

Earnings Management around Research and Development Manipulation

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Abstract *The aim of this paper is to investigate the impact of research and development investment (R&D) on managers' behaviour. Specifically, considering that R&D is a specific investment, inherently exposed to a high level of uncertainty and high information asymmetry and that R&D accounting choices are a controversial issue, the current study tries to evaluate R&D effect on earnings management. The study is conducted on a sample of French companies investing heavily in R&D and accounting data are collected from the Worldscope database. The earning management is estimated through the discretionary accruals. Results indicate that R&D favours both incentive and ability for managers' earnings management.*

Key words R&D, earnings management, accruals

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1. Introduction

R&D investment and earning management imply a two-way relationship. R&D (or innovation in general) is both an incentive to earnings management and a procedure of earnings management (El Mir and Seboui, 2005; Jensen, 1993). R&D intensive companies possess simultaneously the key factors impelling in discretionary behaviour and the tools to effectively increase discretion. R&D has a very high risk of failure linked to R&D inherent characteristics and R&D accounting estimations (Affes and Chouaibi, 2007). However, this evidence has received little attention to date and much of the current research on R&D manipulation focus only on detecting the determinants of the choice of accounting for R&D. Therefore, the aim of this paper is to highlight the relationship between R&D and earnings management. This contributes to the literature by presenting evidence of R&D as an incentive and a tool of earnings management.

There is substantial evidence that managers engage in earnings management (Healy, 1985; Healy and Wahlen, 1999; Fields *et al.*, 2001; Kothari, 2001). Scott (1997) argues that different forms of earnings management include income smoothing, short-term earnings maximization, earnings minimization and the big bath. There have been at least three attempts at defining earnings management implying differing interpretations of empirical evidence in studies. Earnings management is defined as a "purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain" (Schipper, 1989). In generally accepted terms, earnings management occurs "when managers use judgment in financial-reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers" (Healy and Wahlen, 1999). Although these definitions are widely expected, they suffer from not taking into account all company stakeholders. To offset this state, Degeorge *et al.* (1999) assumes improved performance is rewarded everywhere and they introduce behavioural thresholds for earnings. Much of the empirical studies on accounting method choice are based on the opportunistic behaviour perspective which draws support from the assumptions of positive accounting theory (Watts and Zimmerman, 1986). Holthausen (1990) illustrates three non-mutually exclusive perspectives on accounting method choice: the opportunistic behaviour, efficient contracting, and

information perspectives; the opportunistic perspective holds that managers seek to mislead investors, the information perspective holds that managers reveal to investors their private expectations about the firm's future cash flows and the efficient perspective holds that managers seek to maximize shareholders' value.

The existing literature on earnings management shows that there are two manners of manipulation earnings. The focus has mostly been limited to the accounting earnings management at the expense of real earnings management. Managers exercise discretion and manage earnings using discretionary accruals based on accounting estimates and methods (accounting earnings management) and special transactions so-called real operational activities (real earnings management). Real earnings management (REM) is defined by Roychowdhury (2006) as follows: "Real activities manipulation is defined as management actions that deviated from normal business practices, undertaken with the primary objective of meeting certain earnings thresholds". Zang (2011) showed that firms prefer different earnings management strategies in a predictive manner, depending on their operational and accounting environment. In theory, accounting practice and accounting earnings management are justified on positive accounting theory (Watts and Zimmerman, 1990) which draws support from assumptions of agency costs and political costs. But, studies on real earnings management suggest that managers' discretion can be explained by other supports (competing theories of the positive theory). In particular, Raffournier (1990) points out the importance of signal assumption, fiscal assumption, smoothing assumption and thresholds assumption.

The particular earnings management we focus on is earnings management through R&D. R&D Accounting standards offer flexibility for the managers to choose between the two accounting treatments and to decide about R&D investments. Thus, R&D is considered to be highly discretionary and can be used for earnings management. It can occur through two channels: accruals (accounting earnings management) and under-investment in R&D (real earnings management). Moreover, R&D activity differs by nature from other investments by a number of attributes: firm-specificity, information asymmetry and high uncertainty (Holmstrom, 1989). R&D characteristics are likely to increase divergence between managers and investors and provide adequate grounds for earnings management.

