Differential information consequences of real *versus* accruals earnings management

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Abstract

Real and accruals earnings management differ across a number of dimensions such as their level of visibility, accountability and also, their associated costs. Certain real actions, such as R&D cuts or asset sales, are hardly opaque, and hence, it is likely that expert users of financial statements are able to undo their effects, at least, partially. However, prior research argues that real earnings management may be more difficult to monitor both by insiders and outsiders, who may struggle to estimate deviations from optimal behaviour. Given this uncertainty about their relative visibility, it is unclear the extent to which market participants fully understand these strategies, how they affect the firm information environment, and particularly, whether unravelling the bias introduced by real earnings management is truly a simple exercise. In this paper, we study the differential information consequences of these two earnings management techniques. We find that both types of earnings management garble the earnings signal, but consistent with our expectations, the evidence suggests that real earnings management is easier to undo for expert financial statement users, such as analysts.

Keywords: *Accrual earnings management, real earnings management, manipulation of real operating activities*

Data Availability: *Data is available from the sources identified in the paper.*

JEL Classification: *G10, G31, M41.*

I. INTRODUCTION

We study the information consequences of real and accruals earning management. Prior literature argues that real and accruals earnings management fundamentally differ across their associated costs (Schipper 1989, Gunny 2010, Zang 2012), but it does not provide direct evidence on whether they differently impact the firm information environment. Whilst it is widely accepted that real and accruals earnings management have different impacts on firm future cash flows and their associated risks, it is unclear to what extent these two forms of earnings management may differently mask underlying trends in fundamental variables needed to estimate firm revenues and future earnings growth. We aim to provide evidence on this issue by analyzing the visibility of real versus accruals earnings management, focusing on whether expert financial statements users such as analysts can differently see through these strategies.

The manipulation of real operating, financing and investment decisions to achieve financial reporting goals, although costly for the firm, is predicted to be more difficult to monitor by auditors, directors or courts, who may struggle to estimate deviations from optimal behaviour. Given the difficulties inherent to the monitoring of such actions, it is likely that the strategic timing and structuring of transactions may actually be preferred by managers to manipulate earnings (Graham et al. 2005). However, the real actions studied in prior literature are hardly opaque. The trimming of research and development, advertising or other discretionary expenses (Bushee 1998), the sale of assets (Bartov 1993), or the introduction of more aggressive credit terms (Roychowdhury 2006) are potentially obvious red flags that accounting numbers may be manipulated that should be observable by expert analysts tracking the firm. Hence, it could be argued that such financial statement users should be able to undo them with relative ease.

Despite this purported visibility, it is unclear i) the extent to which market participants fully understand these strategies and how they affect the firm information environment, and ii) whether unravelling the bias introduced by real earnings management is truly a simple exercise, given the opacity of some of these strategies.

In line with this view that real earnings management may be difficult to detect and unravel, when looking at the roles of accruals and real activities manipulation in inducing overvaluation at the time of a seasoned equity offering, Kothari et al. (2012) conclude that investor's ability to detect earnings management and assess its consequences for future performance is more impaired by real earnings management than by accruals manipulation.

In related research, Bhojraj et al. (2009) and Gunny (2010) provide conflicting evidence and mixed views on the consequences of real earnings management. Bhojraj et al. (2009) show that, in the short-term, firms reducing discretionary expenses to beat analysts' forecasts have stock returns that are equal or better than firms that miss their targets while maintaining their level of discretionary expenses, but also, that this trend reverses over a 3-year horizon, which may be consistent with real earnings management garbling the earnings signal at least in the short-term. They argue this is consistent with real earnings management being opportunistic in nature. However, the evidence in Gunny (2010) indicates that firms that engage in real earnings management can obtain mid- to long-term benefits in the form of increased operating performance. She interprets this result as indicating that real earnings management allows the firm to perform better in the future or to signal improved future performance.

Given the mixed views and theories in prior research, we add to this literature by directly studying the differential information consequences of real versus accruals earnings management. To do so, we follow the method in Ball and Shivakumar (2012) and García Lara et al. (2013),

and study the impact of these differing earnings management techniques on the work of financial analysts, by looking at the accuracy and dispersion of their forecasts. If real earnings management is indeed visible and relatively easy to undo, we expect that it should not affect the firm information environment (or at least, that it will affect it less than accruals earnings management), thereby leading to greater accuracy and lower dispersion in analysts' forecasts than accruals earnings management. In contrasts, if real earnings management increases information uncertainty, it should lead to lower efficiency of analysts' forecasts (e.g., Pastor and Veronesi 2003).

Using a large sample of US firms for the period 1988-2010 we test these predictions. For our tests, we create measures of accruals-based manipulation using Jones (1991) type models, and of real earnings management following the work of Roychowdhury (2006). Using these proxies, we look at the differential information effects of real versus accruals-based earnings management. Our tests yield the following key findings. We find evidence of a positive association between accruals-based earning management and both analysts forecasts errors and the dispersion in forecasts. This is consistent with the findings of Rajgopal and Venkatachalam (2011) and indicates that accruals-based earnings management decreases earnings quality, leading to greater information uncertainty and thus, to a poorer firm information environment. However, we find the opposite holds true for real earnings management. We generally find no evidence of real earnings management garbling the earnings signal for analysts. This may suggest analysts are able to see through this type of manipulation and assess its future consequences. Our results are robust to the use of different proxies of earnings management.

We also study the time-dimension of this phenomenon, expanding the time-period analyzed by Rajgopal and Venkatachalam (2011). These authors focus on the period 1962-2001.

We consider in our sample the years after the passage of the Sarbanes-Oxley Act (SOX), which led to an improvement in the monitoring of the financial reporting system and to a decrease in accruals-based manipulation, albeit at the expense of increases in real earnings management (Cohen et al. 2008). We find no evidence of deteriorations in analysts' work in the last three decades. Our analysis of the post-SOX period suggests that the documented trend of increases in idiosyncratic return volatilities driven by decreased accounting quality was reduced after the passage of SOX. This could be interpreted as consistent with SOX governance measures leading to increases in earnings quality, or alternatively, to easier discovery of true earnings quality by expert financial statement users.

