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Article

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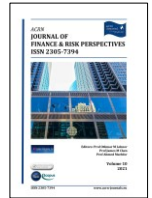


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Mandatory IFRS Adoption and Real/Accruals Bases Earnings Management in the UK

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ABSTRACT

Here, the link between the mandatory adoption of International Financial Reporting Standards (IFRS) and Real Earnings Management (REM), as well as Accrual Earnings Management (AEM), will be examined for non-financial listed firms in the London Stock Exchange. Robust regression analysis of the mandatory IFRS adoption will be conducted on the panel data, as well as earnings management using three AEM models and three REM models. Mixed results with respect to the qualities of AEM and REM were notably garnered, with mandatory IFRS adoption positively relating to the Roychowdhury of abnormal cash flow and the Roychowdhury of abnormal production. Meanwhile, the Roychowdhury of abnormal discretionary expenses, standard Jones, and Kothari negatively related to mandatory IFRS adoption, whilst modified Jones showed an insignificant relation to mandatory IFRS adoption. Changes in IFRS adoption and guidelines for UK firms may have an impact on AEM and REM, and, as predicted, mandatory IFRS adoption mostly affects the Kothari model followed by the standard Jones model as proxies for accounting earnings quality.

Introduction

The goal of the International Accounting Standards Board (IASB) is to develop and promote an international set of high-quality financial reporting standards, and, in order to achieve this goal, the IASB has issued principles-based accounting standards and has taken steps towards requiring accounting measurements that better reflect a firm's economic position and performance. This also serves to further remove acceptable accounting alternatives. Indeed, opportunistic behaviour amongst managers when it comes to formulating accounting income can be reduced through such earnings management. Notably, the prior literature proposes that the mandatory adoption of IFRS is more likely to lead to high-quality accounting earnings, Roychowdhury (2006) pointing out the significance of understanding earnings management in firms in order to determine its impact on business issues worldwide. On the other hand, Barth *et al.* (2008) mention that IFRS adoption may not reduce earnings management, since IFRS is uncompromising in its values founded on principles. This stands in stark contrast to local GAAP, and potentially offers better chances for companies to manage their income and, thus, enhance their actions in this area.

Some past researchers, including Ahmed *et al.* (2013), Ball *et al.* (2003), and Leuz (2003), conclude that IFRS's mandatory implementation enhances the probability of more flexibility amongst managers when it comes to making in-firm decisions, considering at the moment, such direction is non-existent. Moreover, Barth *et al.* (2008) suggest that the mandatory adoption of IFRS is expected to mitigate accounting alternatives, which, in turn, could lead to decreasing firms' accounting number abilities. In addition, Daske *et al.* (2008) document how the characteristic of

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elasticity in the principles-based IFRS standards could lead firms' managers to engage in earnings manipulation through managing their numbers.

Since IFRS became mandatory in 2005, the financial reporting environment in the United Kingdom (UK) has changed significantly, which has affected several issues in the business environment worldwide. However, earnings management is not isolated from this environment: rather, it is deemed to be one of the most significant signs for truthfully assessing firms' value and ensuring that the firms comply with accounting standards, regulations, and policies (Dichev *et al.*, 2013). In the same vein, the prior literature states that the more diligent the earnings management, the more likely it is to lead to less information being offered about a firm's performance, as well as the fact that it is important when it comes to particular decisions being made by decision-makers (Srivastava, 2014). Accordingly, IFRS adoption is found to improve accounting numbers, earnings, and the quality of financial disclosure in both developed countries (Houque *et al.*, 2012; Barth *et al.*, 2008) and developing countries (Nera *et al.*, 2017; Ismail *et al.*, 2013).

As outlined by Chalaki *et al.* (2012), with the aim of bearing in mind the variations amongst financial statements' conventional guidelines, managers' attitudes surrounding earnings, and the quality of accounting data, Accrual Based Earnings Management (AEM) and Real Earnings Management (EM) are the two methods by which earnings management (EM) is measured through. To better estimate the effect of IFRS adoption on earnings management practice, this current study investigates the impact of mandatory IFRS adoption (Callao & Jarne, 2010) on REM and AEM (Cohen & Zarowin, 2010) as the two proxies of earnings management.

Overall, after examining a large sample of 20,192 firm-year observations for the period 1993-2019, the results suggest that mandatory IFRS adoption leads to increases in earnings quality for UK firms. This result is considered to be robust, since multiple different measures of earnings management and test models were used. Further, according to Ismail *et al.* (2013), Houque *et al.* (2012), and Barth *et al.* (2008), this conclusion (i.e., there being a positive relationship between UK firms' earnings quality and mandatory IFRS adoption) aligns with the separate conclusion that there is a positive relationship between accounting numbers' quality and high-quality accounting values.

This field has thus far largely neglected to investigate non-financial UK firms and the nature of their relationship between mandatory IFRS adoption and earnings quality, and so this specific paper endeavours to bridge this gap and shed light on this area. Indeed, as pointed out by Brüggenmann *et al.* (2013), the current literature largely fails to make the distinction between the impact of IFRS and the impact of other factors on the quality of earnings management in firms, since they tend to investigate several countries at once. In the same vein, Oz & Yelkenci (2018) conclude that the legal system is considered to be an important issue that has the potential to lead to different research results in a cross-country study—a conclusion that led them to recommend other researchers to focus on a single country to examine the relationship between REM, AEM, and the mandatory adoption of IFRS. Following this recommendation (as well as that of Brüggenmann *et al.*, 2013), this study focuses on one dataset for non-financial UK firms and covers 27 years—a large sample compared to prior studies in this field. This study additionally contributes to the literature by investigating modifications in EM behaviour from AEM to REM in the UK context, using the same independent and control variables to measure their impact on earnings quality.

