, 2012; Hope et al., 2013), we include numerous control variables which have been shown to be associated with REM and earnings management in general. First, the log of total assets (*SIZE*) and the growth rate of total assets (*GROWTH*) are included to control for possible size and growth effects. Second, we include return on equity (*ROE*), standard deviation of return on assets (*SD_ROA*) and operating cycle (*OPCYCLE*) to decrease the possible relationship between REM measures and performance. Third, we use the variables *ZSCORE* and *LEV* to control for the firms' financial health and debt ratio, because firms' financial health and indebtedness affect the cost of managing earnings through real operating activities (Zang, 2012).[2] Worse health is also associated with higher costs of REM. Moreover, we expect firms with managers as controlling shareholders to engage in less REM. Therefore, we include the variable *MANOWN* to ensure that our results are not only explained by differences in managerial ownership. Since both private and public firms in our sample are audited, we control for audit quality using the industry specialist auditor measure (*ISPEC*) used in Behn et al. (2008). We calculate the measure as the sum of the square root of the total assets of clients that an auditor has in a particular industry divided by the sum of the square root of the total assets of all clients of the auditor.[3] Finally, to control for the trade-off between REM and AEM, we follow Doukakis (2014) and control for REM (AEM) in the regressions when AEM (REM) is the dependent variable.

[1] 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.

[2] The *ZSCORE* is calculated based on Taffler (1983). Firms with computed *ZSCORE* below zero are at risk of failure.

[3] To derive an externally valid industry specialization measure, we use all available UK firms in Orbis to calculate the *ISPEC* variable. For industry classification, we use the 2-digit SIC code. Auditors with fewer than 10 clients per year are regarded as non-specialist (*ISPEC* = 0). Our results are not sensitive to changing the cut-off values to 15, 12, or 8.

Table 2
Descriptive statistics for sample firms during 2008–2014.

Variable	Mean	Std. dev.	25%	Median	75%
Panel A: Private firms (N = 90,594)					
ACFO	0.000	0.125	−0.052	0.006	0.053
ADISEXP	0.006	0.260	−0.089	0.048	0.158
APROD	0.006	0.276	−0.112	0.033	0.157
REM_1	0.006	0.490	−0.192	0.074	0.294
REM_2	0.002	0.270	−0.113	0.040	0.166
REM_{SUM}	0.003	0.519	−0.219	0.069	0.309
AEM	−0.008	0.121	−0.061	−0.007	0.039
TEM	−0.006	0.545	−0.252	0.058	0.315
SIZE	10.468	1.145	9.636	10.166	11.018
ROE	0.232	0.770	0.040	0.163	0.358
LOSS	0.244	0.352	0.000	0.000	0.500
SD_ROA	0.092	1.064	0.024	0.046	0.085
LEV	0.726	0.500	0.418	0.651	0.900
GROWTH	0.093	0.313	−0.046	0.044	0.168
OPCYCLE	118.476	158.289	45.275	83.750	134.804
INV	0.145	0.177	0.005	0.077	0.220
ZSCORE	1.277	18.651	−4.007	0.977	7.636
MANOWN	0.166	0.372	0.000	0.000	0.000
ISPEC	0.031	0.061	0.000	0.009	0.029
Panel B: Public firms (N = 3688)					
ACFO	0.004	0.129	−0.058	−0.005	0.044
ADISEXP	−0.148	0.270	−0.265	−0.089	0.024
APROD	−0.115	0.265	−0.238	−0.078	0.042
REM_1	−0.270	0.489	−0.496	−0.182	0.035
REM_2	−0.146	0.283	−0.289	−0.098	0.030
REM_{SUM}	−0.268	0.523	−0.524	−0.180	0.050
AEM	−0.011	0.092	−0.047	−0.004	0.033
TEM	−0.279	0.543	−0.556	−0.191	0.064
SIZE	12.200	2.017	10.608	11.821	13.634
ROE	0.113	0.652	0.017	0.138	0.254
LOSS	0.276	0.364	0.000	0.000	0.500
SD_ROA	0.093	0.228	0.024	0.042	0.090
LEV	0.559	0.332	0.356	0.524	0.696
GROWTH	0.094	0.323	−0.044	0.037	0.148
OPCYCLE	156.853	177.963	62.640	112.910	176.452
INV	0.107	0.128	0.012	0.065	0.157
ZSCORE	3.869	33.422	−1.190	3.394	9.210
MANOWN	0.018	0.132	0.000	0.000	0.000
ISPEC	0.026	0.044	0.004	0.009	0.016

This table reports descriptive statistics for private firms and public firms, respectively. All the variables are defined in Appendix A.

2.4. Descriptive statistics

Table 2 reports descriptive statistics for the whole sample period of the main variables used in this study. The descriptive statistics for the private and public firms are shown in Panels A and B, respectively. In general, the mean and median values of the control variables for the private and public firms are comparable. We mainly observe differences in the control variables measuring firm size (*SIZE*), profitability (*ROE*), leverage (*LEV*), and managerial ownership (*MANOWN*). More closely, Table 2 shows that public firms are larger, less profitable, less leveraged, and have a lower degree of managerial ownership. These numbers support our argument of innate differences between private and public firms. Regarding the signed earnings management variables, Panel A of Table 2 reports mean and median values close to zero for both the REM variables and the AEM variable. However, the mean and median REM variables are considerably different from zero for the public firms in Panel B of Table 2. The standard deviations are fairly large (e.g., 0.489 for REM_1) however corresponding to those reported in Sohn (2016). These values indicate that REM practices via the various combinations of the individual measures vary widely across firms. Here, it is important to note that REM measures may indicate both opportunistic activities as well as prudent business decisions (Vorst, 2016) and that negative averages cannot exclusively be attributed to REM.

Table 3 reports Pearson correlations. The upper-triangular part reports the correlations for the private firms and the lower-triangular part reports the correlations for the public firms. As expected, the individual REM measures are highly correlated with the composite measures. All REM measures are also significantly correlated with the AEM measure. For private firms, the correlations are significant between firm size and all REM measures except *ADISEXP* and REM_2. Meanwhile, public firm size is not as correlated with the earnings management measures in our sample. In summary, 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. Because the

Table 3
Pearson correlation matrix.

	ACFO	*ADISEXP*	*APROD*	REM_1	REM_2	REM_{SUM}	*AEM*	*TEM*	*SIZE*
ACFO		−0.085***	0.329***	0.142***	0.359***	0.360***	0.054***	0.268***	−0.021***
ADISEXP	−0.078***		0.752***	0.931***	0.896***	0.858***	0.042***	0.181***	0.004
APROD	0.381***	0.735***		0.939***	0.847***	0.960***	0.151***	0.337***	0.038***
REM_1	0.164***	0.932***	0.929***		0.932***	0.974***	0.106***	0.278***	0.025***
REM_2	0.370***	0.895***	0.852***	0.941***		0.961***	0.063***	0.282***	−0.004
REM_{SUM}	0.392***	0.852***	0.957***	0.971***	0.966***		0.113***	0.322***	0.018***
AEM	−0.004	0.171***	0.092***	0.147***	0.159***	0.135***		0.578***	0.019***
TEM	0.256***	0.309***	0.311***	0.333***	0.398***	0.371***	0.456***		0.013***
SIZE	−0.255***	0.143***	−0.027	0.065***	0.018	−0.003	0.046***	0.005	
ROE	−0.287***	0.027*	−0.175***	−0.080***	−0.104***	−0.143***	0.125***	0.034**	0.176***
LOSS	0.569***	−0.107***	0.223***	0.061***	0.155***	0.194***	−0.154***	−0.010	−0.328***
SD_ROA	0.264***	−0.187***	0.073***	−0.067***	−0.059***	0.002	−0.116***	−0.033**	−0.236***
LEV	−0.018	−0.175***	−0.087***	−0.144***	−0.167***	−0.137***	0.092***	−0.053***	0.199***
GROWTH	−0.176***	−0.140***	−0.062***	−0.106***	−0.201***	−0.143***	0.255***	−0.127***	0.021
OPCYCLE	0.086***	−0.095***	−0.012	−0.062***	−0.049***	−0.037**	0.112***	0.059***	−0.094***
INV	−0.043***	0.002	−0.021	−0.014	−0.020	−0.022	0.038**	0.029*	0.026
ZSCORE	−0.515***	0.148***	−0.170***	−0.009	−0.090***	−0.134***	0.189***	−0.013	0.127***
MANOWN	−0.007	0.058***	0.057***	0.061***	0.051***	0.058***	0.005	0.008	−0.041**
ISPEC	−0.051***	−0.005	−0.025	−0.014	−0.027*	−0.024	0.002	−0.017	0.269***

