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The Earnings Management Strategy of Indebted Non-Listed Firms: The Case of Italy

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Abstract

Design/methodology/approach: For a sample of Italian non-listed firms that file full financial

statements, we conduct a cross sectional regression analysis to determine whether the managers of indebted firms complement real activity-based (REM) with accrual-based (AEM) earnings management. To model each technique, we estimate OLS regressions with robust standard errors to avoid heteroscedasticity problems.

Purpose: This research analyses whether the managers of highly indebted Italian non-listed firms, financed mainly by bank-loans, are likely to undertake real activity-based earnings management (REM) and accrual-based earnings management (AEM) as complementary activities to boost the impact of earnings management (EM) on reported earnings and achieve desired earnings targets.

Findings: Consistent with the extant literature, we find that indebted firms are likely to complement REM with AEM to enhance their creditworthiness. We also provide evidence that high-quality audit companies constrain neither REM nor AEM initiatives. Finally, firms suffering from financial problems are less likely to engage in either initiative as they are under greater scrutiny from lenders.

Originality: The paper investigates the complementary use of accrual-based and real activity-based earnings management techniques in non-listed firms, suffering from a high pressure from lenders in the case of indebtedness.

Practical implications: This research should be of interest to banks, managers, and standard setters as it highlights the earnings management strategy employed by firms with a high leverage ratio and provides evidence on the relative costs associated with each earnings management technique.

Keywords: Accrual-based earnings management, Real activity-based earnings management, Complementary use of EM techniques, Leverage, Non-listed firms, Italy

JEL Classification: M41

1. Introduction

This paper investigates the interplay between REM and AEM in indebted Italian non-listed firms. Prior literature, concerning mainly listed firms, has documented both a trade-off (Cohen *et al.*, 2008; Zang, 2012) and a complementary (Cohen and Zarowin, 2010; Roychowdhury, 2006) coordination of the two EM techniques, suggesting that this coordination is driven by the cost-benefit advantages related to each earnings management (EM) technique (Chen *et al.*, 2012). The substitution EM strategy is associated with an increase in the cost of detection of AEM initiatives in the case of an increase of monitoring activities of stakeholders (Cohen *et al.*, 2008), therefore managers are likely to prefer REM to achieve desired earnings targets (Graham *et al.*, 2005).

Roychowdhury (2006) suggests that indebted listed firms are likely increase REM to ameliorate firm financial performance to reduce the probability of debt covenant violation. This may be explained by the fact that REM is hard to detect by stakeholders than AEM (Zang, 2012). Chen et al. (2015) suggest that a high leverage ratio is associated to a high default risk, therefore increasing the scrutiny of stakeholders on borrowers' accounting

practices and incentivizing the complementary use of REM and AEM (Roychowdhury, 2006). This is the case of indebted firms that must coordinate both EM techniques to boost current earnings and signal better creditworthiness, suggesting that these firms are more likely to complement, rather than, substitute REM and AEM. Anagnostopolou & Tsekrekos (2017), analysing a sample of U.S. indebted listed firms provide evidence for a complementary use of both EM techniques, suggesting that leverage incentivizes the use of both EM techniques to achieve desired earnings targets in order to reduce the violation of debt covenants.

The existing literature is scarce in the case of non-listed firms, even though such firms are predominant in Italy (and in Europe more widely). In fact, non-listed firms represent 99.87% of EU firms by number (Beuselinck *et al.*, 2021) and 99.9% of Italian firms. In addition, non-listed firms rely mainly on bank debt to finance their operations (Campa, 2019; Paiva, 2018; Vozzella and Gabbi, 2023). Finally, the findings concerning listed firms cannot be extended *sic et simpliciter* to non-listed firms because of their different financial structure, corporate governance and financing problems (Niskanen, Karjalainen, Niskanen, *et al.*, 2011; Niskanen, Karjalainen and Niskanen, 2011) compared to the listed ones. Therefore, our research contributes to the EM literature by investigating the EM technique undertaken by managers of indebted non-listed firm. Our findings would be interesting for academics and practitioners to understand if managers of indebted firms are likely to substitute or complement REM with AEM to strengthen their scrutiny. Our general hypothesis is that managers of these firms are likely to complement REM with AEM because they would boost the impact of the EM strategy on reported earnings to comply with lenders' forecasts.

To investigate the potentially complementary EM strategies employed by indebted firms, we analyse a sample of Italian non-listed firms over the period 2012 to 2019. Consistent with expectations, our findings provide evidence of the complementary use of REM and AEM.

The remainder of the paper is organized as follows. Section 2 reviews the exant literature and develops our study hypothesis. Section 3 outlines the research methods employed and the nature of the study data. Section 4 discusses the main findings of our empirical analysis and the results of our robustness testing. Finally, our conclusions are presented in section 5, along with the limitations of the study and directions for future research.

2. Literature Review and Hypothesis Development

Leverage is a determinant of EM initiatives as firms seek to ameliorate their creditworthiness (Watts and Zimmerman, 1986). However, Berger & Udell (1998) find that banks can monitor borrowers because of the access to their private information (Hope *et al.*, 2017), and financial statements serve to assess borrower repayment capacity. In addition, leverage means greater scrutiny and monitoring by banks of borrower accounting practices (Jensen, 1986) as a high leverage ratio may cause liquidity problems (Ghosh *et al.*, 2010). Finally, banks are likely to impose unfavorable contracting terms on borrowers not complying with lenders' expectations (Armstrong *et al.*, 2010; Shen and Huang, 2013). Thus, it is argued that indebted firms, relying mainly on bank-loans to finance their operations, are under the pressure of lenders to meet earnings benchmarks and gain better debt contracting terms. In this case, managers may

engage in two EM strategies: the substitution or complementary use of REM and AEM. The substitution EM strategy is observed when the pressure of auditors and financial markets increases. Cohen et al. (2008) find that US listed firms switched from AEM to REM with the passage of SOX regulation which increased the monitoring of authorities and auditors on firm accounting practices. Managers typically make every effort to achieve a desired earnings target that in turn incentivizes managers to coordinate both EM techniques. Thus, researchers analyze the reaction of managers to the greater monitoring role of market and accounting institutions following the passage of SOX. AEM and REM activities and their coordination are considered as part of a strategy to achieve EM targets without being discovered rather than for contractual motivations (e.g. bank-lending purposes). Roychowdhury (2006) finds that US listed firms are likely to engage REM to meet a zero earnings target. This finding suggests that firms rely on this harder to detect EM technique to reduce the probability of EM detection, and then use AEM to fine-tune the unexpected amount of EM realized using REM (Gao et al., 2017). Unfortunately, the literature focuses predominantly on REM as a standalone strategy without investigation of its relationship with AEM. Zang (2012) points out that REM (realized by changing the firm's operations) and AEM (realized by changing accounting methods and estimation criteria) could be used in sequence, therefore AEM is used after the end of the reporting period, when a firm has realized a certain amount of EM by undertaking REM. At the end of the reporting period, if the EM realized by undertaking REM is unexpectedly higher or lower than the amount anticipated, firms may achieve the desired earnings target by undertaking AEM. Zang's research analyses the trade-off between AEM and REM on the basis of the relative cost of each EM practice. However, she does not investigate how managers act when facing a high leverage ratio that attracts the scrutiny of lenders to their accounting practices.