The structure of the remainder of the paper is as follows: Section 2 presents our hypotheses to be tested and discusses the related literature, followed by Section 3, which details our empirical methodology. Next, Section 4 discusses the results, and, finally, Section 5 presents conclusions based on the findings.

Hypotheses and Related Studies

It is possible that EM may rely on several accounting choices and policy selections, which could lead to inconsistencies between income-accounting regulation times and cash flow times (Brüggenmann *et al.*, 2013); hence, EM can be categorised into two types: AEM (which focuses on discretionary and nondiscretionary accruals [Dechow & Dichev, 2002]) and REM (which focuses on cash flow, expenses, and productions [Roychowdhury, 2006]). In addition, Roychowdhury (2006) indicates there to be a difference between real and accrual-based earnings management when measuring their impacts on the evaluation of firms, whereas REM and AEM negatively relate to firm value, in the case of focusing managers on increasing firm earnings in the present. As a matter of fact, this is likely to lead to a decrease in cash inflow in the future—and yet capturing REM is not considered to be easy to track compared to AEM, since managers can hide their manipulation of earnings in daily business transactions by, for instance, compromising decisions about modifications in the timing or formatting of a transaction (Cohen & Zarowin, 2010). Also, managers may incur fewer private costs with REM when compared to AEM—particularly in the short-run—in case of catching them by diagram, for example (Roychowdhury, 2006).

Since 2005, many studies have dealt with IFRS adoption and how its mandatory adoption operates in developing and transitioning countries. The current paper investigates the nature of the relationship between earnings management and IFRS's mandatory adoption, since earnings management is considered to be one of the most essential matters in financial reporting—particularly after the Enron and WorldCom scandals (Almasarwah, 2019).

The early literature indicates that the impact IFRS adoption has on earnings management is important for many reasons: a higher level of IFRS adoption is negatively related to earnings management. Considering the fact that the IFRS is a group of accounting regulations and principles, it may be hard to circumvent them—although the IFRS encourage using fair value accounting, which, in turn, decreases earnings management via allowing firms to more efficiently imitate fundamental financial actions, rather than using local standards. The IFRS additionally decreases choices and accounting options, thus refining accounting quality (Oz & Yelkenci, 2018; Ipino & Parbonetti, 2017). To address why IFRS adoption could lead to lower earnings management, we reviewed the existing literature, which provides empirical evidence of the consequences of IFRS adoption.

Proponents of IFRS adoption argue that IFRS improves transparency by increasing the quality of financial disclosure. Notably, the current combination of IASs and IFRSs has generated more than 2,000 disclosure requirements worldwide, which, in turn, increases the demand from accounting standards bodies to understand and implement such requirements (Ernst & Young, 2006). To add to this, according to Ernst & Young (2006), the length of the studied EU business' annual financial reports increased up to 30% in length after IFRS employment. Ball (2006) suggests that IFRS provides more accurate and timely financial statement information than any national standards, including the local standards of EU countries.

Consistent with the notion that IFRS adoption improves the quality of financial disclosure, previous research has found that IFRS adoption yields favourable capital market consequences. A large number of studies suggest there to be an increase in the value relevance and information content of accounting numbers after IFRS adoption (Ismail *et al.*, 2013; Tsalavoutas *et al.*, 2012; Landsman *et al.*, 2012; Devalle *et al.*, 2010; Barth *et al.*, 2008;). Likewise, Houque *et al.* (2014) and Horton *et al.* (2013) and provide evidence to suggest that IFRS adoption improves the information environment through increasing the forecast accuracy of analysts and reducing analysts' forecast dispersion. In addition, there is a reduction in information processing costs, cash risk, and the cost of equity capital documented by many researchers (DeFond *et al.*, 2015; Armstrong *et al.*, 2010; Daske *et al.*, 2008) following IFRS adoption. Further to this, Gillberto, Loureiro & Taboada (2012), Bissessur & Hodgson (2012), and Beuselinck *et al.* (2010) all document there to be a positive relationship between IFRS adoption and transparency within stock market prices and general discussion surrounding money.

Three types of study shed light on IFRS mandatory adoption and EM worldwide: first, IFRS mandatory adoption and AEM; and second, IFRS mandatory adoption and REM; and third, a mixture of the first two, which is the relationship between IFRS's mandatory adoption and REM and AEM. Based on a sample of 250 French-listed firms during the period of 1999-2011, Sellami & Fakhfakh (2013) found there to be a significant reduction in discretionary accruals and real EM absolute values after six years of IFRS mandatory adoption, meaning earnings quality improved significantly in the French environment. Meanwhile, Oz & Yelkenci (2018) indicated that REM and AEM reduced significantly following mandatory IFRS adoption; however, they also found there to be a significant difference between the REM and AEM models in the detection of their estimate values based on the legal system (e.g., law origin; common law). Also, some of the early literature documented the way in which IFRS adoption led some international firms to unintentional significance by replacing REM for AEM, particularly amongst firms in countries with rigorous enforcement systems.