	ROE	*LOSS*	*SD_ROA*	*LEV*	*GROWTH*	*OPCYCLE*	*INV*	*ZSCORE*	*MANOWN*	*ISPEC*
ACFO	−0.180***	0.471***	0.023***	0.264***	−0.145***	0.033***	0.063***	−0.410***	−0.017***	−0.002
ADISEXP	0.008**	−0.123***	−0.008**	−0.193***	−0.129***	−0.006*	0.007**	0.082***	0.021***	−0.010***
APROD	−0.082***	0.094***	0.011***	0.062***	−0.011***	0.027***	0.079***	−0.133***	0.006*	0.003
REM_1	−0.042***	−0.009***	0.002	−0.063***	−0.069***	0.011***	0.044***	−0.032***	0.012***	−0.001
REM_2	−0.073***	0.094***	0.001	−0.063***	−0.183***	0.010***	0.034***	−0.105***	0.012***	−0.010***
REM_{SUM}	−0.083***	0.097***	0.006*	−0.000	−0.100***	0.018***	0.058***	−0.123***	0.008**	−0.003
AEM	−0.010***	−0.045***	−0.010***	0.106***	0.239***	0.159***	0.084***	0.003	0.008**	−0.000
TEM	−0.058***	0.027***	−0.003	0.050***	0.039***	0.104***	0.057***	−0.079***	0.002	−0.005
SIZE	−0.028***	−0.002	−0.029***	−0.010***	0.047***	0.030***	−0.071***	−0.066***	−0.146***	0.168***
ROE		−0.167***	0.010***	0.079***	0.065***	−0.033***	−0.008**	0.041***	0.001	−0.003
LOSS	−0.287***		0.045***	0.305***	−0.096***	0.055***	−0.018***	−0.377***	−0.070***	0.040***
SD_ROA	−0.134***	0.293***		0.035***	0.003	−0.008**	−0.015***	−0.018***	−0.012***	0.003
LEV	0.140***	−0.093***	0.150***		0.532***	−0.013***	−0.027***	−0.494***	−0.040***	0.025***
GROWTH	0.091***	−0.125***	−0.036**	0.411***		0.024***	−0.036***	0.006*	−0.008***	0.003
OPCYCLE	−0.038**	0.064***	0.066***	−0.127***	0.054***		0.468***	−0.029***	0.031***	−0.036***
INV	0.053***	−0.062***	−0.077***	−0.002	−0.081***	0.321***		0.013***	0.086***	−0.044***
ZSCORE	0.254***	−0.393***	−0.284***	−0.202***	0.241***	0.066***	0.039**		0.036***	−0.040***
MANOWN	−0.016	0.027*	0.002	−0.040**	−0.015	−0.001	−0.016	0.011		−0.104***
ISPEC	0.062***	−0.109***	−0.021	0.105***	0.031**	−0.010	0.049***	−0.002***	−0.024	

This table reports Pearson correlations for the Private firms in the upper-triangular part of the matrix and for the Public firms in the lower-triangular part of the matrix. All the variables are defined in Appendix A.

* Significant at the 10% level (two-tailed).
** Significant at the 5% level (two-tailed).
*** Significant at the 1% level (two-tailed).

Table 4
Earnings management for private versus public firms.

	(1) $\|ACFO\|$	(2) $\|ADISEXP\|$	(3) $\|APROD\|$	(4) $\|REM_1\|$	(5) $\|REM_2\|$	(6) $\|REM_{SUM}\|$	(7) $\|AEM\|$	(8) $\|TEM\|$
PUBLIC	**0.008*****	**0.077*****	**0.055*****	**0.128*****	**0.071*****	**0.124*****	**−0.006*****	**0.123*****
	(4.95)	**(20.48)**	**(14.89)**	**(18.53)**	**(18.61)**	**(17.11)**	**(−4.55)**	**(16.69)**
SIZE	−0.009***	−0.023***	−0.019***	−0.035***	−0.018***	−0.035***	−0.009***	−0.038***
	(−31.96)	(−45.54)	(−32.83)	(−38.06)	(−36.02)	(−35.25)	(−34.84)	(−38.13)
ROE	0.009***	0.002	0.012***	0.010***	0.006***	0.018***	0.000	0.018***
	(13.58)	(1.58)	(9.45)	(5.22)	(6.17)	(8.96)	(0.74)	(8.63)
LOSS	0.065***	0.009***	0.001	−0.002	0.015***	0.008**	0.008***	0.011***
	(58.90)	(4.36)	(0.35)	(−0.56)	(7.62)	(2.12)	(7.85)	(2.75)
SD_ROA	0.003*	0.004***	0.004***	0.005***	0.003***	0.005***	0.001	0.005***
	(1.65)	(2.78)	(3.49)	(4.35)	(2.93)	(4.50)	(1.50)	(3.67)
LEV	0.033***	0.068***	0.074***	0.110***	0.048***	0.104***	0.030***	0.119***
	(20.92)	(25.46)	(25.98)	(24.54)	(21.06)	(22.92)	(25.59)	(25.72)
GROWTH	0.032***	0.033***	0.068***	0.069***	0.049***	0.093***	0.039***	0.127***
	(15.28)	(9.04)	(16.94)	(11.20)	(15.20)	(14.38)	(21.42)	(19.10)
OPCYCLE	−0.000	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	0.000***	−0.000***
	(−1.58)	(−12.06)	(−13.01)	(−13.71)	(−13.34)	(−13.66)	(4.42)	(−8.07)
INV	−0.032***	0.002	0.093***	0.077***	0.005	0.068***	0.055***	0.136***
	(−15.53)	(0.42)	(18.13)	(9.67)	(1.12)	(8.13)	(19.75)	(15.09)
ZSCORE	0.001***	0.000***	0.001***	0.001***	0.000***	0.001***	0.000**	0.001***
	(20.60)	(7.10)	(17.66)	(11.53)	(8.12)	(14.60)	(2.26)	(14.34)
MANOWN	−0.010***	−0.011***	−0.013***	−0.022***	−0.015***	−0.027***	−0.006***	−0.034***
	(−14.12)	(−7.45)	(−7.14)	(−7.15)	(−9.40)	(−8.48)	(−7.70)	(−10.07)
ISPEC	−0.004	−0.024**	−0.029**	−0.056***	−0.022**	−0.061***	−0.017***	−0.077***
	(−1.06)	(−2.36)	(−2.19)	(−2.60)	(−2.10)	(−2.73)	(−2.65)	(−3.29)
$EM_{CONTROL}$	0.112***	0.177***	0.307***	0.326***	0.203***	0.369***	0.022***	
	(25.53)	(21.68)	(30.89)	(21.87)	(25.83)	(23.38)	(23.16)	
CONSTANT	0.118***	0.332***	0.292***	0.576***	0.308***	0.593***	0.111***	0.646***
	(29.23)	(40.74)	(30.85)	(35.52)	(35.66)	(33.84)	(28.06)	(34.72)
Industry and year FE	YES	YES	YES	YES	YES	YES	YES	YES
N	94,282	94,282	94,282	94,282	94,282	94,282	94,282	94,282
Adj. R-sq	0.201	0.187	0.171	0.161	0.157	0.150	0.156	0.135

This table reports the OLS regression results of a dummy for public firms (*PUBLIC*) on absolute earnings management proxies. The *t*-statistics (in parentheses) are based on White (1980) corrected standard errors. All the variables are defined in Appendix A.

* Significant at the 10% level (two-tailed).

** Significant at the 5% level (two-tailed).

*** Significant at the 1% level (two-tailed).

correlations do not control for differences in firm characteristics, we next analyze a multivariate setting.

3. Regression models and results

3.1. Real earnings management for private versus public firms

We analyze the overall difference in earnings management between private and public firms by employing the following Eq. (5):

$$|EM_{i,t}| = \alpha_0 + \beta_1 PUBLIC_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 ROE_{i,t} + \beta_4 LOSS_{i,t} + \beta_5 SD\_ROA_{i,t} + \beta_6 LEV_{i,t} + \beta_7 GROWTH_{i,t} + \beta_8 OPCYCLE_{i,t} + \beta_9 INV_{i,t} + \beta_{10} ZSCORE_{i,t} + \beta_{11} MANOWN_{i,t} + \beta_{12} ISPEC_{i,t} + \beta_{13} EM_{CONTROLi,t} + \varepsilon_{i,t} \quad (5)$$

where the dependent variable is one of our absolute measures of earnings management (*EM*). Our main focus is on the six measures of REM (*ACFO*, *ADISEXP*, *APROD*, REM_1, REM_2, REM_{SUM}). In addition, we also consider *AEM* and *TEM* as dependent variables. Researchers commonly use absolute *AEM* as a proxy for the financial reporting quality (e.g., Hope et al., 2013). Absolute measures of REM have also occurred in the prior literature and this setup allows us to observe the differences in the extent of REM when there are no presumptions about the direction of earnings management (e.g., Kim and Sohn, 2013; Francis et al., 2016; Sohn, 2016). The independent variable of main interest is *PUBLIC*, which indicates whether a firm is publicly listed and β_1 represents the difference in earnings management between private and public firms. Control variables are outlined in Section 2.3 and we estimate the models with industry and year fixed effects.

