

ASSOCIATION BETWEEN INNOVATION AND EARNING MANAGEMENT: EMPIRICAL EVIDENCE FROM THE UK

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ABSTRACT

The aim of this paper is to examine the impact of innovation on earning management of firms listed on the London stock exchange. The motivation of the study is that the UK is encouraging innovations by raising the R&D budget to 2.4% of GDP by 2027. The sample of the study comprises firms which are included in FTSE350. However, subject to various sample restrictions, only 134 companies are finalized for analysis. The data of the study comprised of 10 years, i.e. from the year 2010 to 2019. Innovation is proxied by R&D expenditures, while firm size, growth and leverage are considered as control variables. In order to test the hypothesis of the study, regression model is used. The findings of the study posit that innovation (R&D) has a significantly positive impact on earning management.

Keywords: Earning Management; R&D Expenditures; Innovation; London Stock Exchange.

INTRODUCTION

Innovation has become an integral part of business success, while many of today's organizations still find innovation elusive (Kahn, 2018). Innovations emanate as a result of ongoing research and development (R&D) in processes, techniques and products. These R&D activities tend to garner a competitive advantage for firms and lead towards growth and profitability. Nowadays, to compete in the growing competitive market worldwide, firms need to continuously spend on innovations. The R&D expenditure represents the largest cost incurred by a firm. The expenditure on R&D results in getting patent rights on innovative and competitive techniques or products. The future earnings and growth of an organization are directly related to its R&D expenses; however, despite the importance of R&D expenditure, the disclosure of these expenses in the financial statements still lacks the consensus where different firms report these expenses differently and/or according to their local accounting standards (Callimaci & Landry, 2004). There are two

different viewpoints regarding R&D expense disclosure.

The first perspective argues that a firm gets benefits from these expenses for an extended period. Therefore, these expenses should be capitalized, and the inclusion of R&D expenditure in the current year's expenses increases distortion in the information content of financial statements (Cheung et al., 2019). On the other hand, the proponents of this view argue about how there is no guarantee that these R&D expenses will result in a commercially successful product. Therefore, due to uncertain future outcomes of R&D expenses and their related benefits, a firm should report these expenses in the current year's income statement (Cazavan-Jeny et al., 2011). However, Ryan (2006) argued that recording R&D expenses in the income statement is a highly conservative approach which leads to undervaluation of the firm. In 2005, European Union (EU) decided that European businesses must implement "International Financial Reporting Standards" (IFRS). Such implications of IFRS and its

controversial accounting standards ignited a heated debate among the accounting experts in the corporate sector in the EU. The reporting of R&D expenses in financial statements was one of the hottest debate among professionals.

As per IFRS, a company should consider R&D expenses as revenue expenditure and consequently reports them in the current year's income statement (Markarian et al. 2008). Whereas capitalization of certain R&D expenditures after fulfilling certain requirements is permitted in IFRS (IAS 38). According to IAS 38 paragraph 57, these provisions state that a firm can capitalize R&D expenditure only if it can provide (i) assurance that the firm can convert the intangible assets into a successful commercial product, (ii) The firm has an intention to use the intangible assets, or to sell, them (iii) the firm has any ability to use the intangible assets (iv) the intangible assets can be converted into real economic profits in future (v) The firm has the recourses to complete the R&D project (vi) the method of measurability should be reliable about the project expenses. Under the provisions mentioned above, a firm can capitalize on R&D expenditure. Still, these provisions are very subjective and give the managers the power to apply their discretion to decide the nature of R&D expenses. Moreover, Markarian et al., (2008) mentioned that some countries, i.e. France, allow their firms to treat R&D expenses according to their accounting choices. As discussed above, the major issue in the debate regarding accounting treatment is the ability of managers to use their discretion while capitalizing R&D (Cazavan-Jeny et al., 2011). Zarowin and Oswald (2005) argued that the justification given by the proponents of capitalizing R&D expenses is that through capitalizing R&D expenses, the management of the firm gives a positive signal about the future performance of the firm. It is due to the fact that benefits attached to R&D expenditure have a long life and can directly affect future performance (Ballester et al. 2003).