IFRS Mandatory Adoption and Accruals Earnings Management

The accrual element is considered to be dubious compared to the cash flow element: where accruals are the product of decisions, assessments, and apportionments, cash flows are understood (Nera *et al.*, 2017). The management of firms are permitted to practice accrual accounting estimates—and thus, an accrual decreases or increases a manager's ability to engage in earnings management to re-evaluate a firm's performance (Dechow *et al.*, 2010). In the same vein, Lyimo (2014) found that a low level of accrual quality leads to an increase in reported earnings quality. Notably, accrual quality has extra information that decreases variations in cash flows, thus causing the earning issue to be more valuable (Dechow & Dichev, 2000), with it being argued that the measurement of earnings by accrual may increase earnings quality (Melumad & Nissim, 2008). Ahmed *et al.* (2013) have demonstrated decreases in loss recognition timeliness and increases in income smoothing and accrual aggressiveness after adopting IFRS in 20 countries, whilst Christensen *et al.* (2015), Paananen & Lin (2009), and Paananen (2008), who conducted their studies in the German context, found that income smoothing, financial reporting quality, and loss recognition timeliness all significantly

decrease under voluntary IFRS adoption compared to mandatory IFRS adoption. Moreover, they suggest that mandatory IFRS adopters might perceive fewer benefits from principles based accounting standards (i.e., IFRS), and that they thus avoid the costs of transferring to IFRS. Jeanjean & Stolowy (2008) have similarly documented that the pervasiveness of earnings management in Austria and the United Kingdom is less than France, and relate this responsiveness to Austria's and the United Kingdom's adoption of IFRS.

This mixed evidence has a number of explanations: according to Daske *et al.* (2013), some individuals who adopted IFRS did not make any real impactful changes during this time, thus leading to results reflecting fleeting impacts of initial adoption and low statistical power due to relatively short analysis periods (two to three years after the mandatory adoption) (Brüggemann *et al.*, 2013; Jeanjean & Stolowy, 2008). In reflection of the prior literature, we propose the following hypothesis:

H1: There is a negative relationship between the mandatory adoption of IFRS and accruals earnings management in UK firms.

IFRS Mandatory Adoption and Real Earnings Management

One of the most significant regulatory changes in accounting standards was the adoption of the IFRS, which enhances the quality of reporting and causes firms seek to add value to their shareholders. The ensuing systematic improvements of financial report quality has limited firms' executives in engaging in manipulation, and the majority of earnings management studies (Zang, 2012; Cohen & Zarowin, 2010; Roychowdhury, 2006) document that a real earnings management approach is essential when it comes to understanding executives' behaviour and decision-making during the selection of a specific approach. Roychowdhury (2006) defines his model as 'deviations from the ordinary course of operations', and in his model, Roychowdhury documented executives' manipulation via boosting sales by providing additional discount and extending credit terms, which increased the current income and/or avoided losses.

Similarly, executives reduce the cost of goods sold by overproduction, since this lowers the fixed overhead cost; nevertheless, this approach is only considered to be beneficial when the cost of holding the inventory is not higher than the reduction of the fixed overhead. Lastly, executives increase earnings by reducing discretionary expenses, and, since the operating activities are mainly from sales of goods and services and productions, the downside of these methods is that cash flow will be impacted as the accelerated sales and overproduction decreases the operating cash flow. In addition, executives who select real activities are more concerned about current earnings rather future earnings, in turn impacting firms' future economic benefits. For example, executives that decrease spending on research and development or marketing expenses may lose future opportunities to innovate or entice new customers.

Prior studies (Zang, 2012; Roychowdhury, 2006) have pointed out that in real activities, executives do not have complete information about reporting earnings at the beginning of the fiscal year. Notably, actual tangible tasks can't be altered at the fiscal year's closure, whilst accrual manipulation can. Therefore, executives are more likely to manipulate in the last quarter of the fiscal year, when they are adopting the real activities approach.

Since the adoption of IFRS, studies (Lee, 2019; Wardhani & Anggraeni, 2017; Budrina, 2014) have largely centred on the ways in which real earnings management is influenced by IFRS. Some of these studies (Burgstahler *et al.*, 2006) reveal that IFRS emphasises professional judgement when executives exercise their right; hence, it increases the opportunity for manipulations. Nevertheless, other studies have pointed out that the adoption of IFRS improved accounting information and decreased manipulation (Lee & Swenson, 2011), such differences in the manipulation of financial statements and IFRS possibly being due to testing different geographic areas, the sampling selection, and the methods used by the researchers. Saying this, these differences in findings motivated us to examine IFRS and the manipulation of real activities—and yet the key benefit of our approach is that we employed the last reporting quarter, which adheres to Roychowdhury's (2006) model. Given the above, we propose the following hypothesis in relation to mandatory IFRS adoption and real earnings management:

H2: There is a negative relationship between the mandatory adoption of IFRS and real earnings management in UK firms.