Table 4 reports the regression results of Eq. (5). The coefficients on the *PUBLIC* variable is positive and statistically significant in all REM instances, which indicates that public firms engage in more REM than private firms overall. Similarly, the coefficient is significantly negative in Column (7), which indicates that public firms have higher financial reporting quality than private firms overall, consistent with the view of Hope et al. (2013) and Burgstahler et al. (2006). In Column (8), the coefficient for *PUBLIC* is also positive and statistically significant, which combined with the other results suggest that REM is dominant in the total earnings

Table 5
Earnings management for private versus public firms (matched sample).

	(1) $\|ACFO\|$	(2) $\|ADISEXP\|$	(3) $\|APROD\|$	(4) $\|REM_1\|$	(5) $\|REM_2\|$	(6) $\|REM_{SUM}\|$	(7) $\|AEM\|$	(8) $\|TEM\|$
PUBLIC	**0.001**	**0.058*****	**0.039*****	**0.098*****	**0.056*****	**0.094*****	**−0.008*****	**0.094*****
	(0.27)	**(10.85)**	**(7.00)**	**(9.75)**	**(10.40)**	**(8.92)**	**(−3.70)**	**(8.63)**
SIZE	−0.007***	−0.015***	−0.012***	−0.023***	−0.011***	−0.022***	−0.007***	−0.027***
	(−8.65)	(−10.18)	(−7.32)	(−8.09)	(−7.28)	(−7.18)	(−11.36)	(−8.75)
ROE	0.004*	0.001	0.017***	0.013*	0.009**	0.025***	−0.004**	0.021***
	(1.66)	(0.18)	(3.83)	(1.88)	(2.45)	(3.31)	(−2.51)	(2.68)
LOSS	0.061***	0.013*	−0.021***	−0.019	−0.007	−0.034**	0.013***	−0.031**
	(15.72)	(1.68)	(−2.86)	(−1.44)	(−1.05)	(−2.46)	(3.97)	(−2.22)
SD_ROA	0.102***	0.141***	0.083***	0.106***	0.081***	0.070*	0.052***	0.104**
	(6.65)	(6.59)	(4.42)	(3.04)	(4.49)	(1.84)	(4.35)	(2.44)
LEV	−0.004	0.052***	0.075***	0.121***	0.047***	0.115***	0.013***	0.105***
	(−0.77)	(5.04)	(7.36)	(7.26)	(5.53)	(6.73)	(2.96)	(6.45)
GROWTH	0.053***	0.047***	0.052***	0.066***	0.050***	0.083***	0.032***	0.105***
	(7.78)	(3.43)	(4.21)	(3.16)	(4.37)	(3.78)	(5.63)	(4.89)
OPCYCLE	0.000*	0.000**	−0.000	0.000	0.000	0.000	0.000	0.000
	(1.83)	(1.97)	(−0.39)	(1.24)	(1.44)	(0.98)	(0.97)	(0.52)
INV	−0.042***	−0.044**	0.037*	−0.005	−0.053***	−0.036	0.066***	0.053
	(−4.58)	(−2.40)	(1.87)	(−0.15)	(−2.89)	(−0.99)	(6.17)	(1.51)
ZSCORE	0.000	−0.000	0.001***	0.001***	0.000	0.001***	−0.000***	0.000
	(0.33)	(−1.41)	(5.75)	(3.89)	(1.29)	(5.06)	(−3.23)	(1.46)
MANOWN	−0.005	−0.027***	−0.024***	−0.052***	−0.033***	−0.061***	−0.002	−0.065***
	(−1.34)	(−3.63)	(−2.82)	(−3.67)	(−4.47)	(−4.09)	(−0.52)	(−4.10)
ISPEC	0.004	−0.006	−0.004	−0.014	−0.009	−0.013	−0.001	−0.019
	(1.23)	(−1.08)	(−0.68)	(−1.25)	(−1.51)	(−1.07)	(−0.59)	(−1.62)
$EM_{CONTROL}$	0.124***	0.218***	0.301***	0.371***	0.230***	0.414***	0.017***	
	(6.51)	(6.23)	(7.76)	(5.87)	(6.64)	(6.18)	(6.14)	
CONSTANT	0.108***	0.226***	0.150***	0.312***	0.186***	0.320***	0.109***	0.423***
	(9.69)	(8.71)	(5.77)	(6.26)	(6.66)	(6.02)	(12.65)	(8.11)
Industry and year FE	YES	YES	YES	YES	YES	YES	YES	YES
N	7092	7092	7092	7092	7092	7092	7092	7092
Adj. R-sq	0.222	0.189	0.158	0.154	0.142	0.138	0.159	0.120

This table reports the OLS regression results of a dummy for public firms (*PUBLIC*) on absolute earnings management proxies with a propensity score matched sample. The *t*-statistics (in parentheses) are based on White (1980) corrected standard errors. All the variables are defined in Appendix A.

* Significant at the 10% level (two-tailed).

** Significant at the 5% level (two-tailed).

*** Significant at the 1% level (two-tailed).

management strategy of public firms. The sign of the control variables such as *SIZE* and *LEV* are negative and positive, respectively, as expected in these regressions. Interestingly, the results in Table 4 indicate that firms with higher levels of managerial ownership are associated with less overall REM and AEM. The coefficients on *ISPEC* show that auditor industry specialization constrains earnings management, which is consistent with other studies suggesting that earnings management has a negative relation with audit quality (Hope et al., 2013) and recent studies proposing that auditors are concerned with REM (Kim and Park, 2014; Commerford et al., 2016; Greiner et al., 2017).

In an ideal world, we could solely rely on the full sample approach. However, private and public firms differ in various attributes, such as size, performance, leverage and growth. We use Propensity score matching (PSM) to mitigate the heterogeneity problem. 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. An advantage with the matching procedure is that it does not impose linear dependence between control variables and the earnings management measures. Furthermore, Cohen et al. (2016) suggest the use of performance-matched REM measures to improve the validity. The descriptive statistics of the matched private firms (unreported) reveal that these private firms are closer to the public firms in terms of size, profitability, and leverage than the full sample of private firms presented in Table 2. However, the differences for these variables between the matched private and public firm are still statistically significant. Interestingly we observe that *GROWTH* is low for the matched sample, which indicates that these larger private firms are more stable and less growing than the public firms. Table 5 reports the regression results of Eq. (5) using the PSM-based matched sample. We find that the significance of the coefficient on *PUBLIC* decreases with this setup. However, the coefficient is insignificant only in the case of *ACFO* in Column (1). Taken together, we consider the full sample findings robust to a matched sample approach.