To our best knowledge, only Anagnostopoulou & Tsekrekos (2017) investigate the EM strategies of indebted firms. Analyzing a sample of US listed firms, they find that highly indebted firms are likely to complement REM with AEM as they find a positive relationship between the unexpected amount of REM (differing from the amount anticipated) and AEM, confirming that AEM is undertaken to fine-tune REM to boost reported earnings. This finding suggests that firms under the pressure (and the scrutiny) of lenders show a preference for REM, as in Graham et al. (2005). In other words, using REM before AEM, managers try to reduce the probability of a detection of EM initiatives by lenders. This finding also suggests that lenders should investigate the business of a firm, since REM may be undertaken by manipulating production (e.g. overproduction), sales (e.g. reducing the price or allowing better condition term to firm's clients) and/or cutting or delaying discretionary expenditures (Roychowdhury, 2006). For this reason, REM is more expensive than AEM because it impacts on a firm's cash flows (Zang, 2012), therefore increasing the lender's credit risk. The research of Anagnostopolou & Tsekrekos, however, limits the investigation to only those firms suspected of managing their earnings, while firms might achieve a desired EM target without meeting banks' requirements.

In addition, the prior literature cited focuses on listed firms that are able to substitute bank loans with other (market) sources of finance such as equity or bonds, and therefore the

trade-off between AEM and REM in such firms is driven solely by the increased monitoring of accounting and financial institutions. Therefore, in our paper we focus on the role of financial leverage as a determinant of the relationship between AEM and REM activity since non-listed firms are financed predominantly using bank loans. Further, in contrast to the previous literature, we hypothesize that non-listed firms are likely to use both EM techniques as complements to meet lenders expectations (as specified in lending agreements).

Research investigating the substitution or complementary use of REM and AEM is quite scarce in the case of non-listed firms, even though such firms finance their operations mainly with bank loans (Paiva, 2018). Leverage attracts significant monitoring by banks of borrower accounting practices (Garc á-Teruel *et al.*, 2014; Hope *et al.*, 2017; Palumbo and Rosati, 2022) as financial information is limited for such firms, even though financial statements represent the main source of information to assess the borrowers' creditworthiness (Garc á-Teruel *et al.*, 2014). The monitoring role of banks increased following the enactment of Basel II and III Accords (Mafrolla and D'Amico, 2017), restricting the ability of managers to use AEM. In addition, banks may impose severe costs on borrowers where AEM is detected (Armstrong *et al.*, 2010), therefore, managers may rely heavily on REM. Dierynck et al. (2012) find that Belgian non-listed firms use REM as this EM technique is harder to detect than AEM. This suggests that firms are likely to use REM (harder to detect) to boost current earnings. As a consequence, managers should use AEM (easier to detect) solely for the purpose of fine-tuning unexpected earnings realized by engaging in REM. In the case of bank-loans, it is argued that non-listed firms aim to comply with banks forecasts in order to ameliorate the perceived credit risk induced by their leverage. Therefore, the managers of indebted non-listed firms are likely to use REM to boost current reported earnings and then they fine-tune earnings by engaging in AEM. Such behavior may also arise as AEM use is restricted in the following year due to the reversal of accruals across years (Zhu *et al.*, 2021). Therefore, indebted non-listed firms must rely on both EM techniques, thereby employing a complementary EM strategy. Based on the arguments above, the following hypothesis is thus stated:

Hypothesis*: The managers of indebted non-listed Italian firms undertake REM and AEM as complements to achieve the maximum effect on current reported earnings.*

3. Research Methodology

3.1 Sample Selection Procedure

To test our hypothesis, data for non-listed firms was collected from the Bureau van Dijk AIDA Database for the period 2012 to 2019. Firms in our sample are non-listed and prepare their full financial statements according to the Italian Civil Code and Italian accounting standards, and do not prepare a consolidated financial statement. The population meeting these criteria totaled 45,029 non-listed firms. The sample selection procedure is shown in Table 1.

Table 1. Sample selection procedure

Initial sample firm	45,029
Firms with missing accounting data required to estimate both AEM and REM	(11,587)
Firms that do not report the auditor type	(5,432)
Firms with missing financial data	(1,621)
Firms not filing the financial statements	(475)
Total balanced sample firm	25,696

Table 2 shows the number of firms within each industry and their two-digit NACE industry code membership.

Table 2. Constitution of the firm sample over the period 2012-2019

Code	NACE macro-code (I level)	Description	Freq.	%	Number of Firms
1	A	Agriculture, forestry, and fishing	1,264	0.61	158
2	B, D, E	Mining, quarrying, water supply, electricity, gas	8,384	4.08	1,048
3	C	Manufacturing	93,464	45.47	11,683
4	F	Construction	9,568	4.65	1,196
5	G, H, I	Wholesale and retail trade, transportation, and accommodation	63,440	30.86	7,930
6	J	Information and communication	6,344	3.09	793
7	L	Real estate activities	4,168	2.03	521

8	M, N	Professional, scientific, technical activities, administrative and support service activities	13,416	6.53	1,677
9	O, P, Q	Public administration, education healthcare and social works	3,544	1.72	443
10	R, S, T, U	Art, entertainment, other service activities	1,976	0.96	247
		Total	205,568	100%	25,696

Note: the industry classification employed is based on that of Piot (2005)

3.2 Measurement of the Model Dependent Variables

3.2.1 Accrual-Based Earnings Management

We employ discretionary accruals as a proxy for AEM. We use the ROA-adjusted model of Kothari et al. (2005) in Equation 1 to estimate, cross-sectionally, the firm-specific parameters of total accruals.