Methodology

Sample Construction

Our sample comprises a large and unbalanced panel of 9,049 firm-years from 1,385 non-financial listed firms in the London Stock Exchange (LSE) between the period 1993–2019. All data was collected from the LSE and DataStream, and the analysis of the way in which earnings quality is impacted by IFRS was facilitated by the 27-year study period. This is because a long period before the adoption of IFRS could provide a better measure of earnings quality compared to a short period, which most of the prior literature has used, and because a large sample and long period of study are deemed an advantage for an empirical study, since it provides accurate results (Wang & Yu, 2015). There are several reasons for reducing the number of firms in our study sample, and, in the same vein, financial, banking, and insurance firms have been excluded, since these have special regulations and financial accounting standards. As noted by Kim & Shi (2012) and Hutton *et al.*, (2009), the study sample did not include any companies that did not have the right information to measure the relevant factors, as this would have impacted the accuracy of the findings.

The current research centres on just the UK with the aim of improving the consistency of some elements (e.g., accounting disclosure obligations; regulatory atmospheres; stock listing obligations; smaller market systems), in turn facilitating us to generalise the results in similar countries and thus strengthening the reliability of our findings, as suggested by the prior literature (i.e., Paananen & Lin, 2009; Ruland *et al.*, 2007). In addition, Schipper (2005) states that using a single country reduces heterogeneity in the empirical results compared to cross-country studies.

We utilise a regression model in this study, whereby we use numerous measures of earnings management: real (Roychowdhury of abnormal cash flow; Roychowdhury of abnormal production; Roychowdhury of abnormal discretionary expenses); and accruals (standard Jones models; modified Jones model; the Kothari model). Further, the control measures are Return On Assets (ROA), solvency (SOLV), Return On Equity (ROE), the Leverage Ratio (LEV), the Equity Ratio (EQR), Cash from Operating Activities (CASH) and firm size (*FSIZE*). All of these control variables can differ significantly, and are extremely reliant on the industry; hence, it is common to compare these versus the firm's own earlier performance or its peers'.

Study Variables Measurement

Earnings Quality

In order to calculate the studied UK firms' earnings quality, the current research used accrual-based and real earnings management models, as corresponds to the current literature in this area (Doukakis, 2014; Ismail *et al.*, 2013; Mouselli *et al.*, 2012; Watrin and Ullmann, 2012; Rajgopal and Venkatachalam, 2011; Cohen and Zarowin, 2010; Hutton *et al.*, 2009; Roychowdhury, 2006; Kothari *et al.*, 2005). Our measure for REM is based on Roychowdhury (2006), where three models are used to estimate REM, including the abnormal cash flows from operations (*ROYCF*):

$$\frac{CFO_{i,t}}{LTA_{i,t}} = \alpha \left(\frac{1}{LTA_{i,t}} \right) + \alpha_1 \frac{(SALES_{i,t})}{LTA_{i,t}} + \alpha_2 \left(\frac{\Delta SALES_{i,t}}{LTA_{i,t}} \right) + \epsilon_{i,t} \dots\dots\dots(1)$$

Where *CFO* is cash flow from operations estimated as operating income fewer total accruals, *Sales* and *_Sales* represents sales and change in sales, respectively. All variables are scaled by lagged total assets (*Assets*).

For discretionary expenses (*ROYDIS*), we use model (2) to estimate the abnormal discretionary expenses:

$$\frac{DIS_{i,t}}{LTA_{i,t}} = \alpha \left(\frac{1}{LTA_{i,t}} \right) + \alpha_1 \frac{(L-SALES_{i,t})}{LTA_{i,t}} + \epsilon_{i,t} \dots\dots\dots(2)$$

Where *DIS* is discretionary expenses and calculated as the sum of research and development, sales, administration, and general expenses. The other variables have been defined previously.

The final measure used to estimate real earnings management is production cost (ROYPR). In order to adopt a reduced cost per unit (in turn leading to fewer losses with each sale [COGS]), real earnings management was employed via overproduction. We use model (3) to estimate the normal level of production cost:

$$\frac{PR_{i,t}}{LTA_{i,t}} = \alpha \left(\frac{1}{LTA_{i,t}} \right) + \alpha_1 \left(\frac{SALES_{i,t}}{LTA_{i,t}} \right) + \alpha_2 \left(\frac{\Delta SALES_{i,t}}{LTA_{i,t}} \right) + \left(\frac{\Delta LSALES_{i,t}}{LTA_{i,t}} \right) + \varepsilon_{i,t} \dots\dots\dots(3)$$

Where PR is production costs defined as the sum of costs of goods sold plus the change in inventory in the year. The other variables have been defined previously.

A meta-analysis of over 300 studies concerning establishers of earnings management, concluding Kothari *et al.* (2005), the Modified Jones (1995) Model, and the Jones (1991) Model to all be the most commonly used models within the field when it comes to calculating the quality of earnings. Therefore, these three accrual-based models were used to measure earnings quality in this research.

In the Standard Jones Model (SJM), we use model (4) to estimate accrual-based values for SJM as below:

$$\frac{TA_{i,t}}{A_{i,t-1}} = a_1 \left(\frac{1}{A_{i,t-1}} \right) + a_2 \left(\frac{\Delta REV_{i,t}}{A_{i,t-1}} \right) + a_3 \left(\frac{PPE_{i,t}}{A_{i,t-1}} \right) + \varepsilon_{i,t} \dots\dots\dots(4)$$

Where TA is the total accruals for company (i) during period (t); ΔREV = the change in the revenue for company (i) during period (t); PPE = Property, Plant and Equipment; $A_{i,t-1}$ = the total assets for company (i) for end of period (t-1); and ε_{it} = the random error.