During our sample time period, very few private firms go public. Thus, we are not able to provide direct causal evidence that the extent of earnings management changes when the listing status changes. However, we follow prior research (Ball and Shivakumar, 2005; Hope et al., 2013) by applying the Heckman procedure to control for potential endogeneity issues arising from the fact that firms, to some extent, may choose their listing status. In a first-stage probit model, we include size, long-term leverage, capital need (percentage change in common stock, preferred stock, and long-term debt in year $t + 1$), sales growth, and return on assets as

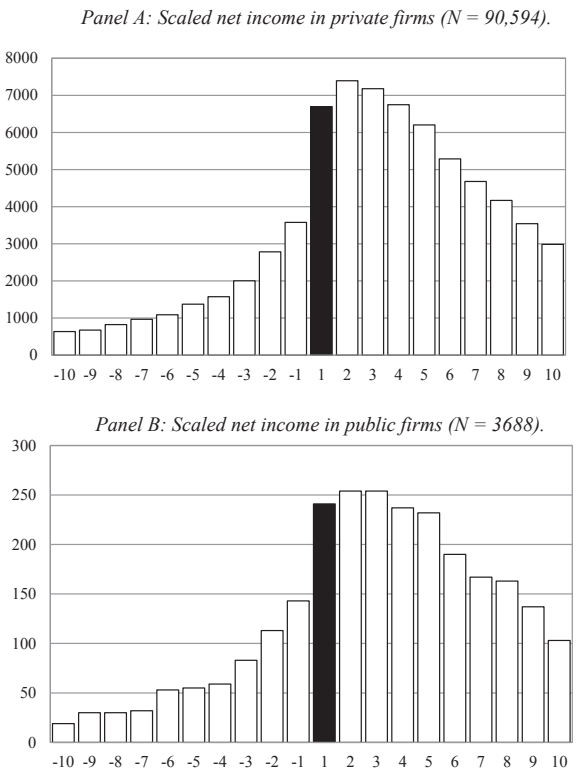

Fig. 1. The empirical distributions of net income scaled by total assets in private and public firms. The histograms are constructed with widths of 0.01 and truncated to the 10th interval on both sides. *Panel A: Scaled net income in private firms (N = 90,594). Panel B: Scaled net income in public firms (N = 3688).*

explanatory variables for the *PUBLIC* variable. While the sample size is somewhat reduced with this setup, all variables in the first-stage regression are significant at the 1 percent level.[4] For the second stage, we repeat the Eq. (5) regression including the inverse Mills ratio as an additional control variable. In the (unreported) results, we observe statistically significant coefficients on the inverse Mills ratios, justifying the endogeneity concerns. However, our control for endogeneity has little effect on the previous findings. For example, the standard OLS coefficient on *PUBLIC* in Column (3) of Table 4 is 0.055 (t = 14.89) is similar to the coefficient of 0.062 (t = 16.98) when endogeneity is controlled for with the full sample.

3.2. Real earnings management in private versus public firms with an incentive

With the evidence that public firms engage in more absolute earnings management, we continue to examine the use of earnings management with an underlying incentive. For this purpose, we analyze the incentive of meeting or beating the zero earnings target. Managers of both private and public firms have motives to meet the zero earnings target since stakeholders often implement heuristic cut-offs to determine the performance of a firm (Burgstahler and Dichev, 1997). In order to provide further justification for our analyses, we first present graphical evidence that both private and public sample firms avoid reporting losses. In Fig. 1, we group firm-years into intervals based on net income scaled by total assets following Coppens and Peek (2005). We construct the histograms with widths of 0.01 consistent with Gunny (2010) and truncate them to the 10th interval on both sides of zero. Similarly as in Gore et al. (2007), we observe a distinct discontinuity at zero for public as well as for private firms, suggesting that firms with small profits have managed their earnings to avoid reporting losses. For the following analyses, we create an indicator variable *BENCH* coded 1 for the firm-years in Interval 1 to the immediate right of zero, and 0 otherwise. Furthermore, we use the centered asymmetry measure proposed by Glaum et al. (2004) to assess the discontinuity in the distributions.[5] For our sample, the measures for the two intervals

[4] The first stage has a pseudo R^2 of 0.20 and all variables have expected signs. For example, firm size and capital need is positively related to the *PUBLIC* variable.

[5] The centered asymmetry measure of Glaum et al. (2004) is defined as $A = (n_r - n_l)/n_{rl}$ where n_r is the number of observations in the interval directly to the right of zero; n_l is the number of observations in the interval directly to the left of zero; and n_{rl} is the number of observations in both intervals. A can take values between -1 and 1 where a higher absolute value indicates a higher level of discontinuity. Further, ΔA is defined as the estimated standard deviation of A to account for measurement error of A. The measure is significant, when the centered measure of asymmetry is at least double to its standard deviation.

Table 6
Regression results on the effect of private versus public firms just meeting earnings benchmarks on earnings management.

	(1) *ACFO*	(2) *ADISEXP*	(3) *APROD*	(4) *REM$_1$*	(5) *REM$_2$*	(6) *REM$_{SUM}$*	(7) *AEM*	(8) *TEM*
PUBLIC	0.013***	−0.171***	−0.136***	−0.295***	−0.153***	−0.289***	−0.006***	−0.293***
	(7.02)	(−35.58)	(−26.14)	(−32.06)	(−29.24)	(−29.77)	(−3.16)	(−29.48)
BENCH	0.042***	0.029***	0.061***	0.090***	0.072***	0.130***	0.006***	0.137***
	(31.71)	(9.41)	(15.62)	(14.42)	(22.64)	(20.44)	(3.65)	(20.49)
PUBLIC* × *BENCH	**−0.008**	**0.037****	**0.035***	**0.074****	**0.033***	**0.069****	**0.015****	**0.076****
	(−0.98)	**(2.09)**	**(1.95)**	**(2.22)**	**(1.75)**	**(1.97)**	**(2.12)**	**(2.04)**
SIZE	−0.002***	0.004***	0.012***	0.014***	0.000	0.010***	0.001*	0.013***
	(−6.44)	(4.85)	(13.33)	(9.43)	(0.06)	(6.79)	(1.74)	(8.56)
ROE	−0.020***	0.004**	−0.028***	−0.031***	−0.021***	−0.050***	−0.003***	−0.051***
	(−45.36)	(2.41)	(−14.11)	(−10.60)	(−13.82)	(−16.14)	(−5.01)	(−16.33)
LOSS	0.113***	−0.069***	0.036***	−0.042***	0.050***	0.085***	−0.011***	0.066***
	(104.23)	(−23.14)	(9.57)	(−7.44)	(16.96)	(14.48)	(−7.81)	(10.85)
SD_ROA	0.000	−0.000	0.003*	0.002	−0.000	0.002	−0.001*	0.001
	(0.82)	(−0.08)	(1.75)	(0.75)	(−0.10)	(0.82)	(−1.71)	(0.37)
LEV	0.046***	−0.078***	0.001	−0.003*	−0.001	−0.002*	0.001	−0.003***
	(45.13)	(−20.73)	(0.60)	(−1.79)	(−1.12)	(−1.71)	(0.40)	(−2.72)
GROWTH	−0.081***	−0.057***	0.000	0.001	−0.001	0.000	0.100***	0.001
	(−58.06)	(−11.30)	(0.24)	(1.01)	(−1.36)	(0.07)	(36.68)	(1.41)
OPCYCLE	−0.000***	−0.000***	0.000	−0.000***	−0.000	−0.000	0.000***	0.000
	(−2.66)	(−3.27)	(0.74)	(−6.35)	(−1.13)	(−0.26)	(29.36)	(1.57)
INV	0.039***	0.032***	0.177***	0.223***	0.066***	0.218***	0.028***	0.285***
	(15.75)	(5.21)	(17.55)	(17.74)	(11.03)	(16.28)	(7.33)	(18.66)
ZSCORE	−0.001***	−0.000***	−0.002***	−0.001***	−0.001***	−0.003***	−0.000	−0.003***
	(−63.38)	(−4.16)	(−25.14)	(−11.42)	(−23.75)	(−30.21)	(−0.56)	(−29.06)
MANOWN	0.003***	0.009***	0.013***	0.020***	0.013***	0.024***	−0.000	0.024***
	(3.88)	(4.22)	(4.32)	(4.34)	(5.57)	(4.81)	(−0.05)	(4.72)
ISPEC	−0.007***	−0.004*	−0.008***	−0.011**	−0.011***	−0.017***	−0.002**	−0.021***
	(−7.61)	(−1.93)	(−2.73)	(−2.33)	(−4.22)	(−3.44)	(−2.06)	(−4.12)
EM$_{CONTROL}$	−0.014***	0.038***	0.177***	0.068***	−0.004	0.055**	−0.014***	
	(−3.58)	(3.18)	(8.78)	(2.81)	(−0.25)	(2.17)	(−9.91)	
CONSTANT	−0.021***	0.035***	−0.148***	−0.138***	−0.015	−0.135***	−0.034***	−0.169***
	(−3.95)	(2.87)	(−10.02)	(−5.54)	(−1.11)	(−5.12)	(−6.36)	(−6.15)
Industry and year FE	YES	YES	YES	YES	YES	YES	YES	YES
N	94,282	94,282	94,282	94,282	94,282	94,282	94,282	94,282
Adj. R-sq	0.349	0.060	0.043	0.022	0.038	0.043	0.091	0.043

This table reports the OLS regression results of the interaction between a dummy for public firms (*PUBLIC*) and a dummy for firms with a small profit (*BENCH*) on signed earnings management proxies. The *t*-statistics (in parentheses) are based on White (1980) corrected standard errors. All the variables are defined in Appendix A.