$$\frac{TA_{i,t}}{A_{i,t-1}} = \frac{\alpha}{A_{i,t-1}} + \frac{\beta_1(\Delta REV_{i,t} - \Delta RECi,_t)}{A_{i,t-1}} + \frac{\beta_2(PPE_{i,t})}{A_{i,t-1}} + ROA_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where: $TA_{i,t}$ = total accruals for firm *i* in year *t*; $\Delta REV_{i,t}$ = sales for firm *i* in year *t* less sales in year *t–1*; ΔREC_t = accounts receivable for firm *i* in year *t* less accounts receivable in year *t–1*; $PPE_{i,t}$ = net property, plant and equipment for firm *i* in year *t*; $ROA_{i,t}$ = return on assets ratio for firm *i* in year *t-1*; $A_{i,t-1}$ = total assets at the beginning of the year; and ε_t = the model error term.

The residuals ($\epsilon_{i,t}$) are thus discretionary accruals (DA). Equation 2 decomposes total accruals in its non-discretionary and discretionary components (Ronen and Yaari, 2008).

$$DA_{i,t} = \frac{TA_{i,t}}{A_{i,t-1}} - \left(\frac{\alpha}{Ai,_{t-1}} + \frac{\beta_1(\Delta REV_{i,t} - \Delta REC_{i,t})}{A_{i,t-1}} + \frac{\beta_2(PPE_{i,t})}{A_{i,t-1}} + \beta_3 ROA_{i,t}\right) \quad (2)$$

Then we compute only the absolute value of discretionary accruals as we are not interested in its direction.

3.2.2 Real Activity-based Earnings Management

As the Italian Civil Code and Italian accounting standards allow non-listed firms to capitalize certain discretionary expenses while the disclosure of such activity in the notes is not mandatory, we estimate REM in relation to abnormal cash flows from operations and abnormal production costs.

We calculate the normal operating cash flows as in Equation 3, a cross-sectional linear function of sales, and the change in sales (Roychowdhury, 2006).

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

Where: $CFO_{i,t}$ = level of cash flows for firm *i* in year *t*; $A_{i,t-1}$ = total assets for firm *i* at the beginning of the year; $S_{i,t}$ = net sales in year *t*; $\Delta S_{i,t}$ = change in net sales from year *t-1* to year *t*; and ε = model error term.

The abnormal cash flows from operations ($Ab\_CFO_{i,t}$) are thus the residuals (error term) from Equation 3, which then become the dependent variable in Equation 4:

$$Ab\_CFO_{i,t} = \frac{CFO_{i,t}}{A_{i,t-1}} - \left[\alpha_0 + \alpha_1\left(\frac{1}{A_{i,t-1}}\right) + \beta_1\left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \beta_2\left(\frac{\Delta S_{i,t-1}}{A_{i,t-1}}\right)\right] \quad (4)$$

Consistent with the approach of Roychowdhury, we multiply the abnormal cash flows from operations by –1 to give a measure which is positive in the case of income-increasing REM.

The production costs are estimated by combining the cost of goods sold and the amount of inventory as detailed in Equations 5 and 6.

$$\frac{COGS_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1\left(\frac{1}{A_{i,t-1}}\right) + \beta_1\left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \epsilon_{i,t} \quad (5)$$

$$\frac{\Delta INV_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1\left(\frac{1}{A_{i,t-1}}\right) + \beta_1\left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \beta_2\left(\frac{\Delta S_{i,t-1}}{A_{i,t-1}}\right) + \epsilon_{i,t} \quad (6)$$

Where: $COGS_{i,t}$ = cost of goods sold for firm *i* in year *t*; $A_{i,t-1}$ = total assets for firm *i* at the beginning of the year; $S_{i,t}$ = net sales in year *t*; $\Delta S_{i,t}$ = change in net sales from year *t-1* to year *t*; $\Delta S_{i,t-1}$ = net sales for firm *i* in year *t-1;* and ε = model error term.

The production costs are thus estimated by combining Equations 5 and 6 to give Equation 7.

$$\frac{PROD_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1\left(\frac{1}{A_{i,t-1}}\right) + \beta_1\left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \beta_2\left(\frac{\Delta S_{i,t}}{A_{i,t-1}}\right) + \beta_3\left(\frac{\Delta S_{i,t-1}}{A_{i,t-1}}\right) + \varepsilon_t \quad (7)$$

Abnormal production costs ($Ab\_PROD_{i,t}$) are then estimated as the residuals from the regression of Equation 7, as given in Equation 8.

$$Ab\_PROD_{i,t} = \frac{PROD_{i,t}}{A_{i,t-1}} - [\alpha_0 + \alpha_1\left(\frac{1}{A_{i,t-1}}\right) + \beta_1\left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \beta_2\left(\frac{\Delta S_{i,t}}{A_{i,t-1}}\right) + \beta_3\left(\frac{\Delta S_{i,t-1}}{A_{i,t-1}}\right)] \quad (8)$$

Where: $Ab\_PROD_{i,t}$ = the abnormal production costs proxied by the sum of cost of goods

sold for firm *i* in year *t* and the change in inventory from *t-1* to *t*; A_{t-1} = total assets for firm *i* at the beginning of the year; $S_{i,t}$ = net sales in year *t*; $\Delta S_{i,t}$ = the change in net sales from year *t-1* to year *t*; and ε = the model error term.

Finally, the comprehensive measure of REM is proxied by summing the two estimates of REM, as given in Equations 4 and 8, respectively, to give Equation 9 (Ding *et al.*, 2021):

$$REM_{i,t} = Ab\_CFO_{i,t} + Ab\_PROD_{i,t} \quad (9)$$

Then we take the absolute value of REM as we are not interested in its direction. All the model variables are detailed in Table 3.