Studies have revealed that the market value of a firm is greatly influenced by its R&D expenses, and it provides reliable information to the market participants (Kothari et al., 2005; Seybert, 2010; Shah, Liang, & Akbar, 2013; Munir et al., 2022). However, Markarian et al., (2008), in their study, argued that capitalization of R&D expenses allows

managers to get involved in EM activities. They do this by delaying the amortization of intangible assets as per the convenience of the managers. It has also been argued that if the managers charge R&D expenses in the income statement, they enhance the objectivity of the financial statements and enhance the transparency of financial information. There are multiple empirical evidences that managers take the help of R&D expenses to manipulate earnings to achieve their goals (Fang & Fu, 2018; Lakhali & Dedaj, 2019). Most accountants prefer to consider R&D and revenue expenses and account for them in the current year's income statement (Nixon, 1997). Empirical evidence has also been provided in the literature that managers used R&D expenses for smoothing income (Markarian et al., 2008; Oswald & Zarowin, 2007).

There is plenty of literature available that discusses the drawback of expensing and capitalizing R&D expenses (Kong & Su, 2021; Ertugrul, 2022; Aslan, 2021). However, literature that sheds light on underlying motivations of capitalizing R&D expenses where flexible treatment of R&D expenditure is allowed is still scarce. In the context of the UK, it is a legal binding for firms to prepare financial statements in accordance with IFRS provision; thus, the firm management is given the discretion to select the accounting procedure for R&D expenses which can be used as earnings management. So, the primary objective of this research is to inspect the association between innovation (R&D expenses) and Earnings Management (EM).

This study expands the literature by presenting empirical evidence in the context of the UK. In literature, the association between R&D expenditure and EM has been tested, but there is a lack of evidence available in the UK context. The government of the UK is encouraging R&D and innovations by raising the R&D budget to 2.4% of GDP by 2027 (National Statistics, 2018). Assets are generated through R&D and innovations, but the cost of R&D investment is not reported as an asset in the financial statements (Oswald, 2007). So, it is important to investigate the relationship between R&D and EM in the UK context. The UK is one of the developed nations in the world, and firms in the UK are consistently increasing their investment in R&D projects. The managers in UK firms argue that

they should invest in R&D to sustain growth in the long run. The R&D statistics show that companies in the UK spent 25 billion pounds in 2018, and which is 5.8% more than R&D expenses in 2017, which was 23.7 billion pounds. Dowsett, 2020 states that aerospace and pharmaceutical companies in the UK spend 210 million pounds and 4.5 million pounds, respectively and maintain the top-ranked position in the world for R&D expenses (National Statistics, 2018).

Literature Review

The main concepts used in the current study need to be defined before moving further in the study. So, the next paragraphs contain the definition of R&D expenses and earnings management.

Earning Management

Walker (2003) defines earnings management as the managers' discretion in regard to the choice between accounting and financial reporting on real-time economic events. Grabińska and Grabiński (2017) posit that EM is an accounting technique that is being used to manipulate financial statements to present an optimistic view of a firm in the financial market. Generally, the aim of earnings management is to show the higher earnings of a firm.

The manager of a firm uses discretionary accruals to conduct earnings management and portray a better picture of the firm's earnings, which influences the potential investors and improve a firm's performance in the financial market (Iatridis & Kadorinis, 2009). Earnings management is also viewed as an agency problem which is defined as a conflict between managers and the stakeholders of a firm due to contradictory interests, and this conflict results in agency cost (Jensen & Meckling, 1976). The information asymmetry due to earnings management makes it more difficult to reduce agency cost. The use of discretion in reporting R&D expenses increases information asymmetry, increasing the possibility of earnings management (Grabińska & Grabiński, 2018).

There are two approaches to earnings management i) accrual-based EM and ii) real EM. However, the major focus of the managers is on accounting or discretionary accruals earnings management. While talking about financial reporting, R&D expenditure reporting is one of the most controversial issues. The main problem is whether R&D expenses need to be

capitalized. Grabińska and Grabiński (2018) argued that the decision regarding R&D reporting is discretionary, which allows managers to indulge in earnings management; therefore, the R&D expenses, as they incurred, need to be charged to the income statement. However, others say that the capitalization of R&D expenses increases the transparency of the financial statements as the R&D expenses are the assets, and that is why these should be recorded in the balance sheet.