* Significant at the 10% level (two-tailed).
** Significant at the 5% level (two-tailed).
*** Significant at the 1% level (two-tailed).

around zero clearly exceed two standard deviations which indicates that private as well as public firms avoid small losses at a statistically significant level (for private firms, $A = 0.30$ and $\Delta A = 0.009$, and for public firms, $A = 0.26$ and $\Delta A = 0.049$). Furthermore, the centered measure of asymmetry is also significantly higher for private firms than for public firms.

Next, we employ the following Eq. (6) to test whether firm-years with small profits are associated with income-increasing earnings management:

$$EM_{i,t} = \alpha_0 + \beta_1 PUBLIC_{i,t} + \beta_2 BENCH_{i,t} + \beta_3 PUBLIC_{i,t} \times BENCH_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 ROE_{i,t} + \beta_6 LOSS_{i,t} + \beta_7 SD\_ROA_{i,t} + \beta_8 LEV_{i,t} + \beta_9 GROWTH_{i,t} + \beta_{10} OPCYCLE_{i,t} + \beta_{11} INV_{i,t} + \beta_{12} ZSCORE_{i,t} + \beta_{13} MANOWN_{i,t} + \beta_{14} ISPEC_{i,t} + \beta_{15} EM_{CONTROLi,t} + \varepsilon_{i,t} \quad (6)$$

where we use a signed dependent variable to capture the direction of earnings management. Furthermore, we now include the public firm variable both alone and in a two-way interaction term (*PUBLIC* × *BENCH*). Control variables are outlined in Section 2.3 and we estimate the models with industry and year fixed effects. Table 6 reports the regression coefficients from Eq. (6). While our focus is on the REM measures shown in Columns (1–6), we continue to investigate eight earnings management measures. Column (8) investigates the use of both REM and AEM. The positive coefficients on the *BENCH* variables reveal that REM is associated with meeting or beating the zero earnings target in private firms. Furthermore, positive coefficients on the interaction term indicate that public firm managers, relative to private firm managers, engage in more income-increasing REM when positive earnings are close to zero. In total, the interaction coefficient in Column (8) shows that public firms use significantly more earnings management to beat the earnings target. Similarly, Column (6) reports that public firms engage in more REM than private firms, because the coefficient for the

Table 7
Regression results among *BENCH* firms with an alternative estimation technique for earnings management.

	(1) *ACFO*	(2) *ADISEXP*	(3) *APROD*	(4) *REM1*	(5) *REM2*	(6) *REMSUM*	(7) *AEM*	(8) *TEM*
PUBLIC	**−0.000**	**0.013***	**0.015****	**0.032****	**0.014****	**0.028****	**0.006**	**0.032****
	(−0.05)	**(1.83)**	**(2.11)**	**(2.33)**	**(1.98)**	**(1.99)**	**(1.01)**	**(2.08)**
SIZE	0.000	−0.001	0.002*	0.001	−0.001	0.001	0.004***	0.002
	(0.44)	(−1.48)	(1.65)	(0.58)	(−1.33)	(0.34)	(3.34)	(0.93)
ROE	−0.000	−0.000	−0.004	−0.006	−0.000	−0.005	0.000	−0.005
	(−0.43)	(−0.13)	(−1.27)	(−1.51)	(−0.14)	(−1.40)	(0.20)	(−1.07)
LOSS	−0.057***	0.014***	−0.043***	−0.028**	−0.043***	−0.089***	0.005	−0.079***
	(−22.52)	(3.10)	(−5.07)	(−2.51)	(−8.94)	(−7.56)	(0.90)	(−6.85)
SD_ROA	−0.000***	0.000	−0.002***	−0.002***	0.000	−0.002***	0.000***	−0.001***
	(−12.56)	(1.09)	(−33.72)	(−14.35)	(0.56)	(−15.15)	(4.15)	(−6.71)
LEV	0.000	0.004***	−0.006***	−0.002**	0.004***	−0.002	0.003***	−0.000
	(0.20)	(9.94)	(−10.20)	(−2.09)	(9.66)	(−1.61)	(4.55)	(−0.32)
GROWTH	−0.000	−0.005***	0.007***	0.002*	−0.005***	0.001	−0.003***	−0.000
	(−0.95)	(−11.51)	(12.62)	(1.92)	(−11.61)	(1.22)	(−5.22)	(−0.30)
OPCYCLE	−0.000***	−0.000	0.000*	0.000*	−0.000	0.000**	0.000***	0.000***
	(−2.95)	(−0.37)	(1.89)	(1.90)	(−0.51)	(2.41)	(8.63)	(7.17)
INV	−0.009***	−0.010	0.052***	0.044***	−0.017***	0.010	0.034***	0.068***
	(−3.45)	(−1.53)	(3.43)	(2.73)	(−3.10)	(0.67)	(3.95)	(3.69)
ZSCORE	0.000***	−0.000	−0.000**	−0.001**	0.000	−0.000	−0.000**	−0.000**
	(4.48)	(−0.92)	(−2.18)	(−2.55)	(1.59)	(−1.63)	(−2.05)	(−2.17)
MANOWN	−0.001	−0.004	−0.001	−0.005	−0.003	−0.006	0.005	−0.004
	(−0.73)	(−1.43)	(−0.22)	(−0.89)	(−1.20)	(−1.05)	(1.32)	(−0.51)
ISPEC	−0.001	0.002	−0.002	0.000	0.006*	0.005	−0.001	0.002
	(−0.20)	(0.76)	(−0.39)	(0.08)	(1.77)	(0.80)	(−0.30)	(0.31)
$EM_{CONTROL}$	0.037***	−0.010	0.188***	0.187***	0.027*	0.224***	0.070***	
	(3.86)	(−0.74)	(4.04)	(3.54)	(1.92)	(4.04)	(4.35)	
CONSTANT	0.010*	0.005	−0.024	−0.013	0.024**	0.000	−0.052***	0.002
	(1.68)	(0.33)	(−1.52)	(−0.58)	(2.37)	(0.02)	(−4.00)	(0.08)
Industry and year FE	YES	YES	YES	YES	YES	YES	YES	YES
N	6319	6319	6319	6319	6319	6319	6319	6319
Adj. R-sq	0.110	0.055	0.054	0.018	0.080	0.031	0.026	0.019

This table reports the OLS regression results of a dummy for public firms (*PUBLIC*) on signed earnings management proxies among firms with a small profit (*BENCH*). The REM dependent variables have been estimated using panel regressions with fixed year and firm effects. The *t*-statistics (in parentheses) are based on White (1980) corrected standard errors. All the variables are defined in Appendix A.

* Significant at the 10% level (two-tailed).
** Significant at the 5% level (two-tailed).
*** Significant at the 1% level (two-tailed).

interaction term is 0.069 and significant at a 5 percent significance level. The interaction coefficient is positive and statistically significant for five of the six REM measures. Out of the separate REM measures, the interaction coefficient for the *ADISEXP* regression is the largest, having the value of 0.037. Moreover, Column (7) presents evidence consistent with Hope et al. (2013) that public firms implement AEM to reach earnings targets. The inferences that public firm managers engage in more REM than public firm managers in a target beating context remain the same with a PSM-based matched sample (unreported). In summary, we provide evidence that public firms, in relation to private firms, engage in more REM in general, as well as to meet or beat the zero earnings target.

4. Additional analyses

4.1. Alternative estimation technique for real earnings management

In this section, we conduct several additional tests. First, we consider an alternative estimation procedure for REM because recent studies criticize the original REM measures of Roychowdhury (2006) for being highly persistent over time. For example, Siriviriyakul (2015) shows that firms with observed high abnormal cash flow from operations at time $t - 1$ are likely to have high abnormal cash flow from operations also at time *t*. The persistence of the original measures suggests an omitted variable problem (Gunny, 2010; Siriviriyakul, 2015). Siriviriyakul (2015) studies different estimation techniques that mitigate the problem and concludes that measures of REM estimated with fixed year and firm effects show desirable features. Accordingly, we re-estimate the measures using panel regressions with fixed year and firm effects and obtain new REM measures with mean and median values closer to zero and smaller differences between private and public firms. Using the new estimation approach for the dependent variables, we replicate the main analyses and find that the (unreported) results remain unchanged. Furthermore, we estimate Eq. (6) for the *BENCH* firms only which means that we omit *BENCH* and *PUBLIC* × *BENCH* from the regression to increase power following Zang (2012). Table 7 reports the results. We find that the coefficients on *PUBLIC* is mostly positive and statistically significant, supporting our findings that public firms engage in more REM than private firms.

Table 8
Comparisons of real earnings management ratios.