Table 3. Variable description and measurement

Label	Variable description and measurement		
Dependent variables:			
$\|REM\|_{i,t}$	The absolute value of real activity-based earnings management, proxied by the sum of abnormal cash flows (multiplied by -1) and abnormal production costs.		
$\|AEM\|_{i,t}$	The absolute value of accrual-based earnings management, estimated using the ROA-adjusted model of Kothari et al. (2005).		
Testing variable:		$\boldsymbol{REM_{i,t}}$	$\boldsymbol{AEM_{i,t}}$
$LEV_{i,t}$	A continuous variable proxying for the leverage ratio (financial debts to total assets) for the firm-year observations. The variable is estimated for each observation, sector and year.	-	-
$UNEXP.REM_{i,t}$	The estimated residuals from Equation 11.		+
Control variables: costs associated with REM:			
$MKT\_S_{i,t}$	The firm's market leader status in the industry at the beginning of the year. The variable is proxied by a dummy indicator taking the value 1 if the percentage of the firm's sales to the total sales of its industry sector at the beginning of the year exceeds the median of the industry sector for each year, and the value 0 otherwise.	+	
$ZSCORE_{i,t-1}$	Altman's Z-Score metric for non-listed firms (Altman, 2000), estimated as follows (Altman and Hotchkiss, 2006): $Z' = 0.717X_1 + 0.847X_2 + 3.107X_3 + 0.420X_4 + 0.998X_5$ Where: Z'= Overall Index or Score; X_1 = (Current Assets – Current Liabilities)/Total Assets; X_2 = Retained Earnings/Total Assets; X_3 = Earnings before Interest and Taxes/Total Assets; X_4= Book Value of Equity/Total Equity; X_5 = Sales/Total Assets. This score metric is	-	

	converted to a categorical variable that takes the value of 0 for firms with a Z-Score exceeding 2.9 (healthy firms), the value of 1 for firms with a Z-Score between 1.23 and 2.9 (firms in the grey area), and the value of 2 for firms with a Z-Score lower than 1.23 (distressed firms).		
$TAX_{i,t}$	The firm's corporate tax ratio, measured as a continuous variable, which scales corporate tax expenses by earnings before tax.	-	
Control variables: costs associated with AEM:			
$BIG4_{i,t}$	A dummy variable which takes the value of 1 where the firm engages a Big 4 audit company (KPMG, PwC, Deloitte and Ernst & Young), and zero otherwise.		-
$NOA_{i,t-1}$	Net operating assets at the beginning of the year, a proxy for the extent of accruals management in previous years. It is measured as a dummy variable that takes the value of 1 if NOA at the beginning of the year divided by lagged sales exceeds the median of the corresponding industry-year, and zero otherwise.		-
$CYCLE_{i,t-1}$	The length of the operating cycle to gauge firm accounting flexibility. The number of days receivables plus the days inventory less the days payable is computed at the beginning of the year. A dummy variable then takes the value of 1 if this value exceeds the median for each industry sector/year, and zero otherwise.		+
Other control variables (firm characteristics)			
$SIZE_{i,t}$	Firm size is the natural logarithm of total assets of the year.	-	-
$ROA_{i,t}$	The return on assets ratio, proxying for firm profitability.	-	+
$INVREC_{i,t}$	A proxy for firm risk, the sum of inventories and receivables, scaled by total assets.	+	+
$LOSS_{i,t-1}$	A dummy variable which takes the value of 1 if a firm reported negative earnings in previous year, and zero otherwise.	-	-
$EU_{i,t}$	A proxy for environmental uncertainty, measured as a continuous variable of the standard deviation of sales revenues for the past five years divided by the mean of sales revenue. For the years 2012 and 2013, the standard deviation is estimated for the past two and three years only, respectively, due to data restrictions.	+	-

Note: This table shows variable descriptions, measurement, and the predicted sign in the REM and AEM models.

3.3 Empirical Models

Our hypothesis is tested using Equations 10 and 11. Equation 10 is run first as REM is employed by firms prior to AEM during a given reporting period:

$$|\boldsymbol{REM}|_{i,t} = \alpha_0 + \alpha_1 LEV_{i,t} + \alpha_2 MKT\_S_{i,t-1} + \alpha_3 ZSCORE_{i,t-1} + \alpha_4 TAX_{i,t} + \alpha_5 BIG4_{i,t} + \alpha_6 NOA_{i,t-1} + \alpha_7 CYCLE_{i,t-1} + \alpha_8 SIZE_{i,t} + \alpha_9 ROA_{i,t} + \alpha_{10} INVREC_{i,t} + \alpha_{11} LOSS_{i,t-1} + \alpha_{12} EU_{i,t} + \varepsilon_{i,t} \quad (10)$$

$$|\boldsymbol{AEM}|_{i,t} = \beta_0 + \beta_1 LEV_{i,t} + \beta_2 MKT\_S_{i,t-1} + \beta_3 ZSCORE_{i,t-1} + \beta_4 TAX_{i,t} + \beta_5 BIG4_{i,t} + \beta_6 NOA_{i,t-1} + \beta_7 CYCLE_{i,t-1} + \beta_8 SIZE_{i,t} + \beta_9 ROA_{i,t} + \beta_{10} INVREC_{i,t} + \beta_{11} LOSS_{i,t-1} + \beta_{12} EU_{i,t} + \beta_{13} UNEXP.REM_{i,t} + \beta_{14}(UNEXP.REM_{i,t}\ x\ LEV_{i,t}) + \varepsilon_{i,t} \quad (11)$$

Where: $|AEM|_{i,t}$ = absolute value of accrual-based earnings management; $|REM|_{i,t}$ = absolute value of total real activity-based earnings management; $LEV_{i,t}$ = leverage ratio of each firm-year observation. Leverage is the proportion of financial leverage to total assets. $MKT\_S_{i,t}$ = a proxy for market leader status; $ZSCORE_{i,t}$ = categorical variable proxying the Altman's Z-Score for non-listed firms; $TAX_{i,t}$ = corporate taxes for period t; $BIG4_{i,t}$ = dummy variable which takes the value of 1 if the firm engages a Big-4 audit company, and zero otherwise; $NOA_{i,t-1}$ = net operating assets, measured as the accruals managed in the previous year; $CYCLE_{i,t-1}$= days receivables plus the days inventory less the days payable at the beginning of the year; $SIZE_{i,t}$ = firm size; $ROA_{i,t}$ = return on assets ratio; $INVREC_{i,t}$ = sum of inventory and receivables, scaled by total assets; $LOSS_{i,t-1}$= if a firm reported a negative earnings in previous year, the dummy variable takes the value 1; $EU_{i,t}$ = gauge of environmental uncertainty; $UNEXP.REM_{i,t}$ = estimated residuals from Equation 10; ($UNEXP.REM_{i,t}$ x $LEV_{i,t}$) is the multiplicative term of our interest, indicating the unexpected amount of REM for the leverage ratio; and $\varepsilon_{i,t}$ = model error term.