Research and Development Expenses

Research and development or innovation is an activity through which an organization develops a new product or technology that helps the organization gain a competitive advantage (Eidizadeh et al., 2017). In the ever-changing world, the need for R&D expenses is inevitable to attain future growth and to create new technologies, especially in the high-tech industries (Guidara & Boujelbene, 2014).

The managers have incentives to manipulate the financial information to do EM. However, the definition of EM is very tricky to operationalize because of the subjectivity associated with managers' intention, and it is not possible to measure the intention of a manager in an objective manner. So, this study defines earnings management that relates to the discretionary use of accounting standards by the management of a firm. Mangala and Dhanda (2018) argued that earnings management is subjective as it depends on the manager's discretion to use real EM or accrual-based EM. Similarly, Seybert (2010) argued that it is the discretion of the manager to increase or decrease the R&D expenditure or how much part of the R&D expenditure accrue.

Earning Management and R&D Expenses

The management of a firm remains under pressure to enhance the firm's earnings, and continuous pressure lures the management to indulge in earnings management activities. In literature, there are multiple pieces of evidence that show the use of manipulation in financial reporting and decisions regarding real activities of the business (Zulkifley et al., 2023). The primary focus of current study is to explore whether R&D expenses and the discretion of manager reading reporting of R&D expenditure have any relationship with earnings management. The study conducted by Zarowin and Oswald (2005)

revealed that companies engaged in EM are either capitalizing R&D expenses or expensing them.

It has been found in the literature that the firms which treat R&D expenditure as expenses are engaged in real earnings management, while the firm that capitalizes on R&D expenditure indulge in accrual earnings management through amortization (Fang et al., 2022; Rahman & Xiong, 2021). The study conducted by Osma (2008) concluded that firms use manipulation in R&D expenditure under-earning pressure in the short run. The author further concluded that the firm reduces the R&D expenditure while facing a decline in earnings, and this conclusion supports the hypothesis of this study, i.e. discovering the association between R&D expenditure and EM. The study conducted by Gunny (2010) concluded the same result that firms tend to improve their earnings by reducing R&D expenditure. The author further concluded that the R&D expenses' capitalization reduces the EM as the R&D expenses do not reflect in the income statement that, reduces the earnings. Seybert (2010) also found that the capitalization of R&D reduces the possibility of earnings management. The investigation conducted by Cazavan-Jeny et al. (2011) found that firms which capitalizing their R&D expenditure are more levered, which negatively affects the firm performance. However, the author was not successful in providing empirical evidence that R&D expenditure has any relationship with earnings management.

The study conducted by Tokuga and Tanaka (2011) established that Japanese companies use R&D expenses by expensing them to gain tax benefits. The study concluded that Japanese companies indulge in earnings manipulation with the help of an increase or decrease in R&D expenses. Tahinakis (2014) postulated similar results while investigating the behaviour of European companies during the Eurozone crisis related to R&D costs and EM. Guidara and Boujelbene (2015) argued that it is inevitable for the firm to reduce R&D expenses to overshadow the losses in a crisis. Sun (2021) conducted a study to examine how R&D and SG&A influence the market stock price and found out that investors positively perceived the reduction in SG&A. On the other hand, a reduction in R&D expenditure is negatively perceived by investors.

Why Managers get engaged in EM

It is the major responsibility of the management to come up with a plan to start R&D projects (Seybert, 2010). The management is more prone to those projects where the cost can be capitalized. However, the fear of failure impels them to expense the Research & Development project costs to reduce their earnings. The study conducted by Osma (2008) found that board independence negatively affects accrual management as independent directors have more technical knowledge. The author further investigated the impact of an independent board of directors on a cut of Research & Development expenses and concluded that; manipulation in R&D expenditure reduced due to the presence of independent directors on the board. Both of these studies suggested that R&D expenditures are used by the management to increase the firm's performance. In the context of the UK, if a firm initiates R&D projects, it becomes eligible for cost recovery. The UK government has taken the initiative to enhance the R&D culture in the organization by introducing an R&D tax scheme. Under this scheme, the government will provide tax relief to those businesses that invest in R&D projects, and firms can use this money to grow further. This study is aimed to investigate the UK as the UK GAAP allows the firm to capitalized on R&D costs under certain provisions (Cook & Vorley, 2021).