As a final test, we use an alternative proxy for the firm information environment and look at the association between accruals and real earnings management and idiosyncratic stock returns volatility. The results from this test confirm the evidence in Rajgopal and Venkatachalam (2011). We find a positive association between accruals manipulation and idiosyncratic stock returns volatility. We also find some evidence of a positive link between real earnings management and idiosyncratic volatility. This result is consistent with real earnings management altering the distribution of firm future cash flows and potentially, their associated risks (Gunny 2010, Kothari et al. 2012), giving rise to uncertainty about the future outlook of the firm. This final test completes and contrasts with the analysts' forecasts tests, which focus more directly on the information consequences of earnings management strategies. This is consistent with the analysts tests isolating the visibility effect of earnings management rather than the real business effects.

We contribute to the literature along a number of dimensions. First, we add to the recent literature on real earnings management. This literature commonly assumes that real earnings management practices are more visible than accruals-based ones. Our evidence is consistent with

differential information consequences of real versus accruals earnings management, suggesting that relatively obvious types of real manipulation (such as the trimming of R&D and advertising expenses) are visible to expert market participants such as analysts and do not interfere with their job, as predicted. We also contribute to the extant literature on analysts' behaviour, by providing new evidence consistent with analysts seeing through real earnings management practices. Finally, our results contribute to the literature on the consequences and effectiveness of the passage of economy-wide corporate governance regulations, by suggesting that the increases in returns volatility driven by poor earnings quality documented in Rajgopal and Venkatachalam (2011) have been reduced after the passage of SOX.

The remainder of the paper is structured as follows. Section 2 reviews the prior literature and presents the hypotheses. Section 3 presents the methodology. The results are discussed in section 4, and finally, section 5 concludes.

II.BACKGROUND AND HYPOTHESES DEVELOPMENT

In this section, we briefly review the prior literature indicating that the extent to which differing earnings management strategies (accruals-based versus real earnings management) succeeds in misleading investors depends on their relative opacity. Then, we present our hypothesis on the expected differential information consequences of these two types of manipulation.

Real versus accrual-based earnings management

Accrual accounting is at the core of the financial reporting system and involves a myriad of judgments and estimations. Extant research shows that managers use the discretion inherent to accrual calculation to alter accounting numbers both for opportunistic and informative purposes.

Earnings management occurs when managers use this flexibility with the intent to mislead firm stakeholders about the underlying true economic performance of the firm.[1] Aside from this (purely accounting) accrual-based type of manipulation, earnings can also be managed by strategically timing and structuring transactions. This manipulation is denoted real earnings management, as it involves real operating, investment or financing decisions (Schipper 1989). For example, management may opportunistically increase earnings by reducing research and development and other discretionary expenses (Bushee 1998), by strategically timing the sale of some assets (Herrmann et al. 2003), by increasing production to decrease unit costs, or by increasing credit sales or aggressively offering discounts (Roychowdhury, 2006).

Each type of manipulation differs in its expected benefits and costs and recent research shows that management trades-off the costs and benefits of the differing strategies when selecting earnings management instruments (Zang 2012, Burnett et al. 2012). In terms of visibility and accountability, it is conceivable that management likely prefers real earnings management, since it may be easier to disguise it as normal activity, whilst managers have to answer for any accounting decisions that lead to earnings that fail to accurately reflect true economic performance before auditors, corporate boards, audit committees, shareholders, and even courts (Lo, 2008). It is however less likely that they have to respond for difficult-to-monitor operating, investment or financing decisions that fully fall within their responsibilities and that are beyond the scrutiny of auditors, regulators and enforcement bodies.

In terms of firm value, real manipulation often involves suboptimal decision, making it a costly type of manipulation (Bhojraj et al. 2009; Cohen and Zarowin 2010) and therefore,

[1] See Healy and Wahlen (1999) and Dechow and Skinner (2000) for reviews of the earnings management literature.

potentially, a last resort for managers. However, in the presence of persistent earnings management incentives and sufficiently strict monitoring over the financial reporting system, managers may opt to manipulate real decisions to meet their earnings goals, regardless of the associated costs, particularly, given its lower visibility. In line with this view, the work of Burnett et al. (2012) shows that stricter monitoring by auditors over the financial reporting process induces greater real earnings management. The survey study conducted by Graham et al. (2005) more generally indicates that managers may in fact prefer real to accrual-based earnings management. That survey was conducted, however, in a period of increased accounting scrutiny, right after the spate of accounting scandals that led to the demise of Arthur Andersen and the passage of the Sarbanes-Oxley Act of 2002 (SOX). Hence, at that time, managers were likely immersed in the switch from accruals to real earnings management that is documented in Cohen et al. (2008). In fact, Cohen et al. make precisely that argument, and suggest that firms switched to real activities manipulation because although it is potentially more costly for the firm, it is less costly for managers, as it is harder to detect or, at least, to question. The evidence in Cohen and Zarowin (2010), Badertscher (2011), Zang (2012) and Wongsunwai (2012) confirms this view that managers choose among instruments depending on their expected net benefits.

Differential information consequences of accruals versus real earnings management

A large literature in accounting and finance suggests that financial statements quality can mitigate information asymmetry problems. In particular, it is argued that firm accounting treatments and disclosure policies can influence the firm information environment (information risk) and, therefore, affect the firm cost of capital or its idiosyncratic volatility (Easley and O'Hara 2004, Francis et al. 2005, Lambert et al. 2007). This literature commonly uses earnings quality, as measured by accruals-based earnings management, as a proxy for information risk,

and demonstrates that poorer earnings quality leads to deteriorations in the firm information environment (e.g., Rajgopal and Venkatachalam 2011).[2]

An underlying assumption in this literature is that earnings management reduces the precision of the earnings signal. This would be the case if through earnings manipulation, accounting numbers become uninformative about the firm future outlook and this earnings management is not detectable for investors (or even if it is detectable by users, it is not entirely possible to undo this manipulation to arrive at the true earnings figure). The counter argument to this idea is that earnings management may be perfectly detectable and actually provide information to investors, and thus, increase the value of the earnings signal. The work of Guay et al. (1996), for example, provides evidence that accruals-based earnings management may be informative in nature, while the work of Gunny (2010) indicates real earnings management may also sometimes signal improved future performance.