In Equation 11 we add the multiplicative term $UNEXP.REM_{i,t}$ x $LEV_{i,t}$, the variable of main interest here, proxied by the residuals from Equation 11, $UNEXP.REM$, along with the leverage ratio of each firm-year observation. If the leverage ratio affects the relationship between REM and AEM the coefficient of the multiplicative term should be positive and significant.

We commence by examining the variable $LEV_{i,t}$ proxying for the leverage ratio. We predict a negative relationship between AEM and $LEV_{i,t}$, as this EM technique may attract the scrutiny of lenders (Jensen, 1986). We also expect a negative relationship between REM and the variable $LEV_{i,t}$ as firm leverage increases the costs associated with REM in term of its impact on firm's cash flows (Zang, 2012).

The control variable $UNEXP.REM_{i,t}$ is measured as the residuals from Equation 10, and shows the degree to which REM differs from expectations. We predict a positive and significant relationship between AEM and this control variable, as the extent of AEM depends on the amount of EM realized by REM. This may be explained by the circumstance that REM cannot be perfectly controlled by managers during the reporting period because

this EM technique is undertaken by changing business operations. Therefore, the effects on the reported earnings can be known only at the end of the reporting period (Gao et al., 2017), when the draft of financial statements is prepared.

3.3.1 Description and Measurement of the Control Variables

Following the prior literature, we include both control and firm characteristic variables in the models that are likely to be potential drivers of each EM technique (Anagnostopoulou and Tsekrekos, 2017; Gao et al., 2017; Zang, 2012).

Control variables: factors impacting REM

The variable capturing a firm's market leader status MKT_S gauges the inverse costs arising from REM (Zang, 2012). Accordingly, we predict a positive relationship between market leader status and REM.

The variable $ZSCORE$ is based on Altman's Z-Score index (Altman, 2000) and it captures the firm's financial health status at the beginning of the year. Anagnostopoulou & Tsekrekos (2017) find a positive, but not significant, relationship between REM and the Z-Score index, suggesting that the status of financial distress does not impact on REM. Since financially distressed firms face higher costs associated with REM (because of its impact on a firm's cash flows), we expect a negative relationship between REM and the Z-Score.

We control for corporate tax expenses (TAX) since it is a determinant of earnings management (Kuo & Lee, 2019). Zang (2012) finds that higher corporate taxes increase costs when using REM. Anagnostopoulou & Tsekrekos (2017) find no relationship between REM and corporate taxes. On a theory basis, we predict a negative relationship between tax expenses and REM.

Control variables: factors impacting AEM

The engagement of a prominent audit company ($BIG4$) may constrain accrual-based earnings management given the greater skills and industry specialization of such auditors (Baatwah and Al-Qadasi, 2020; Bonacchi *et al.*, 2018; Chi *et al.*, 2011). Accordingly, we expect a negative relationship between AEM and the engagement of a Big-X audit company.

We control for the net operating assets (NOA) ratio at the beginning of the fiscal year. Barton & Simko (2002) argue that the ability to manage accruals in a given year depends on the amount of accruals managed in the prior period. Consistent with this, we expect a similar relation in our model.

We control for the length of the firm's operating cycle ($CYCLE$), an additional measure used to gauge the flexibility of the accounting system. Firms with a long operating cycle may enjoy greater accounting flexibility to manage AEM, and thus reduce the costs associated with this technique (Zang, 2012). Accordingly, we expect a positive relationship between AEM and the length of the operating cycle.

Other control variables

We control for firm size ($SIZE$) as larger firms are likely to have better internal control systems that may constrain earnings management initiatives (Francis *et al.*, 1999). Thus, we expect a negative relationship between size and AEM. We also expect a negative relation between firm size and REM as larger firms are more likely to adopt stronger corporate governance models that inhibit REM initiatives (Tulcanaza-Prieto *et al.*, 2020).

We control for firm profitability, ROA. Profitability gauges the ability of a firm to produce profits using its assets. Low profitability firms have several incentives to manage earnings to signal good performance to investors and lenders (Oktasari, 2020). Cohen et al. (2008) and Cohen & Zarowin (2010) argue that the use of REM may damage firm profitability to a greater extent than the use of AEM (Al-Shattarat *et al.*, 2022). Thus, we expect a negative or no relationship between firm profitability and REM and a positive relationship with AEM.

Following Roychowdhury (2006), we include a variable measuring the sum of inventories and receivables ($INVREC$) on the basis that firms with a large proportion of these assets may enjoy greater flexibility to manage their earnings. Anagnostopoulou & Tsekrekos (2017) find a positive relationship between REM and the proportion of inventories and accounts receivable as such earnings management impacts inventories. Roychwdhury (2006) provides evidence of a positive relationship between this variable and AEM. Therefore, we expect a positive relationship between both REM and AEM and $INVREC$.

A control variable $LOSS$ is introduced for firms reporting negative earnings in the previous year. Roychowdhury (2006) provides evidence that managers of US listed firms are likely to undertake REM to avoid reporting small losses. The literature (Alareeni, 2018) provides evidence that reporting negative earnings does not affect EM initiatives in listed firms (GCC area). Therefore, we predict a negative or no relationship between the control variable for loss and REM. Since negative earnings attract the scrutiny of stakeholders (Jensen, 1986) we predict a negative relationship between AEM and the loss variable.

Finally, we control for environment uncertainty with the variable EU. Gao et al. (2017) find a negative relationship between this variable and both AEM and REM in listed firms. However, we argue that in an environment of uncertainty, managers have an incentive to improve firm performance using REM as it is harder for stakeholders to detect than AEM. Thus, a positive relationship is expected between environmental uncertainty and REM, while a negative or no relationship is expected for AEM.

4. Results

4.1 Descriptive Statistics

Table 4 gives the descriptive statistics for the continuous variables employed in Equations 10 and 11. In absolute value terms, *REM* and *AEM* have means of 0.190 and 0.080, respectively, suggesting that the amount of EM realized using REM is greater than that realized using AEM.

The mean of continuous variable LEV *i*s 0.188, and it assumes values in the range 0.007 to

0.670.