Following the most recent papers about earnings management, R&D manipulations are estimated by accrual-based measures, mainly the Jones model (1991), modified by a performance indicator ROA (Kothari, 2005) in order to align methodology with the literature (Rebai, 2011; El Mir and Seboui, 2005; Djama *et al.*, 2011), is used as a proxy of the extent of earnings management. Test estimation of accruals model is conducted on a control sample, supposed not to be incited to manage earnings, including non R&D intensive companies from CAC ALL TRADABLE from 2007 to 2011. Once coefficients are obtained for the control sample, the discretionary accruals are calculated for the year 2011 for the R&D intensive companies of CAC ALL TRADABLE (test sample). For comparison reasons, the discretionary accruals are also calculated for the no R&D intensive companies of CAC ALL TRADABLE (control sample).

Empirical results show that for R&D intensive companies, the discretionary accruals is statistically different to zero at 5% (as it is indicated by student test), while for no R&D intensive companies, the discretionary accruals is statistically equal to zero. We can then deduct that R&D incites companies to manipulate earnings and explain the results of El Mir and Seboui (2005) and Djama *et al.* (2011). Results also show a significant correlation between discretionary R&D and accruals. They confirm the assumption that R&D is a tool to earn management and explain the results of El Mi and Seboui (2005) and Thi *et al.* (2009).

The remainder of the paper is organized as follows: Section 2 discusses the theoretical background of the earnings management through R&D characteristics and develops the first study hypothesis. Section 3 discusses the theoretical background of the earnings management through R&D accounting treatment and develops the second study hypothesis. In section 4, the paper identifies data and estimation model. Section 5 presents empirical results. Section 6 discusses the implications of this paper, as well as areas for further research.

2. Theoretical Background: R&D, an incentive to earnings management?

2.1. R&D characteristics

Holmstrom (1989) argued that R&D activity differs from other investments by a number of attributes. By nature, R&D is subject to firm-specificity, information asymmetry and high uncertainty.

2.1.1. Asset specificity

Hirigoyen and Caby (1998) state that assets are specific when a durable investment has to be undertaken to support a particular transaction and this investment cannot be deployed on another transaction. According to Williamson (1975, 1985) “if an asset cannot be redeployed, it represents for the other agents a value creation inferior to the value attributed to this asset by its owner”. Asset specificity can arise in six dimensional typologies: site, physical asset, human asset, dedicated asset, brand capital asset and temporal asset specificity (Williamson, 1988). These investments are difficult to imitate because they depend on historic development, present high degree of ambiguity surrounding the causal relation and are very hard to substitute. Then, Yosha (1995) and Zeckhauser and Pound (1990) argue that specificity undermines control system and compounds the information asymmetry problem. This situation leads to the risk of losing the sums of money that were spent in case the R&D project is halted: this is irreversible R&D.

2.1.2. Uncertainty (moral hazard)

Uncertainty refers to the fact that circumstances change in unpredictable ways, and such change may disrupt existing patterns of transactions (Williamson, 1975). R&D increases the moral hazard and risk problems. R&D uncertainty concerns implementation, time dedicated, appropriation, marketing, results etc. Volatility in operating income and/or net income is driven by R&D immateriality leading to cash flow problems and technology and market risks. Uncertainty in R&D reflects the extent to which the market is unable to assess these investments and to evaluate their probable consequences on the market value. This situation leads to a technological risk and a competitive risk: technological risk is that of technological divide which renders this investment almost obsolete, then competitive risk is that of being incorrect to say that the discovery leads to a market “standard” (Thibierge, 1997).

2.1.3. Informational Asymmetry

The uncertainty and the specificity of R&D increase the informational asymmetry. Aboody and Lev (2000) have concluded that the different characteristics of R&D cause an informational imbalance between the entity and its environment and within the entity. Their findings, for the period from 1985 to 1997, indicate that insiders take advantage of information on planned changes in R&D budgets and that R&D is thus a major contributor to information asymmetry. In this context, Davis (2001) defines information asymmetries as arising due to differentials in the kinds of information emanating from the firm’s various R&D activities, where the information generated is initially private to that firm – and hence not available to others. R&D creates information asymmetry because of the relative uniqueness of R&D investments, the absence of organized market of R&D and the availability of many accounting choices of R&D. Davis (2001) suggests that four strategies may be used to exploit the information asymmetries from R&D: (1) publish the details of the innovation in return for legal protection; (2) keep the information inside the firm; (3) make the information selectively, informally available to others; and (4) disseminate the information as widely and rapidly as possible.

2.2. Review and hypothesis

The relationship between R&D and the propensity to use earnings management is justified in terms of specificity, uncertainty and information asymmetry around R&D. R&D can complex agency problems and further reinforce the asymmetric information problem and make the information divulgation process incomplete and biased due to the loss of managerial control (Hall, 2002).