In the Modified Jones Model (MJM), meanwhile, we used model (5) to estimate accrual-based values for MJM as below:

$$\frac{TA_{i,t}}{A_{i,t-1}} = a_1 \left(\frac{1}{A_{i,t-1}} \right) + a_2 \left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} \right) + a_3 \left(\frac{PPE_{i,t}}{A_{i,t-1}} \right) + \varepsilon_{i,t} \dots\dots\dots(5)$$

Where $\Delta REC_{i,t}$ is the changes in account receivable for company (i) during period (t). The other variables have been defined in equation (4).

In the Kothari Model (KM), we use model (6) to estimate accrual-based values for KM as below:

$$\frac{TA_{i,t}}{A_{i,t-1}} = a_1 \left(\frac{1}{A_{i,t-1}} \right) + a_2 \left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} \right) + a_3 \left(\frac{PPE_{i,t}}{A_{i,t-1}} \right) + a_4 \left(\frac{NI_{i,t}}{A_{i,t-1}} \right) + \varepsilon_{i,t} \dots\dots\dots(6)$$

Where $NI_{i,t}$ is net income for company (i) during period (t). The other variables have been defined in equations (4) and (5).

International Financial Reporting Standards (IFRS)

The information about IAS and IFRS that was followed when preparing the firm's financial statements for a specific firm was obtained from the DataStream database, which used the Worldscode code (WC07536). Table 1 provides a detailed explanation of the Worldscode code (WC07536) classification of IAS and IFRS for each firm, whilst 23 accounting standards employed for their financial statements were pinpointed by DataStream. Indeed, this current research mirrors that of Kim & Shi (2012a) in the sense that it employs a full set of either IAS or IFRS, a value of 1 being provided and, if not, a value of 0.

Table 1. Worldscape description of accounting standards followed (Field 07536)

Worldscope fields 07536	Worldscope description
1	Local standards
2	International standards
3	U.S. standards (GAAP)
4	Commonwealth countries standards
5	EU standards
6	International standards and some EU guidelines
7	Specific standards set by the group
8	Local standards with EU and IASC guidelines
9	Not disclosed
10	Local standards with some EU guidelines
11	Local standards – inconsistency problems
12	International standards – inconsistency problems
13	US standards – inconsistency problems
14	Commonwealth standards – inconsistency problems
15	EEC standards – inconsistency problems
16	International standards and some EU guidelines – inconsistency problems
17	Local standards with some OECD guidelines
18	Local standards with some IASC guidelines
19	Local standards with OECD and IASC guidelines
20	US GAAP reclassified from local standards
21	Local standards with a certain reclassification for foreign companies
22	Other
23	IFRS

Control Variables

In addition to our accounting standards, we also identified a number of control variables in our earnings quality evaluation model for completeness (Almasarwah et al., 2018; Adams & Jiang, 2016; Kalelkar, 2016): first, the majority of existing studies identify that a firm's size is an important factor that generally affects earnings management; however, firm size and IFRS also possibly relate to one another in the sense that larger firms generally have more agency problems, hence requiring the integration of stronger accounting standards (Wardhani & Anggraeni, 2017; Budrina, 2014). That being said, opportunities and prospects for financial manipulation are far fewer. We notably measure firm size (FISZE) using the natural logarithm of year-end total assets and hypothesise a negative sign when it is specified as a regressor for earnings management.

Other IFRS adoption and earnings management research suggests firm solvency, particularly in those countries with strong accounting standards and regulations (and possibly due to the greater oversight of more complex organisational structures). These also determine less engaging in earnings management (Almasarwah, 2019; Yamani & Almasarwah, 2019). We measure this using firm subsidiary (SOLV). Lastly, high cash flow from operating activities (CASH) is also more likely to lead to a decrease in earnings management, which, in turn, attracts more investors (Almasarwah, 2019). We measure this using cash flow from operating activities, divided by year-beginning total assets. We expect both SOLV and CASH to display negative signs on their coefficients (Fernandez *et al.*, 2019; Ibhagui & Olokoyo, 2018).

We succeed in pinpointing separate ways in which sufficient accounting and reduced earnings result in enhanced quality of firm earnings by highlighting the other factors (i.e., ROE, LEV, ROA, and EQR) that also influence earnings management and overall accounting values and bearing them in mind as control variables (Almasarwah, 2019; Ben-Nasr & Cosset, 2014; McInnis & Collins, 2011; Gul Srinidhi *et al.*, 2011). Thus, we expect all ROA, ROE, EQR and LEV to display negative signs on their coefficients with earnings management. Table 2 summarises the study variables definitions and measurements.

Table 2. Variable definitions

Group	Variable	Code	Measurement
Independent variables	International Financial Reporting Standards	IFRS	This variable was measured by using dummy variable with value 1 if firm adopt IFRS to prepare financial statement and value 0 otherwise.
Dependent variables	Roychowdhury (Abnormal Cash Flow)	ROYCFO	This variable was measured by using standard prediction abnormal cash flow from the Roychowdhury Model.
	Roychowdhury (Abnormal Discretionary Expenses)	ROYDIS	This variable was measured by using standard prediction abnormal discretionary expenses flow from the Roychowdhury Model
	Roychowdhury (Abnormal Production)	ROYPRO	This variable was measured by using standard prediction abnormal production from the Roychowdhury Model
	Standard Jones Model	SJM	This variable was measured by using standard prediction errors from the Standard Jones Model.
	Modified Jones Model	MJM	This variable was measured by using standard prediction errors from the Modified Jones Model.
	Kathori Model	KM	This variable was measured by using standard prediction errors from the Kathori Model.
Control variables	Return on Assets	ROA	Net income divided by average total assets.
	Solvency Ratio	SOLV	Net income divided by total Liabilities.
	Return on Equity	ROE	Net income divided by shareholders' equity
	Leverage Ratio	LEV	Total Liabilities divided by total assets.
	Equity Ratio	EQR	Total Liabilities divided by total equity.
	Cash from Operating Activities	CASH	Cash flow from operating activities divided by total assets at the beginning of a year.
	Firm Size	FSIZE	Total assets at year-end for each firm.