Table 4. Descriptive statistics for the model continuous variables

(N= 25,696 firms in the sample and 205,568 firm-year observations)

	Mean	SD	Min.	25%	50%	75%	Max
REM	0.190	0.239	0	0.047	0.110	0.231	1.381
AEM	0.080	0.087	0	0.022	0.051	0.103	0.435
LEV	0.188	0.177	0	0.007	0.154	0.319	0.670
TAX	0.355	0.443	-1.619	0.241	0.334	0.473	2.552
INVREC	0.573	0.246	0.017	0.406	0.598	0.768	0.979
EU	0.196	0.223	0.000	0.065	0.120	0.224	1,159
ROA	0.028	0.063	-0.228	0.003	0.018	0.052	0.239
SIZE	9.826	1.362	0.070	9.081	9.696	10.492	17.725

Note: This table shows descriptive statistics for continuous variables in Equations 10 and 11

Sample firms have a mean corporate tax ratio (TAX) of 35.5%, indicating a high degree of taxation on corporate profits. The variable $INVREC$ has a mean of 57.3%, indicating that the sum of accounts receivable and inventories represents more than 50% of total assets, and suggesting significant accounting flexibility in managing earnings. The variable EU has a mean of 0.196, indicating a moderate effect of environment uncertainty on the firm's EM strategy. The variable ROA has a mean of 2.8% and thus firms are on average profitable.

Table 5 provides descriptive statistics for the dichotomous and categorical variables in Equations 10 and 11. The statistics for the $BIG4$ variable show that 23.5% of the firm-year observations evidence financial audit engagement with a Big 4 auditor, while 76.5% of observations show the financial audit assigned by firms to a non-Big4 auditor or to the Board of Statutory Audit (BSA), a mandatory body within the traditional model of Corporate Governance adopted by most Italian non-listed firms (Mariani *et al.*, 2010). In Italy, the shareholders of Italian non-listed firms may assign the financial audit to an audit company (Big-4 or non-Big-4) or to a BSA. The Italian Civil Code established the latter as an independent body to conduct the administrative audit and, where the shareholders agree, the financial audit.

The statistics for the $ZSCORE$ variable show that 27.8% of firm-year observations are classified in the distressed zone (the variable assumes the value 2), while the 61.5% are placed in the grey zone (the value assumes the value 1), and 10.7% are in the healthy zone (the variable assumes the value zero).

The table shows that 17% of firm-year observations reported negative earnings in the previous year ($LOSS$), while the majority of observations (83%) evidence reported profits. 20% of firm-year observations indicate market leader status (MKT_S) in the previous year. Finally, 48.6% of firm-year observations indicate that the length of a firm's operating cycle ($CYCLE$) exceeds the median for each industry sector/year, suggesting significant accounting flexibility in such firms.

Table 5. Descriptive statistics for the dichotomous and categorical variables

Firm units: 25,696 – Firm year observations: 205,568			
	Levels	Obs.	%
BIG4	0	157,328	76.5
	1	48,240	23.5
ZSCORE	0	21,964	10.7
	1	126,379	61.5
	2	57,225	27.8
LOSS	0	170,724	83.0
	1	34,844	17.0
MKT_S	0	164,505	80.0
	1	41,063	20.0
CYCLE	0	105,733	51.4
	1	99,835	48.6
Total		205,568	100%

Notes: This table shows frequencies for the dummy and categorical variables in Equations 10 and 11.

4.2 Correlation Matrix

Table 6 presents the Pearson (below diagonal) and Spearman (above diagonal) correlations between the model variables of Equations 10 and 11. We comment only on the relationships concerning the main model variables (the cost factors) and their association with the dependent variables REM and AEM. The correlation between the variables REM and AEM is significant and positive, and thus AEM and REM use is often complementary in firms. The variable *LEV* has a significant negative correlation with both REM and AEM. It appears that earnings management is reduced when there is an increase in financial leverage, and the pressure of debt covenants and strict audits for leveraged firms leads to a constraint on opportunistic managerial behavior.

Table 6. Pearson/Spearman correlation matrix for the model variables (N= 25,696 firms; 205,568 firm-year observations)

	REM	AEM	LOSS	LEV	MKT_S	ZSCORE	TAX	BIG4	NOA	CYCLE	ROA	INVREC	EU	SIZE
REM	--	0.143***	0.075***	-0.131***	0.007**	-0.089***	-0.074***	0.051***	-0.117***	-0.04***	0.065***	0.08***	0.132***	-0.039***
AEM	0.219***	--	0.091***	-0.09***	-0.012***	-0.012***	-0.057***	0.069***	-0.054***	-0.06***	0.05***	-0.055***	0.106***	-0.021***
LOSS	0.08***	0.061***	--	0.032***	-0.051***	0.217***	-0.178***	0.09***	0.185***	-0.022***	-0.431***	-0.046***	0.035***	0.027***
LEV	-0.111***	-0.078***	0.046***	--	-0.002	0.135***	0.062***	-0.167***	0.374***	0.115***	-0.238***	0.052***	-0.021***	0.024***
MKT_S	-0.003	-0.02***	-0.051***	-0.002	--	-0.163***	-0.021***	0.276***	-0.085***	-0.0	0.114***	0.083***	0.012***	0.592***
ZSCORE	0.06***	0.009***	0.209***	0.132***	-0.166***	--	-0.069***	0.059***	0.497***	-0.029***	-0.317***	-0.38***	-0.018***	0.175***
TAX	-0.026***	-0.04***	-0.103***	0.123***	-0.012***	-0.039***	--	-0.116***	0.019***	0.046***	-0.087***	0.148***	-0.05***	-0.086***
BIG4	0.047***	0.086***	0.09***	-0.196***	0.276***	0.055***	-0.07***	--	0.025***	-0.054***	0.036***	-0.09***	0.021***	0.308***
NOA	-0.087***	-0.039***	0.185***	0.379***	-0.085***	0.497***	0.008***	0.025***	--	0.066***	-0.346***	-0.064***	0.034***	0.157***
CYCLE	-0.056***	-0.075***	-0.022***	0.115***	-0.0	-0.016***	0.031***	-0.054***	0.066***	--	-0.002	0.24***	-0.058***	0.005*
ROA	0.028***	-0.004	-0.389***	-0.27***	0.086***	-0.279***	0.028***	0.007***	-0.298***	-0.004	--	-0.009***	0.009***	-0.002

INVREC	0.079***	-0.07***	-0.054***	0.066***	0.093***	-0.394***	0.086***	-0.099***	-0.076***	0.254***	-0.012***	--	0.033***	-0.133***
EU	0.17***	0.124***	0.063***	0.004	-0.016***	0.045***	-0.025***	0.052***	0.047***	-0.086***	-0.042***	0.096***	--	-0.01***
SIZE	-0.039***	-0.017***	0.027***	0.018***	0.592***	0.171***	-0.046***	0.308***	0.157***	0.005*	-0.008***	-0.139***	0.01***	--

Notes: This table reports pairwise Pearson (below diagonal) and Spearman (above diagonal) correlations for the model variables in Equations 10 and 11. All p-values < 0.001 = ***, p-values < 0.01 = **, and p-values < than 0.05 = *.