In this context, Nekhili and Poincelot (2000) survey found that the inherent characteristics embedded in R&D are all important factors facilitating managerial intervention in the reporting process. They pinpoint three different fraudulent practices which could be positively interpreted by certain stakeholders, whereas when taken simultaneously these practices increase the managerial discretion. The inherent characteristics studied are: the importance of human capital, protection of research and development results and a particularly long time horizon. To better understand the managers’ attitudes and behaviours, authors examine manipulation tools through investment in R&D, R&D reduction and R&D abandon. They rely on empirical studies differentiating between four elements of R&Ds’ manipulation: being threatened by an OPA

(Chan *et al.*, 1990; Hall, 1988), being targets for LBO (Lichtenberg and Siegel, 1990; Long and Ravenscraft, 1993), having surplus cash (Cho, 1998; Himmelberg and Petersen, 1994) and having results below predictions (Thurrow, 1993; Bange and De Bondt, 1998). The study concludes that these events motivate managers to change their R&D investment strategy without regard to stakeholders' interests; otherwise it justifies the relevance of its initiative with regard to the manipulation enhancing with R&D investment.

El Mir and Seboui (2005) also tested whether innovation creates a favourable climate for earnings management. They divided the base sample into quartiles ranging companies in increasing order of the discretionary accruals: ranging from companies with most positive accruals to companies with most negative accruals. The t-test of the difference of means (for equality of means) of different quartiles was done to verify dissemblance between quartiles. Tests' result confirms the main assumption that the most innovative firms may manage earnings by increasing or decreasing accounting results. The study contributes to existing literature by analyzing the relationship between innovation, diversification and earnings management. Particularly, it examines the impact of innovation and diversification on earnings management. Using a sample of 319 US firms available in Fortune 1000 list over the 1994–2000 periods, authors find that the interaction between innovation and diversification strategies facilitates earnings management.

For their part, Djama *et al.* (2011) examine whether innovation constitutes an incentive to engage in corporate earnings management as measured by accruals. Measure of the earning management through the discretionary accruals were applied for a sample comprising innovative firms based on the OSEO certification standards and a control sample comprising non innovative firms for the year 2009. Results showed that only innovative firms manage earnings by having increased earnings. The survey indicates that innovation through its characteristics induces information asymmetry and consequently managerial discretion. Since managers have more capacity to manipulate accruals and to influence the way the investors perceive the firm's result or performance. The study also aims at determining the characteristics of innovative enterprises intending to engage in corporate earnings management. It shows that neither debt nor asset structure are statistically significant variables.

However, Chouaibi and Affes (2007) found that informational asymmetry optimizes the R&D investments. In a Tunisian context, results show that managers' latitude encourages the development of technologically innovative activities as measured by the R&D investments. It reveals the interdependence between human capital and technological innovation process that undermine the principle of entrenchment and the agency theory.

According to this way, managers' objective is to increase information asymmetry to manage earnings to influence investor's perceptions about the firm value. It may be apparent that firms in which R&D are intensive should be incited to earnings management. We formulate the hypothesis as follows:

Hypothesis 1. The R&D may incite to earnings management.

3. Theoretical Background: R&D, a procedure of earnings management?

3.1. Accounting treatment of R&D

The valuation of intangible assets within the accounting framework raises several problems relating to their identification, measurement, and control (Zéghal and Maaloul, 2011). These problems imply a trade off surrounding the most effective accounting between relevance and reliability. The capitalization of R&D may increase value relevance for those who utilize financial statements (Lev and Sougiannis, 1996; Aboody and Lev 1998; Healy *et al.*, 2002). In distortion of the accounting principle of periodically matching costs with revenues, the immediate expensing of R&D is a most conservative accounting treatment and may increase reliability and decrease the earnings management risk (Nelson *et al.*, 2003). In this setting, the accounting treatment of R&D costs is a controversial issue and there are international accounting differences about accounting for R&D costs.

IAS No. 38 (IASB, 2004) requires that research expenditures be expensed in the income statement and development expenditures must be included in the balance sheet if some conditions are respected. Paragraph 57 of this standard requires six conditions to be fulfilled for recognition: technical feasibility, intention to complete, ability to use or sell, future economic benefits, adequate resources and ability to measure.

While IAS authorizes the capitalization of R&D expenditures under certain criteria, US GAAP takes a stricter approach to the issue. SFAS No. 2 -Accounting for Research and Development Costs (FASB, 1974) -

mandates that all R&D expenditures be immediately charged as an expense for each reporting period, except for the development costs of computer software that can be capitalized (SFAS 86).