We add to this prior work by separately studying the information effects of the two types of earnings manipulation that we have briefly reviewed in the above section: accruals-based *versus* real earnings management. Similar to the work of Kothari et al. (2012) we do not focus on managerial attempts to inflate reported figures through either of these mechanisms in isolation. We expect that, for a number of firms, both accruals and real earnings management may take place during the year. We are interested in examining their relative economic consequences as these forms of manipulation are expected to differ along two fundamental dimensions: 1) the extent to which they are detectable (visible) by expert financial statement users; and 2) the extent to which they are informative about the firm future outlook.

[2] In related literature, a number of papers indicate that greater accounting conservatism leads to improvements in the firm information environment (e.g., LaFond and Watts 2008, García Lara et al. 2013).

In particular, and as argued in Gunny (2010), accruals-based earnings management is subject to greater scrutiny both by auditors and regulators such as the Securities and Exchange Commission. Thus, it is expected that the audited financial statements do not contain any obvious, easily detectable, likely to lead to class action litigation, accruals-based earnings management. It is clearly in managers' best interests to dedicate significant effort to reduce the visibility of any (remaining) accruals-based earnings management so that it may go undetected and thus unchallenged by the auditor. On the other hand, operating, financing and investment decisions are controlled by managers, and thus, not as closely monitored by auditors and other corporate governance bodies concerned with financial reporting quality, thereby lowering any visibility concerns. Plus, some of these actions, such as strategically timing asset sales, shaving discretionary expenses in R&D or advertising, or offering more lenient credit terms are hardly opaque measures, and may be detected (and interpreted) by outsiders. Thus, we expect that real earnings management has, overall, greater visibility than accruals earnings management, and therefore, less negative consequences than accruals based earnings management on the firm information environment, leading to our main hypothesis:

> H1: *Accruals-based and real earnings management have different consequences for the firm information environment.*

To ensure that we focus on expert financial statement users, we look at how these two related but different forms of earnings management affect the performance of financial analysts. There is no clear consensus in the prior literature on whether financial analysts are able to see through the manipulation of accounting figures. Some prior studies find that analysts do not fully impound in their forecasts relevant accounting information (Abarbanell and Bushee 1997). In particular, consistent with the view that earnings management obfuscates the earnings signal, Burgstahler

and Eames (2003) provide evidence that analysts are unable to identify firms that engage in earnings management and often predict earnings management that is not realized. These studies question the ability of analysts to aid investors in understanding the implications of managerial accounting choices. Contrary to these findings, several studies show that analysts predict future earnings more accurately than time-series statistical models, and that their forecasts are less biased than the earnings expectations embedded in share prices (Brown et al. 1987, Abarbanell and Bernard 1992). Thus, the issue of whether accruals based earnings management affects analysts' behaviour remains an issue of interest.

Regarding real earnings management, although some papers analyse the stock market consequences of inefficient operational decisions (Bhojraj et al. 2009, Kothari et al. 2012), we are not aware of any prior study that directly analyses whether real earnings management affects the accuracy and variability of analysts' earnings forecasts. This is also the first study, to the best of our knowledge that directly analyses the differential information consequences of the two types of earnings management.

III. RESEARCH DESIGN

To study the differential information consequences of real versus accruals earnings management on the information environment for expert financial statement users, we run the following simple regression that models our proxy of the firm's information environment (InfoENV) as a function of the level of prior-period accruals and real earnings management and controls:

$$InfoENV_{it+1} = \alpha_0 + \alpha_1 AEM_{i,t} + \alpha_2 REM_{i,t} + \delta Controls_{it} + \varepsilon_{it+1} \quad (1)$$

Where, InfoENV is either analysts' forecasts accuracy (FERR), or analysts' forecasts dispersion (FVAR). In sensitivity analysis, we also look at stock returns variability as a proxy for the firm information environment. AEM is our measure of accruals-based earnings management, and REM is our measure of real earnings management, and *i* and *t* are the firm and period indicators, respectively. The following section describes in detail the measurement of AEM and REM.

Analysts forecast accuracy (FERR) is the earnings-per-share (EPS) forecast error, measured as the absolute value of the difference between the mean forecast EPS and the actual EPS, scaled by the actual EPS. The forecast is taken in the tenth month of the fiscal year from IBES summary data. Forecasts variability (FVAR) is calculated as the standard deviation of the earnings forecasts scaled by the mean earnings consensus.

A fundamental issue in model (1) is timing. Real earnings management is expected to take place during the year (*t*). No real actions can be taken after the fiscal year end that may impact on current period's earnings. Accruals earnings management is also expected to take place during the year (*t*) but particularly, in the last quarter (Das et al. 2009). Indeed, decisions on the required level of accruals earnings management required to meet existing targets may be taken several weeks *after* the fiscal year end, when management prepares the financial statements for the year (Zang 2012). This relative timing of events may mean that real and accruals earnings management become visible to analysts at different times during the year. Real earnings management would be visible earlier and more fully than accruals earnings management, the extent of which may not be observable at all until the earnings of the last quarter of the year are revealed during the first quarter of *t*+1. To overcome this issue, the forecasts are taken in the tenth month of *t*+1, when both the accruals and the real earnings management of period *t* must have been observed by analysts. In this way, we may assess if

these types of earnings management influence the ability of analysts to formulate predictions of the following year's earnings. We impose a minimum of three earnings forecasts per firm-year. If both types of earnings management obfuscate the earnings signal, they will lead to greater forecast errors and dispersion in analysts' forecasts (positive α_1 and α_2).

Following Rajgopal and Venkatachalam (2011), in model (1) we also control for i) cash flow volatility (CFOVAR); ii) operating performance (CFO); iii) stock return performance (Ret) and its square (Ret2); iv) firm size (Size); v) firm book-to-market (BM); vi) leverage (Leverage); vii) number of analysts following (Analysts); viii) the proportion of institutional holdings (Institutions); and ix) audit quality (Auditing). All variables are defined in the Appendix.

Earnings management measures

Our measure of accruals earnings management (AEM) is the discretionary accruals obtained from the modified Jones (1991) model, as proposed by Dechow et al. (1995). To measure real earnings management, we use the proxies in Roychowdhury (2006): abnormal production costs and abnormal discretionary expenses, and combine them into a single measure (REM). In the next subsections, we explain the calculation of each of these proxies.