	Private	Public	Difference
ACFO/(ACFO + AEM)	0.268	0.382	−0.115*
ADISEXP/(ADISEXP + AEM)	0.304	0.509	−0.206***
APROD/(APROD + AEM)	0.417	0.442	−0.025*
$REM_1/(REM_1 + AEM)$	0.514	0.657	−0.143**
$REM_2/(REM_2 + AEM)$	0.495	0.665	−0.170***
$REM_{SUM}/(REM_{SUM} + AEM)$	0.549	0.684	−0.135**

This table reports the results for median comparisons of real earnings management ratios between private and public firms. Negative differences indicate that the public firm ratio is larger than the private firm ratio. All the variables are defined in Appendix A.

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

4.2. Earnings management ratios for private and public firms

Hope et al. (2013) find that public firms use more AEM to meet earnings targets and we find that public firms also engage in more REM. The natural question that follows is whether the proportion of REM is larger among public firms than among private firms. In this additional test, we therefore compare a ratio among *BENCH* firms that have positive values for REM and AEM. We calculate the ratio as REM divided by the sum of REM and AEM, where the REM component is one of the six measures.[6] Table 8 reports the median values for the ratio for both private and public firms as well as the level of significance based on the z-values from the Wilcoxon median comparison test. In all six ratios the median for public firms is larger than for private firms.[7] This means, in the context of target beating, that public firms have a larger proportion of REM than private firms. For example, public firms manage discretionary expenses to a similar degree as they use the subjectivity of accruals, which is observable from the median ratio of 50.9 percent. Meanwhile, this ratio is significantly lower for private firms. Out of the three ratios based on the separate measures, we observe the strongest results with *ADISEXP* in the numerator, while *APROD* yields the weakest results.

4.3. Factors affecting differential real earnings management between private and public firms

In this section, we investigate the impact of four mitigating factors on earnings management. First, we investigate the cross-sectional impact of managerial ownership by augmenting Eq. (5) with a two-way interaction term (*PUBLIC* × *MANOWN*). Panel A of Table 9 reports that public firms with owner-managers engage in less REM than other public firms and the same is true for private firms with high managerial ownership versus other private firms.[8] The difference is larger in public firms, which the significantly negative coefficient on the interaction indicates. However, the interaction is not significant in terms of AEM. Interestingly, we also observe that the level of REM_{SUM} is lower in public firms with high managerial ownership than in private firms with the same attribute, whereas the opposite applies for the low managerial ownership firms. Based on these results, we argue that owner-managers in public firms moderate the extent of REM more than in private firms.

Second, we examine the impact of bank financing by augmenting Eq. (5) with a two-way interaction term (*PUBLIC* × *BANKLOAN*), and a *BANKLOAN* variable indicating if a firm has bank debt to total assets higher than the industry median.[9] Panel B of Table 9 reports the results. The coefficient on *BANKLOAN* in Column (7) is positive and statistically significant, which is consistent with the findings of Mafrolla and D'Amico (2017) that more AEM is used to potentially improve creditor relations. However, the coefficients on *BANKLOAN* in the other columns indicate less REM in private firms with high amounts of loans. This finding is reasonable since stakeholders of private firms may use various channels to access insider corporate information and more insider information enables stakeholders such as banks to easier detect REM. Consequently, private firms may therefore be more hesitant to use REM in this context. Public firms with high amounts of bank financing also use less REM than other public firms while the difference is zero for AEM. Furthermore, the interaction term is negative and significant for most variables, suggesting that the difference is larger in public firms.

Third, Zang (2012) recognizes financial distress risk as one cost factor for REM since the marginal cost of deviating from optimal operations is likely to be high for a firm in poor financial health. We re-estimate Eq. (5) by changing the *ZSCORE* variable to a

[6] The REM measures are estimated using panel regressions with fixed year and firm effects. We are not able to construct REM ratios based on the original measures developed by Roychowdhury (2006) because these measures yield means and medians that differ significantly from zero specifically regarding the public firms in our sample.

[7] In (unreported) results with non-*BENCH* firms, we observe no significant differences in the ratios between private and public firms.

[8] For the sake of parsimony we do not tabulate constant and control variable coefficients.

[9] The underlying accounting information of the *BANKLOAN* variable tells us that private firms have significantly more bank debt to total assets than public firms (ratio average 0.275 versus 0.060).

Table 9
Factors affecting differential earnings management between private and public firms.

	(1) $\|ACFO\|$	(2) $\|ADISEXP\|$	(3) $\|APROD\|$	(4) $\|REM_1\|$	(5) $\|REM_2\|$	(6) $\|REM_{SUM}\|$	(7) $\|AEM\|$	(8) $\|TEM\|$
Panel A: High managerial ownership								
PUBLIC	0.008***	0.079***	0.056***	0.132***	0.073***	0.128***	−0.006***	0.127***
	(4.73)	(20.75)	(15.07)	(18.83)	(18.94)	(17.41)	(−4.51)	(17.00)
MANOWN	−0.010***	−0.011***	−0.013***	−0.021***	−0.014***	−0.026***	−0.006***	−0.032***
	(−14.27)	(−7.09)	(−6.90)	(−6.77)	(−9.00)	(−8.11)	(−7.67)	(−9.70)
PUBLIC* × *MANOWN	**0.021**	**−0.110****	**−0.077****	**−0.210****	**−0.121****	**−0.215****	**−0.000**	**−0.215****
	(1.50)	**(−8.03)**	**(−5.91)**	**(−11.34)**	**(−10.30)**	**(−8.85)**	**(−0.05)**	**(−7.66)**
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Industry and year FE	YES	YES	YES	YES	YES	YES	YES	YES
N	94,282	94,282	94,282	94,282	94,282	94,282	94,282	94,282
Adj. R-sq	0.201	0.187	0.171	0.161	0.157	0.150	0.156	0.136
Panel B: High bank debt								
PUBLIC	0.009***	0.078***	0.060***	0.134***	0.075***	0.134***	−0.004***	0.137***
	(4.93)	(18.74)	(14.52)	(17.46)	(17.70)	(16.64)	(−3.03)	(16.61)
BANKLOAN	0.000	−0.008***	−0.005***	−0.007***	−0.004***	−0.006**	0.003***	−0.002
	(0.50)	(−5.84)	(−3.48)	(−2.97)	(−2.91)	(−2.31)	(4.76)	(−0.85)
PUBLIC* × *BANKLOAN	**−0.002**	**−0.020****	**−0.042****	**−0.057****	**−0.034****	**−0.079****	**−0.003**	**−0.090****
	(−0.47)	**(−2.32)**	**(−5.05)**	**(−3.72)**	**(−4.05)**	**(−4.92)**	**(−0.97)**	**(−5.49)**
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Industry and year FE	YES	YES	YES	YES	YES	YES	YES	YES
N	94,282	94,282	94,282	94,282	94,282	94,282	94,282	94,282
Adj. R-sq	0.200	0.187	0.172	0.161	0.157	0.150	0.156	0.136
Panel C: High financial distress risk								
PUBLIC	−0.002	0.068***	0.064***	0.138***	0.077***	0.146***	−0.012***	0.136***
	(−1.00)	(14.45)	(13.37)	(15.35)	(15.50)	(15.34)	(−8.97)	(14.07)
CRITICAL_Z	−0.021***	−0.012***	−0.017***	−0.016***	−0.010***	−0.021***	0.003***	−0.021***
	(−31.21)	(−9.34)	(−11.09)	(−6.45)	(−7.63)	(−8.05)	(4.18)	(−7.83)
PUBLIC* × *CRITICAL_Z	**0.025*****	**0.019*****	**−0.027*****	**−0.032****	**−0.021*****	**−0.063*****	**0.017*****	**−0.035****
	(7.58)	**(2.66)**	**(−3.91)**	**(−2.51)**	**(−3.01)**	**(−4.72)**	**(6.56)**	**(−2.55)**
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Industry and year FE	YES	YES	YES	YES	YES	YES	YES	YES
N	94,282	94,282	94,282	94,282	94,282	94,282	94,282	94,282
Adj. R-sq	0.201	0.187	0.169	0.160	0.156	0.149	0.155	0.134
Panel D: High audit quality								
PUBLIC	0.008***	0.087***	0.065***	0.146***	0.079***	0.140***	−0.007***	0.140***
	(4.28)	(19.74)	(15.02)	(18.00)	(17.76)	(16.55)	(−4.72)	(16.16)
ISPEC	−0.004	−0.020**	−0.026*	−0.049**	−0.019*	−0.055**	−0.017***	−0.070***
	(−1.06)	(−2.00)	(−1.90)	(−2.28)	(−1.81)	(−2.44)	(−2.70)	(−3.01)
PUBLIC* × *ISPEC	**0.001**	**−0.343*****	**−0.367*****	**−0.628*****	**−0.290*****	**−0.589*****	**0.037**	**−0.579*****
	(0.02)	**(−4.33)**	**(−4.80)**	**(−4.20)**	**(−3.59)**	**(−3.80)**	**(1.18)**	**(−3.60)**
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Industry and year FE	YES	YES	YES	YES	YES	YES	YES	YES
N	94,282	94,282	94,282	94,282	94,282	94,282	94,282	94,282
Adj. R-sq	0.200	0.187	0.171	0.161	0.157	0.150	0.156	0.135