The previous literature suggested that managers do earnings management to cover up the losses or to gain certain advantages in contractual agreements. It has also been discussed in the literature that R&D expenses are used by managers to supplement EM. Managers' discretion about the R&D expenditure and earnings management also creates the agency problem. The agency problem specific to EM and manipulation of R&D expenditure can be explained as the information asymmetry between managers and other stakeholders of a firm. The managers use discretion about the R&D expenses to manipulate the financial statement information as an EM practice and also create information asymmetry between management and shareholders (Abad et al. 2018). Tahinakis (2014) used a sample of companies in the Eurozone for the period of 2005-2013. The focus of the study was on understanding whether earnings manipulation through R&D is used to avoid reporting losses on earnings in Eurozone. They found that the firms in Eurozone are involved in conducting EM

activities through cutting R&D. This behaviour was found not only during periods of crises only but also during the recessive environment. Bayraktar and Tutuncu (2020) postulated that R&D expenditures are of significant importance for the success of a business. However, in terms of accounting and reporting manipulations can be done for with the aim of achieving personal or corporate objectives (Zulkifley et al., 2021; Munir et al., 2020). They used the data from 2007-2018 and found that there is a negative association between EM and R&D. Whereas, Fuentes and Persson (2011) also investigated the relationship between R&D and EM of Swedish firms. They used a multiple regression methodology and found that the accounting treatment of R&D can be used by the managers to conduct income smoothing. The above discussion and evidence from the literature suggest an association between R&D expenses and EM.

H₁: There is a substantial connection between EM and R&D expenses

Data and Methodology

The data on earning management, CSR, firm size, profitability, leverage and growth is taken from Thomson Reuters-Datastream. The sample of the study is derived from FTSE350, which comprises of UK 350 companies and is considered a representative index of the whole UK market. The sample of the study comprises of the year 2010 to 2019. The justification for the sample selection is that due to the global financial crisis (GFC) of 2008, the earnings of the company were distorted. Thus, taking that period in the sample might impact the average earnings of the firm. Same is the case with the years 2020 and 2021 when the world was hit by a global pandemic and resulting in lockdowns (Kufel et al. 2022). Therefore, the focus of the study is on the post-GFC period and pre-pandemic. The purposive sampling technique is used in the current study, as in this technique, the sample frame is decided subject to

the researcher's own judgement and/or some specific criteria (Etikan et al., 2016). Thus, in accordance with the purpose of sampling, certain restrictions are imposed to make the sample more representative. Firstly, only those firms will be selected that are listed on the London stock exchange; next, the company should be indexed in FTSE350. Further, the most important restriction is that only those firms are selected who have been spending money in R&D over the last 10 years. Further, in case of missing values, such firms are dropped from the final sample. Consequently, after the imposition of the restrictions, the final sample size became 134.

Earnings Management (Response Variable)

The response variable of the current study is earning management (EM). There are various approaches that have been opted to measure the EM in the previous literature. However, the most commonly used proxy of EM is accrual estimation errors, which is exhibited by Dechow and Dichey (2002). The foundation of this method rests with the idea that there exists estimation error in accruals. Suppose it is so. The quality of the earnings decreases as a result of subsequent correction in the errors. Discretionary accruals are another method used in the literature to measure earning management, which is figured out by comprehending the modified Jones model (Kothari et al., 2005). This model further classifies the method into two approaches, where one approach is a time-series approach while the other is the cross-sectional approach. The time-series approach only deals with one specific firm, whilst the cross-sectional approach has the tendency to detect the earning management of cross-sectional firms. In the current research, the cross-sectional approach of the Jones model is adopted. Moreover, in this study, "current discretionary accruals" is used as a substitute for total discretionary accruals, as recommended by Teoh et al. (1998). The EM is computed in the following steps;