Accrual-based earnings management proxy

Our proxy AEM is based on the residuals of the modified Jones model (Dechow et al., 1995):

$$TAccr_t /Assets_{t-1} = \alpha + \beta_0\, 1/Assets_{t-1} + \beta_1\, (\Delta Sales_t - \Delta REC_{it}) /Assets_{t-1} + \beta_2\, PPE_t/Assets_{t-1} + \beta_3\, ROA_{t-1} + \beta_4\, SG_t + \varepsilon_t \quad (2)$$

where total accruals (TAccr) is the difference between earnings before extraordinary items and cash flows from operations reported in the statement of cash flows, ΔSales is change in sales,

ΔREC is the change in accounts receivable and PPE is gross property, plant and equipment. All the variables, including the intercept are scaled by total assets at the end of year t-1. We also include an unscaled intercept in all our regressions. To control for the influence of firm performance and growth, we follow the recommendations of Kothari et al. (2005) and Collins et al. (2012) and also include as additional regressors lagged ROA (defined as net income scaled by total assets) and current growth in sales (SG). These controls for performance and growth are included in the estimation of all our proxies for earnings management. Model (3) is estimated for each 2-digit SIC industry-fiscal year grouping, imposing a minimum of 15 observations per regression. Finally, we take the annual decile rankings of the residuals of this model as our proxy for discretionary accruals, which we denote as AEM. In our tests, we construct this proxy using the absolute value of the residuals. The interpretation of this ranked measure as follows. Greater values of AEM are associated to poorer earnings quality, and thus, they should lead to greater noise in earnings and more information uncertainty.

Real earnings management proxies

To measure real earnings management, we use a combination of two proxies proposed by Roychowdhury (2006): abnormal production costs and abnormal discretionary expenses. Following Roychowdhury, production costs are modeled as a linear function of contemporaneous sales and of contemporaneous and lagged changes in sales. To estimate this model, we run the following cross-sectional regression for each two-digit SIC industry/fiscal year grouping imposing a minimum of 15 observations per regression:

$$PROD_t/Assets_{t-1} = \alpha + \beta_0\, 1/Assets_{t-1} + \beta_1\, Sales_t/Assets_{t-1} + \beta_2\, \Delta Sales_t/Assets_{t-1} + \beta_3\, \Delta Sales_{t-1}/Assets_{t-1} + \beta_4\, ROA_{t-1} + \beta_5\, SG_t + \varepsilon_t \quad (3)$$

Production costs (PROD) are defined as the sum of costs of goods sold and the change in inventory during the year. The other regressors have already been defined. The residuals from model (4) are our estimate of abnormal production costs (APROD). More positive values of APROD are associated with more income increasing real earnings management.

Our second proxy for real earnings managements is abnormal discretionary expenses. The normal level of discretionary expenses can be expressed as a linear function of lagged sales using the following model for each industry-fiscal year grouping:

$$DEXP_t / Assets_{t-1} = \alpha + \beta_0 \, 1/Assets_{t-1} + \beta_1 \, Sales_t / Assets_{t-1} + \beta_4 \, ROA_{t-1} + \beta_5 \, SG_t + \varepsilon_t \qquad (4)$$

Discretionary expenses (DEXP) are defined as the sum of SG&A, R&D and advertising expenses. The residuals of this model are our estimate of abnormal discretionary expenses (AEXP). More negative values of AEXP are associated with more income increasing real earnings management.

Finally, we follow Cohen and Zarowin (2010) and Zang (2012) and aggregate the two measures into one proxy (REM), by adding APROD and -1*AEXP. Higher values of REM are interpreted as evidence of more real earnings management and thus of lower earnings quality and potentially, more noise in earnings.[3] As before, REM is the annual decile rankings of (APROD – AEXP), constructed in absolute values.

[3] We do not examine abnormal cash flows from operations because real activities manipulation impacts this variable in different directions and the net effect is ambiguous, as discussed by Roychowdhury (2006).

Control variables

To analyze the association between earnings management and different measures of the firm's information environment (forecast accuracy and forecast dispersion, as well as stock returns variability in our sensitivity checks), we control for several variables that are posited to influence these later measures in the cross-section and that are derived from the work of Rajgopal and Venkatachalam (2011).

In particular, it is expected that errors in the work of analysts as well as firm-level stock volatility may be driven both by shifts in expected return news and cash flow news (Vuolteenaho 2002), that is, that cash flow volatility may generate uncertainty about the structure of future cash flows, and thus, lead to greater future return volatility. Thus, we control for cash flow volatility (CFOVAR) in our models. Second, we control for operating performance, measured as operating cash flows scaled by lagged total assets (CFO), since operating performance is negatively associated with stocks return volatility (Hanlon et al. 2004). We also control for stock returns performance (Ret and its square Ret2), since it is negatively associated with returns volatility and uncertainty (Duffie 1995), and for firm size (Size), since smaller firms tend to have poorer information environments and greater return volatility (Pastor and Veronesi 2003). We also control for book-to-market (BM) and leverage (Leverage). Firms with greater growth opportunities, inversely captured by BM, are likely to suffer from greater information asymmetries and to experience greater stock return volatility and greater forecasts errors. Regarding leverage, more levered firms are more likely to experience a financial health problem, which creates uncertainty about firm future cash flows and performance and is expected to be associated with greater volatility.

In addition to these variables, based on the work of Rajgopal and Venkatachalam (2011), we also incorporate in our models a number of controls for firm-specific characteristics and monitoring over the financial reporting process that may impact on the precision of the forecasts (Lang and Lundholm 1993; Wang 2007; Aramov et al. 2009). In particular, we control for the number of analysts following the firm (Analysts). The greater the number of analysts following the firm, the better the information environment is predicted to be. We also control for the monitoring exerted over the financial reporting system both by interested outsiders (Institutions) and auditors (Auditing). We explain how all these variables are constructed in greater detail in the Appendix.

IV. SAMPLE AND RESULTS

We use COMPUSTAT to extract accounting data and CRSP to extract stock market data. Analyst data come from IBES, and ownership data from Thomson Financial. Our final sample contains 46,808 firm-year observations and spans 23 years, t = 1988 to 2010. The sample period begins in 1988 because it is the first year in which some of the analyst variables are available. We eliminate financial firms (SIC 6000–6999) and winsorize all continuous variables at the top and bottom percentiles to avoid the effect of outliers.