Results

Descriptive Statistics

Table 3 details the means, standard deviations, median, maximum, and minimum for the six dependent earnings management variables and mandatory IFRS adoption as both independent and control variables. Table 3 demonstrates the fact that there is not much difference between the value of abnormal accruals calculated using the Jones Model (SJM) and those calculated using the Modified Jones Model (MJM); the mean and median value of SJM and MJM are 0.002 (0.001) and 0.09 and 0.097 respectively. In addition, ROYDIS is the model that most frequently presents a higher mean, followed by ROYPRO and then ROYCFO, with values of 0.408, 0.228, -0.010 and 0.177, respectively.

Table 3. Descriptive statistics

Variables	Mean	Std. dev.	Median	Max.	Min.
IFRS	0.417	0.493	0.000	1.000	0.000
ROYCFO	0.177	0.246	0.000	1.413	0.109
ROYDIS	0.408	0.273	0.110	1.818	0.323
ROYPRO	0.228	0.306	0.000	3.582	0.141
SJM	0.002	0.008	-0.090	0.056	0.003
MJM	0.001	0.009	-0.097	0.048	0.001
KM	-0.011	0.027	-0.156	0.359	-0.014
ROA	-0.042	0.307	-3.909	0.474	0.036
SOLV	-0.163	1.039	-11.483	20.856	0.066
ROE	-0.030	0.925	-9.600	5.323	0.084
LEV	0.548	1.464	0.023	203.825	0.515
EQR	1.391	3.654	-34.594	46.587	0.960
CASH	0.041	0.226	-8.497	0.476	0.083
FSIZE	1.809	1.012	-1.081	4.761	1.757

In terms of the IFRS average, this appears to broadly indicate that UK firms are weak in their IFRS adoption during the period both before and after adoption. Notably, our supposition that the extent to which IFRS is implemented within UK companies could be impacted by variations in earnings management standards is backed by the fact that there is significant variation amongst earnings management models' values, thus suggesting that this is likely to occur in our own model.

Correlation, Multicollinearity, and Heteroscedasticity

As a fractional test of the possibility for harmful multicollinearity in our regression analysis to follow, we also investigate the statistically significant pairwise associations between variables. Table 4 provides the Pearson product-moment correlation coefficients between the AEM, REM, mandatory IFRS adoption, and control variables, whilst for alternative earnings management, Table 4 shows that the correlation between real- and accrual-based earnings management measures and other variables are relatively small, the highest correlation coefficient being 54.4% (between SJM and ROA). Further, the multicollinearity should not pose any issue to the information collected considering there is not a correlation coefficient that is larger than 80%.

Table 4. Correlation coefficients

Variables	IFRS	ROYCFO	ROYDIS	ROYPRO	SJM	MJM	KM	ROA	SOLV	ROE	LEV	EQR	CASH	FSIZE
IFRS	1.000													
ROYCFO	0.016	1.000												
ROYDIS	0.017	0.069	1.000											
ROYPRO	0.016	0.379	0.119	1.000										
SJM	0.001	-0.438	-0.045	-0.247	1.000									
MJM	0.006	-0.280	0.008	-0.111	0.655	1.000								
KM	0.004	0.232	0.015	0.182	0.159	0.028	1.000							
ROA	0.008	-0.369	-0.019	-0.176	0.544	0.468	0.392	1.000						
SOLV	0.000	-0.319	-0.014	-0.138	0.343	0.277	0.423	0.639	1.000					
ROE	0.005	-0.120	0.002	-0.044	0.223	0.190	0.184	0.354	0.313	1.000				
LEV	0.016	0.068	0.047	0.078	0.211	0.167	0.050	0.261	0.137	0.074	1.000			
EQR	0.001	-0.067	0.015	-0.017	0.019	0.036	0.042	0.051	0.051	0.214	0.123	1.000		
CASH	0.010	-0.450	-0.021	-0.203	0.199	0.168	0.651	0.749	0.590	0.283	0.117	0.066	1.000	
FSIZE	0.007	-0.103	0.007	-0.088	0.092	0.023	0.082	0.119	0.122	0.068	0.071	0.033	0.145	1.000

The tolerance and Variance Inflation Factors (VIFs) are demonstrated in Table 5 so as to more effectively explore the possibility of regressive multicollinearity. As a rule of thumb, VIFs that are less than 10 and tolerances of more than 0.2 suggest no serious multicollinearity—and, as shown in Table 5, we meet these criteria for all of all our dependent, independent, and control variables, and, accordingly, we suggest that there is no prospect for harmful multicollinearity overall.