Step # 1:

The first step of EM calculation involves the calculation of current discretionary accruals (CDA). In order to calculate CDA, firstly, total accruals are calculated, which are denoted as TCA_{it} , which is calculated as;

$$TCA_{it} = (\Delta CA_{it} - \Delta Cash_{it}) - (\Delta CL_{it} - \Delta ST Debt_{it}) \quad 3.1$$

In the above equation, ΔCA_{it} is basically the change in current assets of firm i at time t . Similarly, $\Delta Cash_{i,t}$, $\Delta CL_{i,t}$ and $\Delta ST Debt_{i,t}$ shows the variation in cash, current liabilities and short-term debt over time and across entities.

Step # 2:

In the second step of EM calculations, OLS regression is implemented on all sample data firms. It is written mathematically as;

$$\frac{TCA_{i,t}}{TA_{i,t}} = \alpha_0 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_1 \left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{TA_{i,t-1}} \right) + \varepsilon_{i,t} \quad 3.2$$

Here $TCA_{i,t}$, $\Delta REV_{i,t}$, $\Delta REC_{i,t}$ and $TA_{i,t}$ posits the variation in total current accruals, revenues, net receivables and total accruals, respectively. Additionally, each of the given variables is deflated by taking a lag so that homoscedasticity assumption could meet.

Step # 3:

In the third step, non-discretionary accruals are calculated for each firm. This involves the use of industry and year-specific estimates of coefficient.

$$NDAC_{i,t} = \hat{\alpha} \left(\frac{1}{TA_{i,t-1}} \right) + \hat{\alpha} \left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{TA_{i,t-1}} \right) \quad 3.3$$

Step # 4:

In step 4 discretionary ($DAC_{i,t}$) component of earnings management is calculated through the following formula;

$$DAC_{i,t} = \frac{TCA_{i,t}}{TA_{i,t-1}} - NDAC_{i,t} \quad 3.4$$

Although discretionary accruals are calculated in 3.4, however, it is preferable to use absolute values $DAC_{i,t}$ instead of using actual value as a proxy from EM.

$$|DAC_{i,t}| = \left| \frac{TCA_{i,t}}{TA_{i,t-1}} - NDAC_{i,t} \right| \quad 3.5$$

Research and Development (Independent Variable)

The variable of interest in the current research is innovation. In the literature, different researchers have used different proxies. However most commonly used proxy is research and development expenses.

Control Variables

Apart from the above-mentioned factor, some control variables are also employed in current research, which include firm size, firm growth, return on asset and leverage.

Firm size

Size of firm is described as the log value of total assets (Ajina & Habib, 2017; Wagner, 2021). The

reason for taking this variable as a control variable is that firms get engaged in earning management to avoid costs. As a result, high absolute discretionary accruals are generated, which means high EM. However, studies have revealed that large firms tend to involve low in EM activities. The reason for such behaviour of large firms is that they have better internal controls (Francis et al., 1999). Additionally, large corporations are monitored by institutional and sophisticated investors, and they perform a robust analysis before making any investment decision. This factor also hinders large firms from staying away from earning management (Walker, 2013). Thus, the size of the firm has significant importance, and it has a theoretically negative relationship with EM.

$$Size_{i,t} = \ln(Total\ Assets_{i,t}) \quad (1)$$

H₂: The association between size and earning management (EM) is significantly negative.

Firm-Growth

Studies have revealed that growth stocks have more association with earning management as compared to other firms and stocks. So it can be hypothesized that there is more incentive for high-growth stocks to get involved in earning management (Skinner & Sloan,

2002). In this regard, Larcker and Richardson (2004) postulated that higher accruals occur with growth firms. Therefore, controlling growth is essential while doing analysis. In this study, as a proxy of growth, we used the market-to-book ratio as suggested by (Skinner & Sloan, 2002).

$$MB_{i,t} = \frac{Market\ Value\ of\ Equity_{i,t}}{Book\ Value\ of\ Equity_{i,t}}$$

H₃: The association between growth and earnings management (EM) is significantly positive.