This table reports the OLS regression results of the interaction between a dummy for public firms (*PUBLIC*) and a variable for factors affecting differential absolute earnings management for private and public firms. In Panel A, the factor variable is a dummy for firms with high managerial ownership (*MANOWN*). In Panel B, the factor variable is a dummy for firms with high bank debt (*BANKLOAN*). In Panel C, the factor variable is a dummy for firms with high financial distress risk (*CRITICAL_Z*). In Panel D, the factor variable is the industry specialist auditor measure (*ISPEC*). The *t*-statistics (in parentheses) are based on White (1980) corrected standard errors. All the variables are defined in Appendix A.

* Significant at the 10% level (two-tailed).
** Significant at the 5% level (two-tailed).
*** Significant at the 1% level (two-tailed).

CRITICAL_Z variable indicating higher financial distress risk than the industry median. We also add a two-way interaction term (*PUBLIC* × *CRITICAL_Z*). Panel C of Table 9 reports the results which convey that both private and public firms with poorer financial health engage in less REM than in healthier firms. While the interaction coefficients are both positive and negative for the individual REM measures, all coefficients for the composite measures indicate that the public firm difference is larger than the difference for private firms. Consistent with Zang (2012), the results in Column (7) show that AEM is still utilized by riskier firms.

Finally, we examine the impact of audit quality. Graham et al. (2005) and Zang (2012) argue that auditors are more likely to question AEM than REM, which would suggest a positive (negative) relationship between REM (AEM) and audit quality. Burnett et al. (2012) also find that high audit quality firms pick REM before AEM in an analyst target beating context. However, recent studies indicate that REM is associated with auditor resignations (Kim and Park, 2014) and auditor concern (Commerford et al., 2016).

Greiner et al. (2017) provide further evidence that auditor effort increases with aggressive income-increasing REM. An implication of these later findings is that firms with higher REM are less likely to have a high quality auditor and that there should be a negative association between REM and audit quality, which we also observe in our main results regarding our audit quality proxy *ISPEC* (e.g., Table 4). In order to investigate the matter further, we augment Eq. (5) with a two-way interaction term (*PUBLIC* × *ISPEC*) and report the results in Panel D of Table 9. These results suggest that audit quality mitigates the extent of both REM and AEM in private firms. Higher audit quality in public firms have an even stronger mitigating effect, as the interaction coefficient is mostly negative and statistically significant. Thus, our results are consistent with the more recent studies linking high audit quality with less REM.

4.4. Impact of correlated omitted variables

Next, we provide an estimate of the robustness of our main results with respect to correlated omitted variables by assessing 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). We define the ITCV 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 and independent variable of interest. For Table 4 results (with *PUBLIC* as the variable of interest), the ITCV value averages around 0.052. The correlation between our REM metrics and the indicator variable would thus each need to be around 0.228 to render the coefficient 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. We define impact 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. However, none of the included control variables has an impact with larger magnitude than the ITCV. Any unobserved confounding variable must be more correlated with the REM variable and the independent variable of interest than any of the existing control variables to overturn the results. We conclude that the main results are reasonably robust to potential correlated omitted variables.

4.5. Impact of loss firms

We conduct our main analyses on both profitable and loss-making firms. While we control for the loss history in the regressions, we acknowledge that loss-making firms are a very particular group of firms and the motives of being loss-making can be very diverse between private and public firms (Hayn, 1995; Mills and Newberry, 2001; Coppens and Peek, 2005). Hence, we conduct additional tests by re-running all applicable analyses for profitable firms only. The (unreported) results do not change any of our main inferences.

4.6. Impact of IFRS

Finally, we recognize 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) provides 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. We retrieve the accounting practice data from the Orbis database and we run the main regressions by firstly including and secondly excluding firms that report under IFRS. In these (unreported) tests, we confirm the conclusion that public firms engage in more REM no matter the applied accounting practice.

5. Conclusions

In this study, we examine whether the extent of real earnings management (REM) differs between privately held and publicly listed firms. It is important to study REM because of its potential value-destroying nature and severe economic consequences. Previous studies suggest that there is an ambiguity about the association between listing status and REM based on the impact of capital market influences and managerial ownership. We contribute to the literature on non-accrual earnings management and financial reporting incentives. Our first finding is that public firms engage in more REM overall. While there has been research examining differences in accrual manipulation between private and public firms (Burgstahler et al., 2006; Hope et al., 2013), our study is the first of our knowledge to investigate REM between private and public firms. Second, we find that managers of public firms manage operating activities to achieve positive earnings more than private firm managers. Third, we also provide deeper insights into the private-public differences by studying the mix between AEM and REM. Analyses of earnings management ratios in the context of target beating reveal that public firms, in relation to private firms, have a larger proportion of REM to the total earnings management tactic. The low cost of REM for managers of public firms relative to the cost for private firm managers provides a reasonable explanation for this finding. Our findings are robust to propensity score matching, alternative estimation techniques for REM, correlated omitted variables, exclusion of loss firms, and differences in accounting practices. Additional tests show that managerial ownership, bank financing, distress risk, and audit quality constrain the extent of REM in both private and public firms.

Universally, our findings are consistent with the view that public firm listing status and consequently increased mandatory financial reporting intensify the myopic behavior among public firm managers (Asker et al., 2014; Ernstberger et al., 2016). In our study, we find that this increase in obligations is associated with deviations from normal operational practices and normal financial

reporting behavior. Thus, we emphasize one potentially important cost of stock market listing, which is the increase in value-destroying real earnings management.

We note that our study has limitations. For example, the fact that our study focuses on firms within the UK could pose as a limitation of the study. However, our data 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 financial statement filing and audit regulation, reporting frequency regime, and the size of listed firms. Moreover, we are not able to prove a direct causal relationship between stock market listing and REM. However, we address issues of endogeneity consistently with prior literature. Meanwhile, it seems unlikely that firms wanting to engage in more REM would change their status from being private with little external monitoring to being public and strictly monitored.

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Appendix A. Variable definitions

ACFO	Abnormal cash flow from operations
ADISEXP	Abnormal discretionary expenses
AEM	Discretionary accruals
APROD	Abnormal production costs
BANKLOAN	Indicator variable for firm-years with bank debt to total assets larger than the 2-digit SIC industry median
BENCH	Indicator variable for firm-years with small earnings (between 1 and 0 percent of total assets)
CRITICAL_Z	Indicator variable for firm-years with lower *ZSCORE* than the 2-digit SIC industry median
$EM_{CONTROL}$	REM_{SUM} in a regression with *AEM* as the dependent variable, and vice versa
GROWTH	Growth in total assets
INV	Inventory scaled by total assets
ISPEC	Industry specialist auditor measure based on the sum of the square root of the total assets of the clients of an auditor in a specific 2-digit SIC industry divided by the total sum of the square root of the total assets of entire clients of the auditor
LEV	Financial leverage, total debt divided by total assets
LOSS	Cumulative percentage of sample years that the firm reported a loss
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 (i.e., listed) firms
REM_1	Composite measure of REM (*APROD* + *ADISEXP*)
REM_2	Composite measure of REM (*APROD* + *ADISEXP*)
REM_{SUM}	Composite measure of REM (*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
TEM	REM_{SUM} + *AEM*
ZSCORE	Z-score of Taffler (1983)

References

Ahearne, M.J., Boichuk, J.P., Chapman, C.J., Steenburgh, T.J., 2016. Real earnings management in sales. J. Account. Res. 54 (5), 1233–1266.
Alhadab, M., Clacher, I., Keasey, K., 2015. Real and accrual earnings management and IPO failure risk. Account. Bus. Res. 45 (1), 55–92.
Ashbaugh-Skaife, H., Collins, D., Kinney, W., LaFond, R., 2008. The effect of SOX internal control deficiencies on firm risk and cost of equity. J. Account. Res. 47 (1), 1–43.
Asker, J., Farre-Mensa, J., Ljungqvist, A., 2014. Corporate investment and stock market listing: a puzzle? Rev. Financ. Stud. 28 (2), 342–390.
Atieh, A., Hussain, S., 2012. Do UK firms manage earnings to meet dividend thresholds? Account. Bus. Res. 42 (1), 77–94.
Ball, R., Shivakumar, L., 2005. Earnings quality in UK private firms: comparative loss recognition timeliness. J. Account. Econ. 39 (1), 83–128.
Ball, R., Kothari, S.P., Robin, A., 2000. The effect of international institutional factors on properties of accounting earnings. J. Account. Econ. 29 (1), 1–51.
Behn, B.K., Choi, J.-H., Kang, T., 2008. Audit quality and properties of analyst earnings forecasts. Account. Rev. 83 (2), 327–349.