Table 1 reports summary statistics of the main variables of interest used to run our analyses. Table 2 contains the correlation matrix. The descriptive evidence presented in Table 1 is generally consistent with prior evidence. Both earnings management proxies (AEM and REM)

are on average close to zero, as expected.[4] The results presented in Table 2 provide some initial evidence that both real and accrual earnings management are positively associated with greater forecasts errors. We also find a positive correlation between our earnings management proxies, AEM and REM (corr=0.127, *p*-val<0.01). This may indicate that the two strategies are applied simultaneously by a significant number of firms within our sample. All three main dependent variables (VAR, FERR and FVAR) are positively correlated, as expected, although the correlations are not large (they range from 0.102 between FERR and FVAR and 0.122 between FERR and VAR), indicating that they may capture differing elements of the firm information environment.

Discussion of main results

Table 3 presents results of the main analysis (equation 1) where we model the consequences of real and accruals earnings management over the firm information environment. Reported *p*-values in all tables are based on robust standard errors clustered at the firm and year level, following the recommendations in Petersen (2009). We report results in two columns. The first column presents results obtained when using analysts forecast errors (FERR) as our dependent variable. Consistent with our prediction, we find that AEM is positively associated with greater forecast errors (AEM=1.019, *p*-val<0.01 in column 1). However, we find no evidence that real earnings management impacts on analysts' forecasts errors, in fact the coefficient on REM is negative, albeit not significant (REM=-0.245, *p*-val=0.28 in column 1).

These results are confirmed when we look at the variability of forecasts (FVAR) as our

[4] The means are not exactly zero because these two proxies were estimated using all the data available and here we have a subsample due to data availability of the rest of variables used in the analyses.

proxy for the firm information environment. These results are reported in column 2. We find that AEM is positively associated with greater forecast variability (AEM=0.219, *p*-val<0.01 in column 2), consistent with the results obtained for FERR. Again, we find no evidence that real earnings management introduces noise in earnings as measured by an increase in the dispersion of analysts' forecasts. In fact, we find evidence that, consistent with the work of Gunny (2010), real earnings management may actually be informative, as we find a negative association between the absolute level of REM and FVAR (REM=-0.139, *p*-val=0.07), indicating lower analysts' dispersion in the presence of greater real earnings management.

Overall, this evidence confirms our expectation that real and accruals earnings management have different information effects. The results appear to indicate that real earnings management is either more visible to expert financial statement users than accruals earnings management and analysts can easily undo it to predict future earnings, or alternatively, that it improves the firm information environment, facilitating the work of analysts in predicting reported earnings.

Evidence on the effects of SOX

Given the evidence in Cohen et al. (2008) that real earnings management may have increased and accruals-based earnings management may have decreased as a consequence of the passage of SOX, we study whether our main results are affected by the passage of this regulation. To analyse if this is the case, we create a dummy variable (SOX) and interact it with our main proxies of interest in model (1). SOX equals 1 for the years 2002 onwards, 0 otherwise (i.e., it is a post-SOX period dummy variable). The results from this test are presented in Table 4. As before, *p*-values are based on robust standard errors clustered at the firm- and year- levels, and

we present the results in four columns. Consistent with our prior results, we find that AEM appears to lead to a poorer information environment and that REM does not. AEM is significantly positive in both models (AEM=1.568, *p*-val<0.01 in column 1, and AEM=0.274, *p*-val<0.01 in column 2), whilst REM is not significant. Regarding SOX, we do not find evidence of an average effect on the precision and dispersion of analysts' forecasts. The interaction between SOX and the earnings management proxies (SOX_AEM and SOX_REM) are generally negative, albeit they are only significant in the FERR specification. Overall, this provides some weak evidence that SOX has had a positive influence on financial reporting quality and the firm information environment.

Analysis of time trends

Rajgopal and Venkatachalam (2011) analyse if decreasing earnings quality in the last few decades has contributed to the documented increase in idiosyncratic stocks returns volatility, which according to Campbell et al. (2001) significantly increased between 1962 and 1997. The evidence reported in Rajgopal and Venkatachalam (2011) is consistent with time-increasing accruals-based manipulation partly explaining this trend in idiosyncratic volatility. We extend the work of these authors and, in a further robustness check, we study whether the differential information consequences of real versus accruals earnings management have changed over time. We use the following simple model to assess any such trends:

$$\begin{aligned} InfoENV_{it+1} = {} & \beta_0 + \beta_1 TIME_{i,t} + \beta_2 TIME_{i,t}*AEM_{i,t} + \beta_3 TIME_{i,t}*REM_{i,t} \\ & + \alpha_1 AEM_{i,t} + \alpha_2 REM_{i,t} + \delta Controls_{it} + \varepsilon_{it+1} \end{aligned} \quad (5)$$

where TIME is a time trend variable that takes on values from 1 to 23 for each of the years 1988 to 2010. Next, we describe the calculation of the accruals and real earnings management proxies, as well as describe the controls included in the models.

Results from this test are reported in Table 5. As before, *p*-values are based on robust standard errors clustered at the firm- and year- levels. The evidence on the AEM and REM proxies is consistent with the findings reported in Table 3. We find evidence of accruals earnings management leading to poorer analysts' performance and of REM not being associated with deteriorated analysts' forecasting performance. In contrast to the findings of Rajgopal and Venkatachalam (2011), we find that analysts have not become worse at their jobs in the last three decades. In fact, we find that the opposite is true, our evidence indicates that there is an average decrease in analysts' forecast errors (TIME=-1.314, *p*-val<0.01) and in the dispersion of their forecasts (TIME=-0.187, *p*-val<0.21 in column 2) from 1988 to 2010 although this second effect is not significant at conventional levels. This difference in conclusions may be partly driven by the difference in our considered sample periods. Consistent with our prior findings, overall, we do not find evidence that REM deteriorates the firm information environment or that it has become a more pervasive problem in recent years, in terms of its impact on the firm information environment.

Alternative measure of information consequences

To check the robustness of our findings, we re-run our main model using stock returns volatility (VAR) as our dependent variable. This is the proxy used by Rajgopal and Venkatachalam (2011) in their study. Following these authors, we calculate VAR as the average monthly variance of raw returns for firm *i* in fiscal year *t*. We opt not to use this as our main proxy of this paper, as

potentially, real and accruals earnings management may have comparable information risk consequences, but certainly, the operational risk consequences are quite dissimilar, and this increase in operational risk may inflate the REM coefficient, whilst it would not affect AEM.