Returns on Assets

Another control variable that has tremendous importance is the return on assets (ROA). This variable is computed by dividing EBIT with total assets of the company. Various researchers have used the same proxy in their research (Alsaadi et al.,

2017). This proxy is being used in many pieces of research, including (Kabajeh et al., 2012; Salim & Winanto, 2020). The justification for using ROA as a control variable is that ROA is associated with discretionary accruals, and this relationship is positive.

$$ROA_{i,t} = \frac{Sales_{i,t}}{Total\ Assets_{i,t}} \quad (3)$$

H₄: There is a significant and positive relationship between return on assets and EM

Leverage

Leverage is the percentage of assets financed through debts. In the current study, leverage is estimated by dividing total long-term debts with total assets. Alsaadi et al. (2017) also used leverage as a control variable while testing earning management.

Theoretically, it is highly likely that a firm with a high magnitude of leverage is expected to engage in earning management (Walker, 2013). Leverage may result in increased bankruptcy costs. Therefore, leverage affects the earnings of the firm negatively.

$$LEV_{i,t} = \frac{Total\ Liabilities_{i,t}}{Total\ Assets_{i,t}} \quad (2)$$

H₅: The relationship between leverage and earnings quality (EQ) is significantly negative

Econometric Model

The data of the study comprise of both time series and cross-sections; therefore, the panel data methodology is best suited for the study. Since the

objective of the study is to find the association between CSR and EM, the following econometric model is defined;

$$EQ_{it} = \alpha_{it} + \beta_1 R\&D_{it} + \beta_2 Firm\ Size_{it} + \beta_3 Growth_{it} + \beta_4 ROA_{it} + \beta_5 LEV_{it} + e_{it}$$

Here, α is the intercept; $R\&D$ is the variable of interest; while firm size, growth, ROA and LEV are the control variables, and, e , the error term as used in Alsaadi et al. (2017).

Results and Discussion

The final sample contained 134 firms, selected on the basis of sample restrictions. The sample of the study was set to 2009-2019. However, due to frequent missing data of earning management measured through the Jones model, the year 2010 is dropped from the analysis. Table 1 represents the descriptive statistics of the data. The mean value of earning

management is found to be 0.046 with a standard deviation of 0.10, which signifies that the deviation from the mean is quite low. Table 2 represents the correlation between the variables of the study. The correlation is found to be quite low and negative in the case of Earning quality and R&D. However, the correlation between the control variables is found to be high and statistically significant as well.

Table 1: Descriptive Statistics

Variable	N	mean	SD	p10	p50	p90	Skewness	Kurtosis
EQ	1205	0.046	0.100	0.004	0.025	0.101	11.362	158.732
R&D	1205	3620541	9408229	50715	678114	9439000	5.961	47.789
Lev	1205	0.229	0.142	0.050	0.218	0.423	0.813	1.261
Firm size	1205	15.193	1.545	13.441	14.992	17.438	0.567	-0.134
Roa	1205	7.421	7.265	1.200	6.810	13.660	0.717	15.264

Since the study aim to find the relationship between innovation and EM, therefore, regression analysis is applied. Though, before moving to the regression analysis, it is essential to perform some pre-estimation and model section tests to get justified inference.

Table 2: Correlation Table

	(1)	(2)	(3)	(4)	(5)	
EQ	(1)	1				
R&D	(2)	-0.0346	1			
Lev	(3)	-0.0445	0.1648*	1		
Firm size	(4)	0.0264	0.6473*	0.1252*	1	
Roa	(5)	-0.0588*	-0.0407	-0.1216*	-0.1525*	1

Note: * shows significance at 10% level.

Pre-estimation

Three pre-estimation tests, including multicollinearity, homogeneity and autocorrelation, are used in the current study.

Multicollinearity

The variance inflation test is used to test the multicollinearity between the independent variables of the study. The rule of thumb posits that the value of VIF should be less than 10 (García et al., 2015), which is evident in the table below. Thus, there is no Multicollinearity in the data.