The variable $ZSCORE$ is significantly positively correlated with both AEM and REM, and thus distressed firms are likely to undertake both earnings management techniques to reduce the risk of financial difficulties. The variable NOA has a significant negative correlation with REM and AEM, indicating that accruals managed in the previous year do not incentivize the use of earnings management techniques. The variable TAX is significantly negatively correlated with REM and significantly positively correlated with AEM. Thus, the managers of firms facing a high corporate tax ratio are less likely to engage in REM and more likely to engage in AEM. The $BIG4$ variable shows a significant positive correlation with both REM and AEM and thus the engagement of a more prominent auditor appears not to constrain earnings manipulation activity. Finally, the negative correlation of the variable $CYCLE$ with both AEM and REM indicates that firms with a shorter operating cycle enjoy more accounting flexibility in undertaking both AEM and REM.

4.3 Regression Model Results

Table 7 reports linear regression model results for REM and AEM as given in Equations 10 and 11, respectively, for the full sample. The adjusted R^2 is 32.16% for the REM model and 12.72% for the AEM model. The F-statistic is significant at the 1% level for both models. To address potential autocorrelation issues, Equations 10 and 11 are computed using Petersen (2009) robust standard errors clustered for firms. Independent variables were winsorized at the 5% level (two-tails) when outliers were present. Finally, we control for year and industry sector to avoid problems with heteroscedasticity and multicollinearity. The VIF is less than 2 for all variables across the two equations.

Table 7. The earnings management regression OLS models with standard robust errors clustered by firms (Petersen, 2009)

	Equation 10		**Equation 11**	
	Dependent variable: REM		Dependent variable: AEM	
	Pred. sign	*Coefficient*	*Pred. sign*	*Coefficient*
Const		0.548***		0.236***
		(0.026)		(0.010)
$LEV_{i,t}$	-	-0.098***	-	-0.020***
		(0.004)		(0.001)
$UNEXP.REM_{i,t}$			+	0.074***
				(0.002)
$(UNEXP.REMxLEV)_{i,t}$			+	0.034***
				(0.009)
Control variables (costs associated with REM)				

MKT_S	+	0.017***		0.002**
		(0.017)		(0.001)
ZSCORE:				
Grey area [1]	-	-0.088***		-0.013***
		(0.003)		(0.001)
Distress zone [2]	-	-0.057***		-0.010***
		(0.003)		(0.001)
TAX	-	-0.021***		-0.006***
		(0.002)		(0.000)
Control variables (costs associated with AEM)				
BIG4		0.027***	-	0.016***
		(0.002)		(0.001)
NOA		0.000	-	-0.000***
		(0.000)		(0.000)
CYCLE		-0.000***	+	-0.000***
		(0.000)		(0.000)
Other control variables (firm characteristics):				
EU	+	0.141***	-	0.038***
		(0.004)		(0.001)
INVREC	+	0.061***	+	-0.015***
		(0.004)		(0.001)
LOSS	-	0.047***	-	0.017***
		(0.002)		(0.001)
ROA	-	0.247***	+	0.027***
		(0.022)		(0.005)
SIZE	-	-0.023***	-	-0.006***
		(0.001)		(0.000)
Firm-year Obs.		205,568		205,568
Adj. R-square		32.16%		12.72%
Root MSE		0.197		0.082
F-test		324.98***		143.96***
Control for:				
Firm		Yes		Yes
Year		Yes		Yes
Industry		Yes		Yes
VIF < 2 for all variables		Yes		Yes

Note: This table reports results for the regression estimation of Equations 10 and 11, respectively. In the full sample there are 205,568 firm-year observations, that is 25,696 firms over the 8 years from 2012 to 2019. Robust standard errors (Petersen, 2009) are reported in parentheses. Variable measurement is given in Table 3. Decimals are rounded at the third decimal. Statistical significance levels are reported as follows: *** = 1%; ** = 5%; * = 10%.

Our research hypothesis predicts that highly indebted non-listed firms are likely to use REM and AEM as complements to achieve their desired earnings targets to satisfy lenders. Therefore, the variable of central importance in our analysis is ($UNEXP.REM$ x LEV) in Equation 11. As expected, this variable has a positive coefficient which is significant at the 1% level, indicating that indebted firms are likely to complement REM with AEM in a strategy to boost current earnings to achieve desired earnings targets. This strategy may be very harmful for lenders since a part of the total EM realized (REM) is hard to detect. In addition, the descriptive statistics (Table 3) indicate that, on average, the amount of REM is systematically higher than the amount of AEM for each research period, suggesting that managers are likely to realize the majority of EM undertaking REM (Graham *et al.*, 2005), therefore misleading lenders who may believe that reported earnings have been realized in the normal course of business and not as a predetermined EM strategy.

Our finding is consistent with Anagnostopoulou & Tsekrekos (2017) and our study hypothesis is thus supported.

For AEM, the term $LEV_{i,t}$ has a negative sign, as expected, significant at the 1% level. Consistent with the control hypothesis (Jensen, 1986), our finding suggests that leverage constrains AEM initiatives. In the REM model, the coefficient for this variable is negative and significant at the 1% level, confirming that leverage also constrains REM due to its costliness, especially for indebted firms.

The coefficient of the variable $UNEXP.REM$ is positive and significant at the 1% level in the AEM model, contrary to previous literature (Anagnostopoulou and Tsekrekos, 2017). This finding provides evidence that non-listed firms are likely to complement REM with AEM even where they are not leveraged. This may be explained by the circumstance that REM cannot be controlled by managers until the end of the reporting period, therefore managers adjust the unexpected amount or EM realized by REM with AEM.

We control for the costs associated with REM and AEM, as well as for other firm characteristics influencing earnings management initiatives.