The results from this test are presented in Table 7. As before, *p*-values are based on robust standard errors clustered at the firm- and year- levels. We report two columns. In column 1, we run model (1) using VAR as the dependent variable. Column 2 reports results of introducing a SOX dummy in model (1). The results obtained are consistent with the work of Rajgopal and Venkatachalam (2011). We find a positive and significant AEM coefficient across all three specifications. Regarding real earnings management, we also find a positive association between REM and VAR, which is significant in two out of the three specifications (REM=0.195, *p*-val<0.03 in column 1, REM=0.016, *p*-val=0.26 in column 2, REM=0.551, *p*-val<0.01 in column 3). A test of the difference between the REM and AEM coefficients confirms that the REM coefficient is significantly smaller than the AEM coefficient, confirming that there are differential consequences associated to these two types of manipulation. However, the results from this table indicate that real earnings management also garbles the earnings signal, potentially leading to more noise in earnings, and thus, to greater idiosyncratic volatility.

Signed values of AEM and REM

Our focus is not on whether income-increasing or income-decreasing earnings management differently garbles the earnings signal, but rather, on whether real versus accruals earnings management differently impact the firm information environment. In this sense, it is of relatively little interest if the manipulation increases or decreases earnings. However, as a final test, we re-run our main model using signed measures of REM and AEM. To do so, we follow the

calculations explained above, but construct our REM and AEM proxies using signed values, so that the greater REM and AEM are, the greater the income-increasing manipulation.

The results from this test are presented in Table 7. As before, *p*-values are based on robust standard errors clustered at the firm- and year- levels. We report two columns. The results obtained are generally consistent with the prior evidence. We still find no evidence of REM having an impact on the firm information environment (REM=0.108, *p*-val=0.62 in column 1, REM=0.057, *p*-val=0.52 in column 2). With regards to accruals earnings management, we find a positive association when we look at forecasts errors (AEM=0.802, *p*-val<0.01 in column 1), consistent with our previous findings. However, we find a negative coefficient when we look at the dispersion in analysts' forecasts (AEM=-0.201, *p*-val=-0.01 in column 2), which may indicate that it particularly income-decreasing earnings management that negatively impacts the firm information environment.

V. SUMMARY AND CONCLUSIONS

Real and accruals earnings management are expected to differ across their level of visibility, accountability and also, their associated costs. Real earnings management is generally predicted to be more difficult to monitor by outsiders, who may struggle to estimate deviations from optimal behaviour. However, these real actions are hardly opaque. Hence, expert financial statement users should be able to undo them with relative ease. Despite this purported visibility, it is unclear the extent to which market participants fully understand these strategies and how they affect the quality of earnings and the firm information environment, and whether unravelling the bias introduced by real earnings management is truly a simple exercise, given the

opacity of certain strategies. In this paper, we look at the differential information consequences of these two earnings management techniques. Consistent with our expectations, we find that both types of earnings management garble the earnings signal, but real earnings management is easier to undo for expert financial statement users, such as analysts.

We contribute to the literature along a number of dimensions. First, we add to the recent literature on real earnings management. This literature commonly assumes that real earnings management practices are more visible than accruals-based ones. Our evidence is consistent with differential information consequences of real versus accruals earnings management, suggesting that relatively obvious types of real manipulation (such as the trimming of R&D and advertising expenses) are visible to expert market participants such as analysts and do not interfere with their job, as predicted. We also contribute to the extant literature on analysts' behaviour, by providing new evidence consistent with analysts seeing through real earnings management practices. Finally, our results contribute to the literature on the consequences and effectiveness of the passage of economy-wide corporate governance regulations, by suggesting that the increases in returns volatility driven by poor earnings quality documented in Rajgopal and Venkatachalam (2011) have been reduced after the passage of SOX.

APPENDIX

Variables description

AEM (t+1)	Annual decile rankings of discretionary accruals (DACC) obtained with the modified Jones model.
REM (t+1)	Annual decile rankings of the real earnings management proxy computed as the addition of APROD and -1*AEXP, which are Roychowdhury's (2006) abnormal production costs and abnormal discretionary expenses, respectively.
absAEM (t+1)	is the annual decile rankings of the absolute value of AEM.
absREM (t+1)	is the annual decile rankings of the absolute value of REM.
VAR	is stocks returns variability measured as the standard deviation of one year of daily stock returns, annualized by multiplying it by the square root of 252 trading days in a year, and expressed as a percentage.
FERROR	is the analysts forecast accuracy defined as the earnings-per-share (EPS) forecast error, measured as the absolute value of the difference between the mean forecast EPS and the actual EPS, scaled by the actual EPS. The forecast is taken in the tenth month of the fiscal year from IBES summary data. Expressed as a percentage.
FVAR	is analysts' forecasts variability calculated as the standard deviation of the earnings forecasts. The forecasts are taken in the tenth month of the fiscal year from IBES summary data. We impose a minimum of three earnings forecasts per firm-year. Expressed as a percentage.
CFOVAR	equals the standard deviation operating cash flows scaled by lagged total assets, computed using a five-year rolling window ending in the current year.
CFO	equals operating cash flows scaled by lagged total assets.
BM	is the natural log of the book-to-market value of equity ratio.
Ret	buy and hold annual stock returns ending three months after fiscal year end.
Ret2	equals Ret squared.
Leverage	equals short-term plus long-term debt scaled by total assets.
Size	is the log of market value of equity.
Institutions	is the proportion of firm shares held by institutional investors, at the start of the year.
Analysts	is the number of analysts following the firm.
Auditing	is an indicator variable that equals one if the firm has a Top-8 auditor and the auditor tenure is above the sample mean, and zero otherwise.
TIME	is a time trend variable that takes on values from 1 to 23 for each of the years 1988 to 2010.