Table 3: Multicollinearity

Variable	VIF	1/VIF
firmsize	1.77	0.564983
rd	1.76	0.569197
roa	1.04	0.958305

Lev	1.04	0.959584
Mean VIF	1.4	

Heteroscedasticity Test

Modified Wald test is used to test the variance of residuals. Table 4 presents the test results where P-value is equal to 0.0000. Since the p-value is <0.05 thus, the null of homoscedasticity is rejected, which

postulates that the OLS results will be biased. Therefore, the current study used "robust heteroscedasticity consistent standard error estimates" for running all regression tests represented by White (1980).

Table 4: Modified Wald test

All Industries

Chi2	P-value
73148.13	0.0000

Serial Correlation Test

Another vital assumption of the regression model is that there should be no correlation between the residual terms. To test this assumption, the

Wooldridge test is used. The F-statistics value is 14.317, while its p-value is greater than 0.05, which posits that the null hypothesis of no serial correlation is accepted (Drukker, 2003).

Table 5: Wooldridge test for autocorrelation

P-value	F
0.5079	14.317

Model Selection for the Regression model

Model selection is of immense importance before conducting analysis. The author used the panel data methodologies like fixed effect regression, OLS regression and random effect regression models to conduct the analysis.

F-test

F-test is conducted to check the appropriateness of the fixed-effect model as compared to the OLS regression model (Azeem et al., 2018; Altahtamouni et al., 2022). The result of the test reveals that the fixed-effect model is not appropriate to apply to this study as the F value of the test is "0.1286", which is greater than the benchmark value of 10%.

Breusch and Pagan LaGrange Multiplier (BPLM) test

BPLM test is conducted to check the appropriateness of the random-effect model as compared to the OLS regression model (Alsaleh & Abdul-Rahim, 2021). So, the author applied the BPLM test, and the result revealed that the random-effect model is appropriate to apply to this study as compared to the OLS regression because the F-value is less than 0.05% level of significance.

Hausman test

The Hausman test is used to testify appropriateness of the random-effect model as compared to the fixed-effect model (Amini et al., 2012). The result postulated that the author has failed to reject the null hypothesis, so, as suggested by the results of BPLM and The Hausman test, the random effect model was applied to the study.

Table 6: Model Selection

Tests	F-Value	Prob > F
F-Test	F(133, 1067) = 1.88	0.1286
BPLM Test	chibar2(01) = 36.77	0.0000
Hausman Test	chi2(3)=1.73	0.6302

Regression model

Three regression models, including ordinary least square regression, fixed effect model and random effect model, are tested in this study. The aim is to find the association between earning management and innovation. The results of OLS regression postulated that the relationship between innovation and earning management is positive and significant. The control variables also showed significant association with earning management; however, leverage and return on asset showed significant negative impact whilst firm size showed a significant positive impact on earning management. On the

other hand, both the fixed-effect model and random effect model showed no sign of the significant impact of innovation on earning management. Further, the association of control variables is also found to be insignificant. Since heteroskedasticity affects the standard errors and narrows the confidence intervals, therefore, the results of all these models are different. Thus there is a need to adjust the standard error without distrusting the coefficients. Since the model selection criteria posit that the random effect model is the best fit model, therefore, robust standard errors are calculated for the random effect model.

Table 7: Regression Results for the whole period

EQ	OLS		Fixed Effect Model		Random Effect Model		Random Effect Model (ROBUST)	
	Coef.	t	Coef.	P> t	Coef.	P> t	Coef.	z
rd	0.2186	-2.01*	0.2336	-0.90	0.2147	0.11	0.2147	-3.33***
lev	-0.03379	-1.63*	-.044636	-1.47	-0.03589	0.12	-0.03589	-1.92*
firmsize	0.00474	1.92*	.0008271	0.21	0.00376	0.18	0.00376	2.37**
roa	-0.00078	-1.93*	-.000671	-1.46	-0.00073	0.08*	-0.00073	-2.42**
cons	-0.00907	-0.24	.04 6248	0.79	0.00557	0.90	0.00557	0.23

***, ** and * denotes 1%; 5% and 10% level of significance

The result of the robust random effect model are given in Table 7, where it is found that there is a highly significant and positive relationship between innovation and earning management (0.21; $p < 0.01$). Thus one can argue that the impact of innovation on earning management is positive. The control variables also posted a significant association with earning management, with leverage and return on assets showing significant negative impact, whilst firm size showed a significant positive impact. This means that through earning management, the managers of the firm are able to increase the overall firm size. However, it has a negative impact on return on assets as it posits a negative signal in the market. The findings are in line with the findings of (Mande et al., 2000; Markarian et al., 2008; Oswald & Zarowin, 2007; Bayraktar & Tutuncu, 2020), who posit that managers use innovation costs to achieve earning smoothing and earning targets.