Table 5. VIF and Tolerance Results for all Models

	Real Earnings Management		Accruals Earnings Management	
	ROYCFO, ROYDIS and ROYPRO		SJM, MJM and KM	
	<i>VIF</i>	<i>Toler.</i>	<i>VIF</i>	<i>Toler.</i>
IFRS	1.000	0.999	1.000	0.999
ROA	3.330	0.301	3.330	0.301
SOLV	2.110	0.474	2.110	0.474
ROE	1.290	0.777	1.290	0.777
LEV	1.380	0.726	1.380	0.726
EQR	1.110	0.898	1.110	0.898
CASH	2.410	0.415	2.410	0.415
FSIZE	1.030	0.969	1.030	0.969

However, one problem that is very likely to arise when using firm-level data is heteroscedasticity, especially when linking cross-sectional and time-series data, as was the case in this study. We use the Breusch–Pagan/Cook–Weisberg to test for heteroscedasticity and the χ^2 values (p-values in brackets) as significant for ROYCFO = 9232.37 (<0.001), ROYDIS = 3446.38 (<0.001), ROYPRO = 80.77 (<0.001), SJM = 20659.61 (<0.001), MJM = 7544.44 (0.001) and KM = 29433.68 (0.001), indicating that this is, indeed, the case the majority of the time. We would conventionally address this using nonparametric regression, but for our analysis, we select robust regression.

Table 6. Heteroskedasticity for all Models

Breusch-Pagan/Cook-Weisberg test for H0: Constant variance Variables: fitted values of V			
<i>Real Earnings Management</i>			
	Model (ROYCFO)	Model (ROYDIS)	Model (ROYPRO)
Chi2(1)	9232.37	3446.38	80.77
Prob > chi2	0.000	0.000	0.000
<i>Accruals Earnings Management</i>			
	Model (SJM)	Model (MJM)	Model (KM)
Chi2(1)	20659.61	7544.44	29433.68
Prob > chi2	0.000	0.000	0.000

Multivariate Analysis

Table 7 provides the estimated coefficients and t-statistics of the six robust regression models, each specifying an alternate measure of firm performance (ROYCFO, ROYDIS, ROYPRO, SJM, MJM and KM). For comparison purposes, we also estimated the models using ordinary least squares (OLS), assuming common, GLS, and fixed regression effects (results not shown), and, in all cases, the diagnostic tests indicated that our robust effects regression approach was superior. As demonstrated, all the models in Table 7 are highly significant overall and partially reject the null hypotheses that the slope coefficients are jointly zero at the 0.01 level. In terms of goodness-of-fit, the models explain between 0.003% (ROYPRO) and 46% (KM) of the variation in earnings management.

Table 7. Robust regression estimates for all Models

Panel (A)						
	Model (ROYCFO)		Model (ROYDIS)		Model (ROYPRO)	
	Coef.	t-value	Coef.	t-value	Coef.	t-value
IFRS	0.006	1.950*	-0.010	-2.230**	0.009	2.300**
ROA	-0.018	-0.950	-0.012	-0.560	0.022	1.750*
SOLV	-0.021	-4.840***	-0.014	-2.710***	-0.008	-2.620***
ROE	0.003	0.910	0.005	1.380	0.001	0.600
LEV	0.030	3.030***	0.069	5.780***	0.049	5.870***
EQR	-0.003	-4.500***	-0.001	-0.700	0.001	1.350
CASH	-0.416	-19.710***	-0.215	-9.130***	-0.023	-1.610
FSIZE	-0.009	-5.430***	-0.020	-8.240***	0.002	0.820
CONST.	0.192	31.460***	0.239	30.890***	0.374	62.100***
T-statistics	157.52***		49.33 ***		7.07 ***	
R ²	0.211		0.050		0.003	

Panel (B)						
	Model (SJM)		Model (MJM)		Model (KM)	
IFRS	0.000	-2.550**	0.000	-0.880	-0.001	-2.770***
ROA	0.019	22.610***	0.022	21.160***	0.022	10.300***
SOLV	0.001	6.010***	0.001	3.520***	-0.003	-6.060***
ROE	0.000	3.920***	0.001	3.670***	0.000	-0.960
LEV	-0.002	-8.220***	-0.001	-4.110***	-0.006	-5.930***
EQR	0.000	4.290***	0.000	5.220***	0.000	1.380
CASH	-0.017	-21.080***	-0.018	-17.860***	-0.096	-36.890***
FSIZE	0.000	9.720***	0.000	-1.450	0.001	3.580***
CONST.	0.004	27.700***	0.003	16.520***	-0.004	-7.100***
T-statistics	204.32***		140.55***		266.17***	
R ²	0.409		0.299		0.460	

Notes: Asterisks denote significance at the *** – 0.01, ** – 0.05, and * – 0.10 level.

Turning first to the estimated coefficients for the variables describing IFRS adoption, Table 7 presents the results of the robust regressions in order to test the relationship between REM and AEM and mandatory IFRS adoption. Panel A in Table 7 reports the estimated results for the REM models based on Roychowdhury (2006), whilst Panel B reports the estimated results for the AEM models based on Jones (1991), as per Kothari *et al.* (2005) and Dechow *et al.* (1995). The findings reveal more heterogeneous results, whereby the table shows that the coefficient on the IFRS variable is significant and positive for two measures of REM; ROYCFO = 1.950 (<0.01) and ROYPRO = 2.300 (<0.001). This result suggests that the adoption of IFRS-based accounting standards is significantly associated with a higher level of earnings management, and is measured by ROYCFO and ROYPRO; or, in other words, that the extent of reported cash flow from operations and production cost departure from normal ones is higher after the adoption of the IFRS, suggesting that real earnings management, as estimated by these two variables, are higher after the mandatory adoption of IFRS. Cohen *et al.* (2008) suggest that managers prefer REM because it may be difficult to detect compared to AEM. Meanwhile, Chen & Huang (2013) and Graham *et al.* (2005) document the use by managers of ‘harder to detect’ REM instead of AEM after the application of a stricter regulatory mechanisms, such as the Sarbanes-Oxley Act (SOX).