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TABLE 1

Descriptive Statistics

Variable	Mean	Std. dev	Q1	Median	Q3	N
VAR t+1 (%)	53.339	30.069	33.442	46.594	65.462	46,808
FERR t+1 (%)	25.790	106.191	-5.479	0.000	16.667	34,703
FVAR t+1 (%)	8.361	19.202	2.000	3.000	8.000	29,705
AEM (unranked)	0.002	0.082	-0.036	0.005	0.043	46,808
REM (unranked)	-0.019	0.362	-0.190	0.011	0.188	46,808
CFOVAR	0.084	0.112	0.034	0.058	0.097	46,808
CFO	0.094	0.115	0.039	0.094	0.152	46,808
Ret	0.159	0.618	-0.207	0.063	0.376	46,808
Size	5.807	1.949	4.339	5.744	7.162	46,808
BM	-0.672	0.713	-1.121	-0.636	-0.186	46,808
Leverage	0.204	0.175	0.034	0.185	0.324	46,808
Analysts	6.740	7.362	1.000	4.000	10.000	46,808
Institutions	0.410	0.318	0.103	0.391	0.677	46,808
Auditing	0.437	0.496	0.000	0.000	1.000	46,808

The sample comprises a maximum of 46,808 firm-year observations for the period 1988-2010, corresponding to 6,381 different firms. *VAR* is stocks returns variability measured as the standard deviation of one year of daily stock returns, annualized by multiplying it by the square root of 252 trading days in a year, and expressed as a percentage. *FERR* is the analysts forecast accuracy defined as the earnings-per-share (EPS) forecast error, measured as the absolute value of the difference between the mean forecast EPS and the actual EPS, scaled by the actual EPS. The forecast is taken in the tenth month of the fiscal year from IBES summary data, expressed as a percentage. *FVAR* is analysts' forecasts variability, as a percentage, calculated as the standard deviation of the earnings forecasts. The forecasts are taken in the tenth month of the fiscal year. We impose a minimum of three earnings forecasts per firm-year. *AEM* represents discretionary accruals obtained with the modified Jones model. REM is real earnings management computed as the addition of *APROD* and -1**AEXP*, which are Roychowdhury's (2006) abnormal production costs and abnormal discretionary expenses, respectively. In the regression analyses in the following tables, *AEM* and *REM* will be the annual decile rankings of these two variables. *Analysts* equals the number of analysts following the firm. *Auditing* is an indicator variable that equals one if the firm has a Top-8 auditor and the auditor tenure is above the sample mean, and zero otherwise. *BM* is the natural log of the book-to-market value of equity ratio. *CFO* equals operating cash flows scaled by lagged total assets. *CFOVA* equals the standard deviation operating cash flows scaled by lagged total assets, computed using a five-year rolling window ending in the current year. *Institutions* is the proportion of firm shares held by institutional investors, at the start of the year. *Leverage* equals short-term plus long-term debt scaled by total assets. *Ret* is the buy and hold annual stock returns ending three months after fiscal year end. *Size* is the log of market value of equity.

TABLE 2

Pearson correlation matrix

	VAR t+1	FERR t+1	FVAR t+1	AEM	REM	CFOVAR	CFO	Ret	Size	BM	Leverage	Analysts	Institutions
VAR t+1	**1.000**												
FERR t+1	**0.122**	**1.000**											
FVAR t+1	**0.120**	**0.102**	**1.000**										
AEM	**-0.035**	**0.035**	0.010	**1.000**									
REM	-0.002	**0.030**	**0.048**	**0.127**	**1.000**								
CFOVAR	**0.232**	**0.017**	**0.035**	**-0.032**	**-0.025**	**1.000**							
CFO	**-0.241**	**-0.081**	**-0.103**	**-0.414**	**-0.148**	**-0.112**	**1.000**						
Ret	**-0.088**	**-0.047**	**-0.051**	-0.011	**-0.033**	0.005	**0.129**	**1.000**					
Size	**-0.415**	**-0.152**	**-0.017**	-0.005	**-0.093**	**-0.154**	**0.270**	**0.094**	**1.000**				
BM	**0.132**	**0.107**	**0.090**	**0.046**	**0.207**	**-0.076**	**-0.233**	**-0.253**	**-0.491**	**1.000**			
Leverage	0.006	**0.052**	**0.112**	**0.029**	**0.141**	**-0.120**	**-0.133**	**-0.053**	0.011	**0.059**	**1.000**		
Analysts	**-0.236**	**-0.103**	-0.013	**-0.045**	**-0.104**	**-0.071**	**0.198**	-0.008	**0.686**	**-0.308**	**0.016**	**1.000**	
Institutions	**-0.231**	**-0.100**	**-0.129**	**-0.017**	**-0.065**	**-0.122**	**0.161**	-0.003	**0.429**	**-0.164**	**-0.062**	**0.370**	**1.000**
Auditing	**-0.185**	**-0.031**	-0.007	**0.022**	**-0.013**	**-0.173**	**0.049**	-0.005	**0.197**	**-0.014**	**0.026**	**0.163**	**0.138**

Bold figures indicate statistical significance at the 0.01 level (two-tailed). The sample comprises a maximum of 46,808 firm-year observations for the period 1988-2010, corresponding to 6,381 different firms. All the variables are described in the Appendix and in Table 1.

TABLE 3

Differential information effects of REM versus AEM

	(1)	(2)
	FERR t+1	FVAR t+1
AEM	1.019***	0.219***
	[0.000]	[0.000]
REM	-0.245	-0.139*
	[0.282]	[0.070]
Ret2	1.568	0.739***
	[0.103]	[0.000]
Analysts	-0.078	-0.053
	[0.545]	[0.210]
Institutions	-18.680***	-7.563***
	[0.000]	[0.000]
Auditing	-0.987	-0.064
	[0.593]	[0.867]
CFO	-22.780**	-9.713***
	[0.025]	[0.000]
CFOVAR	-7.441	7.743***
	[0.371]	[0.010]
BM	5.512***	2.225***
	[0.002]	[0.000]
Size	-6.357***	0.993***
	[0.000]	[0.000]
Leverage	28.467***	10.054***
	[0.000]	[0.000]
Ret	-8.160**	-2.602***
	[0.049]	[0.002]
Constant	73.849***	6.241***
	[0.000]	[0.000]
Observations	34,703	29,705
Adjusted R-squared	0.033	0.046

The sample comprises a maximum of 46,808 firm-year observations for the period 1988-2010, corresponding to 6,381 different firms. All the variables are described in the Appendix and in Table 1.