Brav, O., 2009. Access to capital, capital structure, and the funding of the firm. J. Finance 64 (1), 263–308.
Brown, K., Chen, V.Y.S., Kim, M., 2015. Earnings management through real activities choices of firms near the investment–speculative grade borderline. J. Account. Publ. Pol. 34 (1), 74–94.
Burgstahler, D., Dichev, I., 1997. Earnings management to avoid earnings decreases and losses. J. Account. Econ. 24 (1), 99–126.
Burgstahler, D.C., Hail, L., Leuz, C., 2006. The importance of reporting incentives: Earnings management in European private and public firms. Account. Rev. 81 (5), 983–1016.
Burnett, B.M., Cripe, B.M., Martin, G.W., McAllister, B.P., 2012. Audit quality and the trade-off between accretive stock repurchases and accrual-based earnings management. Account. Rev. 87 (6), 1861–1884.
Cohen, D., Dey, A., Lys, T., 2008. Real and accrual-based earnings management in the pre- and post- Sarbanes-Oxley period. Account. Rev. 83 (3), 757–787.
Cohen, D.A., Pandit, S., Wasley, C.E., Zach, T., 2016. Measuring real activity management. Working paper. Available at SSRN: < http://ssrn.com/abstract = 1792639 > .
Cohen, D.A., Zarowin, P., 2010. Accrual-based and real earnings management activities around seasoned equity offerings. J. Account. Econ. 50 (1), 2–19.
Commerford, B.P., Hermanson, D.R., Houston, R.W., Peters, M.F., 2016. Real earnings management: a threat to auditor comfort? Audit.: J. Pract. Theory 35 (4), 39–56.
Coppens, L., Peek, E., 2005. An analysis of earnings management by European private firms. J. Int. Account., Audit. Tax. 14 (1), 1–17.
Di Meo, F., García Lara, J.M., Surroca, J.A., 2017. Managerial entrenchment and earnings management. J. Account. Publ. Pol. 36 (5), 399–414.
Dierynck, B., Landsman, W.R., Renders, A., 2012. Do managerial incentives drive cost behavior? Evidence about the role of the zero earnings benchmark for labor cost behavior in private Belgian firms. Account. Rev. 87 (4), 1219–1246.
Doukakis, L.C., 2014. The effect of mandatory IFRS adoption on real and accrual-based earnings management activities. J. Account. Publ. Pol. 33 (6), 551–572.
Ernstberger, J., Link, B., Stich, M., Vogler, O., 2016. The real effects of mandatory quarterly reporting. Account. Rev (Forthcoming).
Francis, B., Hasan, I., Li, L., 2016. A cross-country study of legal-system strength and real earnings management. J. Account. Publ. Pol. 35 (5), 477–512.
Givoly, D., Hayn, C.K., Katz, S.P., 2010. Does public ownership of equity improve earnings quality? Account. Rev. 85 (1), 195–225.
Glaum, M., Lichtblau, K., Lindemann, J., 2004. The extent of earnings management in the U.S. and Germany. J. Int. Account. Res. 3 (2), 45–77.
Gore, P., Pope, P.F., Singh, A.K., 2007. Earnings management and the distribution of earnings relative to targets: UK evidence. Account. Bus. Res. 37 (2), 123–150.
Graham, J.R., Harvey, C.R., Rajgopal, S., 2005. The economic implications of corporate financial reporting. J. Account. Econ. 40 (1–3), 3–73.
Greiner, A., Kohlbeck, M.J., Smith, T.J., 2017. The relationship between aggressive real earnings management and current and future audit fees. Audit.: J. Pract. Theory 36 (1), 85–107.
Gunny, K.A., 2010. The relation between earnings management using real activities manipulation and future performance: evidence from meeting earnings benchmarks. Contemp. Account. Res. 27 (3), 855–888.
Hayn, C., 1995. The information content of losses. J. Account. Econ. 20 (2), 125–153.
Hope, O.-K., Thomas, W.B., Vyas, D., 2013. Financial reporting quality of U.S. private and public firms. Account. Rev. 88 (5), 1715–1742.
Hribar, P., Collins, D.W., 2002. Errors in estimating accruals: implications for empirical research. J. Account. Res. 40 (1), 105–134.
Jensen, M.C., Meckling, W.H., 1976. Theory of the firm: managerial behaviour, agency costs and ownership structure. J. Financ. Econ. 3 (4), 305–360.
Kim, Y., Park, M.S., 2014. Real activities manipulation and auditors' client-retention decisions. Account. Rev. 89 (1), 367–401.
Kim, J.-B., Sohn, B.C., 2013. Real earnings management and cost of capital. J. Account. Publ. Pol. 32 (6), 518–543.
Kothari, S.P., Leone, A.J., Wasley, C.E., 2005. Performance matched discretionary accrual measures. J. Account. Econ. 39 (1), 163–197.
Larcker, D., Rusticus, T., 2010. On the use of instrumental variables in accounting research. J. Account. Econ. 49 (3), 186–205.
Lin, K.Z., Mills, L.F., Zhang, F., 2014. Public versus private firm responses to the tax rate reduction in China. J. Am. Tax. Assoc. 36 (1), 137–163.
Mafrolla, E., D'Amico, E., 2017. Borrowing capacity and earnings management: an analysis of private loans in private firms. J. Account. Publ. Pol. 36 (4), 284–301.
Michaely, R., Roberts, M., 2012. Corporate dividend policies: Lessons from private firms. Rev. Financ. Stud. 25 (3), 711–746.
Mills, L.F., Newberry, K.J., 2001. The influence of tax and nontax costs on book-tax reporting differences: public and private firms. J. Am. Tax. Assoc. 23 (1), 1–19.
Minnis, M., Shroff, N., 2017. Why regulate private firm disclosure and auditing? Account. Bus. Res. 47 (5), 473–502.
Nelson, M., Elliott, R., Tarpley, R., 2002. Evidence from auditors about managers' and auditors' earnings management decisions. Account. Rev. 77 (Supplement), 175–202.
Peasnell, K.V., Pope, P.F., Young, S., 2000. Detecting earnings management using cross-sectional abnormal accruals models. Account. Bus. Res. 30 (4), 313–326.
Roychowdhury, S., 2006. Earnings management through real activities manipulation. J. Account. Econ. 42 (3), 335–370.
Saunders, A., Steffen, S., 2011. The costs of being private: Evidence from the loan market. Rev. Financ. Stud. 24 (12), 4091–4122.
Siriviriyakul, S., 2015. A detailed analysis of empirical measures for real activities manipulation. Working paper. Available at SSRN: < http://ssrn.com/abstract = 2359813 > .
Sohn, B.C., 2016. The effect of accounting comparability on the accrual-based and real earnings management. J. Account. Publ. Pol. 35 (5), 513–539.
Stein, J.C., 1989. Efficient capital markets, inefficient firms: a model of myopic corporate Behavior. Quart. J. Econ. 104 (4), 655–669.
Sundvik, D., 2017. Book-tax conformity and earnings management in response to tax rate cuts. J. Int. Account., Audit. Tax. 28 (1), 31–42.
Taffler, R.J., 1983. The assessment of company solvency and performance using a statistical model. Account. Bus. Res. 15 (52), 295–308.
Vorst, P., 2016. Real earnings management and long-term operating performance: the role of reversals in discretionary investment cuts. Account. Rev. 91 (4), 1219–1256.
White, H., 1980. A heteroskedasticity-consistent covariance matrix and a direct test for heteroskedasticity. Econometrica 48 (4), 817–838.
Yu, F., 2008. Analyst coverage and earnings management. J. Financ. Econ. 88 (2), 245–271.
Zang, A.Y., 2012. Evidence on the trade-off between real activities manipulation and accrual-based earnings management. Account. Rev. 87 (2), 675–703.