Conclusion

The competitive advantage is of immense importance for the business in today's highly competitive era. Innovation through Research & Development expenses or R&D projects help business to get that competitive advantage over their competitors. So, the firms with high investment in R&D projects produce new and more effective products or techniques, resulting in high profits in the future. The economic theories also support the relationship between R&D and future profitability, so policymakers throughout the world emphasize innovation-led R&D projects. Despite its importance, the accounting treatment of Research & Development expenditure is a controversial topic. There are two perspectives in regard to Research & Development expenditure accounting treatment. The first perspective argues that R&D expenses should be capitalized, and they need to be recorded in the statement of financial position as an intangible asset. It is also argued that Research & Development expenditure directly relates to the company's future profitability, and capitalization

R&D expenditure gives a signal in the market regarding management expectations about future growth. But, the proponent of the second perspective argues that Research & Development expenditure should be expensed and charged to the current year's income statement as an expense. This treatment of Research & Development expenditure will increase the objectivity and reduces the information asymmetry in the financial statements as it is uncertain that R&D costs will turn into any economic profit in future.

The IFRS directs the firm to expense R&D cost, but under specific circumstances, IFRS also allow the capitalization of R&D expenses. However, these circumstances are very subjective and allow the management of a firm to use their preference while treating R&D costs. This subjectivity of preference can create an opportunity for the management to indulge in earnings management to achieve their earnings goals. So, the objective of the current study is to understand the motivation of R&D expenses accounting treatment in an environment where the subjective treatment of R&D costs is allowed.

In the UK, firm management is allowed to use subjective preferences in the accounting treatment of R&D expenses. Therefore, the objective of the current study is to understand whether UK firms use R&D expenses to conduct earnings management. The cross-sectional nature of the data allowed the authors to use panel data methodologies to test the hypothesis. The correlation among the independent variables is not found after initial testing. The authors also test the data for serial correlation and found no autocorrelation in the data. The test of heteroskedasticity shows the presence of heteroskedasticity in the data. So, the author used robust standard errors for the estimations. The Hausman test proposes to use the random-effect model. However, the author used fixed effect, random effect and pooled regression models for the estimation purpose. The fixed-effect model and pooled regression estimation provide no statistical evidence regarding the relationship between R&D expenses and EM. But, the findings of random effect model estimations show a significant association between Research & Development costs and EM, but the relationship is not economically strong as the beta value of the coefficient is close to zero. The author is of the view that the economically weak relationship is due to the unique sample of the study. So, it can be said that management uses R&D expenses to indulge in earnings management activities. The management adjusted the

rate of amortization of intangible assets to smooth their earnings.

The findings of this study are important for all the stakeholders alike. The results postulated that managers do use Research & Development expenses to manipulate earnings and to gain personal goals. The results of the study are essential for the accountants and auditors as this study reveals the role of management in earnings management through R&D expenses, so auditors and accountants make sure that the management does not indulge in these activities and ensure the financial statements should be free from any misleading information. Investors can use the result of this study while making an investment in any firm and use appropriate discount rates for future earnings of the company, as the management may use the intangible assets to do earnings management. The policymakers use these results to suggest appropriate measures to make adjustments in accounting reporting standards to reduce the objective treatment of R&D expenses. The sample of the study belongs to the UK, so the results cannot be generalized to firms in other countries. This study uses the non-financial firms as a sample, so the results are not applicable to financial firms inside the UK. As the result of the study is affected by the sample so, the larger sample may influence the results. The authors also recommend a comparative analysis of those firms that expended R&D expenses with the firm that capitalized on R&D expenses to know the basic reasons for variability.

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