TABLE 4

Differential information effects of REM versus AEM – SOX Effects

	(1)	(2)
	FERR t+1	FVAR t+1
AEM	1.568***	0.274***
	[0.000]	[0.000]
SOX_AEM	-1.158**	-0.130
	[0.013]	[0.154]
REM	0.009	-0.058
	[0.973]	[0.554]
SOX_REM	-0.600*	-0.187
	[0.056]	[0.131]
SOX	0.575	1.723
	[0.894]	[0.145]
Ret2	1.674**	0.737***
	[0.037]	[0.000]
Analysts	-0.252*	-0.052
	[0.070]	[0.221]
Institutions	-14.313***	-7.573***
	[0.000]	[0.000]
Auditing	-1.928	-0.038
	[0.273]	[0.919]
CFO	-24.429**	-9.731***
	[0.018]	[0.000]
CFOVAR	-5.862	7.767***
	[0.453]	[0.007]
BM	6.186***	2.223***
	[0.000]	[0.000]
Size	-5.265***	0.986***
	[0.000]	[0.000]
Leverage	26.103***	10.101***
	[0.000]	[0.000]
Ret	-8.499**	-2.611***
	[0.017]	[0.001]
Constant	67.307***	5.517***
	[0.000]	[0.001]
Observations	34,703	29,705
Adjusted R-squared	0.035	0.046

The sample comprises a maximum of 46,808 firm-year observations for the period 1988-2010, corresponding to 6,381 different firms. All the variables are described in the Appendix and in Table 1.

TABLE 5

Differential information effects of REM versus AEM – Time Effects

	(1)	(2)
	FERR t+1	FVAR t+1
TIME	-1.314***	-0.187
	[0.002]	[0.211]
TIME_AEM	-0.011	0.003
	[0.742]	[0.638]
TIME_REM	-0.019	-0.006
	[0.520]	[0.632]
TIME_Ret2	0.01	0.019**
	[0.849]	[0.019]
TIME_Analysts	0.01	-0.002
	[0.366]	[0.676]
TIME_Inst	0.186	0.276*
	[0.704]	[0.082]
TIME_Audit	0.257	-0.03
	[0.373]	[0.565]
TIME_CFO	7.355***	1.418***
	[0.000]	[0.000]
TIME_CFOVAR	-4.914***	-0.996**
	[0.000]	[0.029]
AEM	1.126**	0.156
	[0.035]	[0.183]
REM	-0.005	-0.064
	[0.992]	[0.716]
Ret2	1.766	0.496**
	[0.115]	[0.025]
Analysts	-0.407*	-0.036
	[0.062]	[0.569]
Institutions	-16.663**	-11.388***
	[0.021]	[0.000]
Auditing	-5.024	0.379
	[0.298]	[0.647]
CFO	-121.661***	-28.653***
	[0.000]	[0.000]
CFOVAR	60.642***	21.491***
	[0.001]	[0.001]
BM	5.783***	2.112***
	[0.000]	[0.000]
Size	-5.026***	1.009***
	[0.000]	[0.000]
Leverage	22.748***	9.389***
	[0.000]	[0.000]
Ret	-8.937**	-2.689***
	[0.011]	[0.000]
Constant	83.499***	8.568***
	[0.000]	[0.000]
Observations	34703	29705
Adjusted R-squared	0.037	0.049

The sample comprises a maximum of 46,808 firm-year observations for the period 1988-2010, corresponding to 6,381 different firms. All the variables are described in the Appendix and in Table 1.

TABLE 6

Differential information effects of REM versus AEM – Stock Returns Volatility

EM Proxies = Absolute value of EM

	(1) VAR t+1	(2) VAR t+1
AEM	0.680***	0.857***
	[0.000]	[0.000]
REM	0.195**	0.551***
	[0.029]	[0.000]
Ret2	5.018***	5.030***
	[0.000]	[0.000]
Analysts	0.324***	0.298***
	[0.008]	[0.000]
Institutions	-4.644*	-3.907***
	[0.098]	[0.001]
Auditing	-4.326***	-4.497***
	[0.000]	[0.000]
CFO	-26.903***	-27.205***
	[0.000]	[0.000]
CFOVAR	29.215***	29.240***
	[0.000]	[0.000]
BM	-4.127***	-4.040***
	[0.000]	[0.000]
Size	-6.149***	-6.009***
	[0.000]	[0.000]
Leverage	2.666	2.191
	[0.148]	[0.337]
Ret	-13.241***	-13.293***
	[0.001]	[0.001]
AEM_SOX		-0.423*
		[0.053]
REM_SOX		-0.876***
		[0.000]
SOX		5.495
		[0.251]
Constant	82.688***	79.728***
	[0.000]	[0.000]
Observations	46,808	46808
Adjusted R-squared	0.286	0.289

p-values in brackets are based of robust standard errors clustered at the firm and year level (* p<0.10, ** p<0.05, *** p<0.01). The variables are described in the Appendix.

TABLE 7

Differential information effects of signed REM versus signed AEM

	EM Proxy = Signed EM	
	(1)	(2)
	FERR t+1	FVAR t+1
AEM	0.802***	-0.202**
	[0.001]	[0.013]
REM	0.108	0.057
	[0.620]	[0.516]
Ret2	1.716*	0.739***
	[0.067]	[0.000]
Analysts	-0.039	-0.052
	[0.761]	[0.222]
Institutions	-18.878***	-7.594***
	[0.000]	[0.000]
Auditing	-1.225	-0.093
	[0.508]	[0.810]
CFO	-15.473	-12.074***
	[0.116]	[0.001]
CFOVAR	-3.250	7.928***
	[0.716]	[0.009]
BM	5.196***	2.177***
	[0.002]	[0.000]
Size	-6.774***	0.980***
	[0.000]	[0.000]
Leverage	28.076***	9.847***
	[0.000]	[0.000]
Ret	-8.541**	-2.590***
	[0.037]	[0.002]
Constant	74.152***	7.778***
	[0.000]	[0.000]
Observations	34,703	29,705
Adjusted R-squared	0.033	0.045

The sample comprises a maximum of 46,808 firm-year observations for the period 1988-2010, corresponding to 6,381 different firms. All the variables are described in the Appendix and in Table 1.