On the other hand, the mandatory IFRS adoption variable reports a negative effect on all three measures of AEM, and it is significant for SJM and KM, -2.550 (<0.001) and -2.770 (<0.001) respectively. These results are consistent with the arguments of previous scholars (e.g., Ismail *et al.*, 2013; Aksu & Espahbodi, 2012; Houque *et al.*, 2012; Ballas *et al.*, 2010; Doukakis, 2010; Barth *et al.*, 2008), who argue that higher quality accounting standards are more likely to lead to higher quality earnings in terms of both number and transparency. In addition, they refer this to the IFRS as limiting managerial discretion, which provides greater disclosure requirements compared to local accounting standards, such as GAAP. Bhattacharya *et al.* (2012) suggest that a higher transparency facilitates the detection of earnings management. Hence, it is expected that IFRS adoption will reduce AEM attempts by firms’ managers, especially in light of the devastating negative consequences the firm will face if earnings manipulation is uncovered (Rodriguez-Ariza *et al.*, 2016; Lundholm, 1999; Dechow *et al.*, 1995).

Finally, we examined the impact of our control variables on earnings management, as variously measured. As expected, all AEM models positively and significantly related to firm size and partially related to REM, particularly in ROYPRO. The presence of solvency also appeared to reduce earnings management through REM and increases

AEM, whereas a negative relationship arose between REM and solvency compared to a positive relationship between AEM and solvency. These different results could relate to the method of calculating earnings management estimation between REM and AEM, as documented in the prior literature (Brüggemann *et al.*, 2013; Roychowdhury, 2006; Dechow & Dichev, 2002). ROA and ROE mostly have a positive relationship with REM and AEM, which indicates that increasing firm investment is more likely related to a higher level of earnings management. This result is expected since increasing firms investment is considered one of the motivations of earnings management (Almasarwah, 2019). In the same vein, EQR shows a positive relationship with AEM, which is consistent with ROE results whereby both variables are overlapping in their formula structures. In contrast, EQR negatively related to REM, particularly with ROYCFO. This result is unsurprising, since ROYCFO focuses on cash from operating activities, where the firm could reduce cash to avoid paying more taxes as a motivation of REM. Finally, there is a different relationship between earnings management and leverage: leverage had a positive effect on REM and a negative impact on AEM, which means that leverage relates to earnings management based on the EM motivations that the firms' managers use to achieve their desired objectives (see Velury & Jenkins, 2006; Eng and Mak, 2003).

Conclusion

This paper has examined the association between the three REM and three AEM models as proxies for earnings management and mandatory IFRS adoption for non-financial listed firms in the London Stock Exchange (LSE) from the period 1993-2019. The period selected was particularly interesting, since it corresponded with the staggered implementation of the UK's new corporate governance code and guidelines. The expectation here was that these would significantly improve corporate governance in the country, alongside an expected increase in firm performance.

The results with respect to the quality of earnings management, which we measured using the Standard Jones Model, Modified Jones Model, and Kothari Model for AEM, and Abnormal Cash Flow Model, Abnormal Production Model, and the Abnormal Discretionary Expenses Model for REM, are somewhat mixed: the IFRS variable is significant and positive for two measures of REM (ROYCFO and ROYPRO), and is significant and negative for measures of AEM (SJM and KM). Finally, our control variables have different effects on earnings management, which has been widely documented.

This study documents clear and novel evidence for whether the mandatory adoption of IFRS reduces the earnings management of UK firms, and, when it comes to policymakers and those who utilise accounting data, the results may wield consequences. Indeed, this study has clearly concluded that a given company's accrual-based earnings management can be lessened with IFS adoption. Therefore, these findings could benefit accounting information users in this respect. However, IFRS adoption increases are hard to detect in real earning management activities. The conclusions drawn from this research may also provide needed data concerning whether or not UK firms should adopt IFRS, since this is an area policymakers currently are known to struggle with.

A challenging feature of our results is the different earnings management measurements and guideline regimes through which these firms have progressed during our sample period; moreover, it would appear that the nature of earnings management model formula structures could be the main reason behind the various impacts of IFRS adoption on earnings management activities. One possibility is that regulations and guidelines for accounting standards in the UK merely result in substantial changes to the adoption of IFRS and earnings management. It is also likely that firms began to make the necessary changes in anticipation of these changes as a means of strengthening their organisational legitimacy by aligning their accounting standards with the expectations of the investor community.

There is certainly a need for more research surrounding the proxies typically employed in assessing earnings management; here, it is argued that quantitative measures of the earnings management level by using AEM and REM will provide more accurate results when compared with prior literature, since this will help determine if UK firms comply more with accounting standards before or after IFRS adoption. At the least, this would further ensure the robustness of the present results and any similar findings.

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