Costs associated with REM

In non-listed firms, MKT_S is significantly positively related to REM (at the 1% level) and to AEM (at 5% level). These findings are partially consistent with Zang (2012), though not with Anagnostopoulou & Tsekrekos (2017), and indicates that the status of market leader drives both EM techniques.

As expected, and inconsistent with the prior literature (Anagnostopoulou and Tsekrekos, 2017), the $ZSCORE$ variable is significantly negatively related to REM and to AEM (at the 1% level) for both firms belonging to the grey and distressed zone. These findings suggest that firms experiencing financial difficulties have less incentive to employ either REM or AEM because of their costs and impact on cash flows.

Consistent with expectations (Zang, 2012), the variable TAX has a negative sign which is significant at the 1% level in both the REM and AEM models. REM imposes a wealth

transfer from firm to tax administration, while AEM increases the visibility to tax authorities and the consequential possibility of a tax audit(Garrod *et al.*, 2011). Thus, our empirical findings for this variable do not support those of the prior literature (Anagnostopoulou and Tsekrekos, 2017; Zang, 2012).

Costs associated with AEM

Contrary to expectations, the variable $BIG4$ exhibits a positive relationship with AEM which is significant at the 1% level. This finding indicates that Big 4 audit companies do not constrain AEM, a finding that is not consistent with the extant literature (Anagnostopoulou and Tsekrekos, 2017; Zang, 2012). As expected, this variable has a positive and significant relationship with REM at the 1% level, as such EM initiatives do not impact auditor opinion, a finding consistent with the existing literature (Chi *et al.*, 2011).

The variable NOA is not significant in both AEM and REM models, indicating that the amount of accruals managed in previous year do not drive AEM and REM in the subsequent period. Our findings are not consistent with prior literature (Anagnostopoulou and Tsekrekos, 2017; Zang, 2012).

Finally, the variable $CYCLE$ has a negative relationship with AEM and REM which is significant at the 1% level, a result which is contrary to expectations. The result suggests that the length of the operating cycle does not impact both AEM and REM, a finding that is partially consistent with the previous literature (Anagnostopoulou and Tsekrekos, 2017; Zang, 2012).

Other control variables

The environmental uncertainty variable, EU, has a positive relationship with REM which is significant at the 1% level. Thus, as environmental uncertainty increases, managers are likely to engage more in REM. However, this finding is inconsistent with the extant literature (Gao et al., 2017). The environmental uncertainty variable evidences a positive relationship (significant at the 1% level) in the AEM model, a finding that is consistent with the extant literature (Gao et al., 2017).

Contrary to expectations, the accounting flexibility control variable, $INVREC$, has a negative relationship with REM which is significant at the 1% level. Contrary to expectations, the relationship is also negative and significant at the 1% level in relation to AEM. Our results are partially consistent with Roychowdhury (2006) and suggest that the accounting flexibility is reduced when the proportion of investments in inventory and account receivables is high.

Contrary to expectations, the control variable $LOSS$ has a positive relationship with REM which is significant at the 1% level, and contrary to Gao et al. (2017). Further, contrary to expectations and to the extant literature (Gao et al., 2017), the variable exhibits a significant positive relationship with AEM at the 1% level. These findings suggest that firms are likely to engage both in REM and AEM when they have reported a loss in the previous year.

Contrary to expectations, the control variable ROA has a positive relationship with REM which is significant at the 1% level. However, consistent with expectations (Gao et al., 2017),

ROA is significantly positively related to AEM (at the 1% level).

Finally, consistent with expectations, the control variable $SIZE$ has a negative relationship with REM which is significant at the 1% level. This finding suggests that larger firms are more likely to adopt stronger corporate governance models that inhibit REM initiatives (Tulcanaza-Prieto *et al.*, 2020). Consistent with the prior literature (Francis et al., 1999; Campa, 2019) and expectations, the variable $SIZE$ has a negative sign in the AEM model which is significant at the 1% level. The result here indicates that larger firms have better internal control systems that inhibit AEM initiatives (Campa, 2019).

5. Conclusions and Limitations

This research aims to investigate whether the degree of financial leverage impacts the coordination of REM and AEM. As leverage may attract greater scrutiny from lenders (Jensen, 1986), we hypothesize that levered firms are likely to maximize the impact of earnings management on reported earnings through the complementary use of REM and AEM. However, such a strategy may be harmful to lenders as REM is hard to detect and it imposes high costs on borrowers in term of cash flows (that reduce the ability to repay loans and interest at the maturity date).

Examining a large balanced sample of Italian non-listed firms over the period 2012-2019, we provide evidence that firm managers are likely complement REM and AEM when they are indebted. We also find that in relation to the costs associated with REM, consistent with expectations, the status of market leader positively drives REM, while the status of financially distressed firms and the corporate tax burden negatively drive REM. In addition, distressed firm status appears to reduce the employment of AEM since firms experiencing financial difficulties are under the greater scrutiny of banks. For those costs associated with AEM, only the length of the operating cycle constrain AEM initiatives, while, surprisingly, the engagement of a Big-4 auditor fails to constrain the use of AEM. Further, the engagement of such an auditor does not constrain REM initiatives, while the length of the operating cycle has a negative impact on their use.

Our research has practical implications for academics, regulators, and lenders. Academics may better understand the EM strategy of non-listed firms which maintain higher leverage. This is an important topic to investigate as non-listed firms are financed in the main by bank loans, and so the quality of financial information impacts debt agreements. Our research is also relevant to regulators who can then better assess the EM environment of highly indebted non-listed firms, thereby identifying how to constrain EM and improve financial reporting quality. Finally, our research should be of relevance to lenders (such as banks) such that they may more readily understand that where they detect a low level of accrual-based earnings management this does not necessarily indicate that there is lower EM as a whole in higher leveraged firms, as such firms may also engage in REM as a complementary activity.

There are two main limitations of our study. The first is the inability to use all three real earnings management metrics as in the previous literature (Roychowdhury, 2006) due to limitations in the format of the financial statements adopted by non-listed Italian firms and to

the absence of mandatory disclosure of R&D expenses. The second limitation is that the analysis focuses solely on the Italian context. However, extending the analysis to additional countries would require a comprehensive knowledge of domestic accounting standards in those countries. It would be interesting to investigate other European contexts in order to provide the IASB and other institutions with useful information concerning the EM strategies of non-listed firms. This would help to improve the assessment criteria of IFRS and EU regulation for SMEs to constrain REM initiatives.

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