French standards reach a compromise between relevance and reliability. By approximating the international level, French GAAP (regulation 2004-06) allows flexibility regarding the treatment of R&D. The conditions of capitalization stated by the French GAAP are similar to those required by IAS. However, while IAS requires that R&D must be included in the balance sheet when some conditions are respected, French accounting standards offer flexibility for the managers to choose between the two accounting treatments (capitalizing or expensing). Thus, the French GAAP gives the executives the inherent subjectivity of deciding whether the conditions of IAS 38 have been satisfied and of choosing the accounting treatment to adopt. Additionally, the implementation of the international standards since 2005 in Europe is considered to be highly discretionary and to be used for earnings management. Consequently there are discretions in the R&D accounting treatment and the choice of R&D investments.

3.2. Review and hypothesis

Some studies focus on the accounting manipulation through discretionary R&D accounting choices (Callimaci and Landry, 2003; Loulou and Triki, 2008; Nelson *et al.*, 2003; Triki and Halioui, 2013; Markarian *et al.*, 2008; Stadler and Banal, 2010) and others focus on accounting manipulation through the discretionary R&D investment decision (Osma, 2008; Dumas, 2012).

In the case of discretionary R&D accounting choices, El Mir and Seboui (2005) analyze the extent of earnings management, using a sample of 319 US firms available in Fortune 1000 list over the 1994–2000 period. In order to test whether R&D are an instrument for earnings management, they test the correlation between discretionary accruals and the ratio «R&D expenditure/total sales». Results show that managers are based on R&D investments decisions in managing earnings and that only for the sectors with intensive R&D (healthcare, chemistry, technology, consumer cyclical). Authors explain that these sectors generally recognize financial losses, which could incite managers to manipulate numbers. An intensive R&D investment, a high level of geographical diversification and a low level of sector (segmented) diversification encourage the determinants of earning management.

For their part, Thi *et al.* (2009) study whether capitalization of R&D expenditures is based on a trade-off between the benefits of information disclosure and the distortions from earnings management. Based on a sample of the largest German firms for the years 2001 through 2006, the results of the study show that R&D expenditures can be used for opportunistic earnings managements and that it can be used by managers to signal private information to the market only when the level of earnings management the firm is engaged in is low. In this context, Rebai (2011) suggests that the choice between capitalization R&D as an asset or showing it as expense reveals a choice between more information disclosure strategies and manage earnings strategies. The investigation about the incentives R&D investment capitalization is based on a sample of 87 French industrial firms listed on the SBF 250 index in the 2000-2004 periods. Results show that R&D capitalization leads to an improvement of the voluntary disclosure index as regards R&D policy. These findings infirm the conclusions of the study conducted by Thi *et al.* (2009).

In addition to discretionary R&D accounting choices, much of the empirical studies have highlighted the discretionary R&D investment decision. In this context, Shleifer and Vishny (1989) argue that managers entrench themselves by making highly specific investment which complements their qualifications and technical skills. The entrenchment makes it costly for shareholders to replace managers. Empirical results indicate that managers are motivated to invest in specific assets like R&D in order to extract higher wages, to broaden their margin of discretion in determining corporate strategy and thus to reduce the probability of being replaced. According to Hirshleifer and Chordia (1992) the announcement of R&D that advances resolution can be good news for investors. Reputational pressure therefore leads to excessive R&D. Hirshleifer (1993) also points out that investment choices affect resolution of uncertainty, so long-term investments and R&D can improve the managers' or firms' reputation. For example, in pharmaceutical firms, managers choose to increase their R&D to improve their reputation and to bring forward the resolution of uncertainty about the success of an innovative undertaking. Therefore, managers can entrench themselves and obtain more latitude in their strategy behaviour. Narayanan (1996) finds that cash flow motivate managers to reduce long term investments and R&D, in order to improve their early reputation. Extending the work of Harris and

Holmstrom (1982), Narayanan (1996) examines how managers who dislike risk protect their reputation through a downward rigid wage schedule. However, more recently, Affes and Chouaibi (2007) found that informational asymmetry optimizes the R&D investments. In a Tunisian context, results show that managers' latitude encourages the development of technologically innovative activities as measured by the R&D investments. It reveals the interdependence between human capital and technological innovation process that undermine the principle of entrenchment and the agency theory.

For his part, Dhaoui (2008) examines the influence of R&D geographic decentralization on the shareholders' wealth (firm's market value) and on managers' capacity to manage earnings (earnings management). The study assumes that the decentralization decision should be primarily motivated by the desire to increase the informational asymmetry between shareholders and managers to facilitate the earnings management. In this perspective, managers may disperse R&D investments. This strategy allows managers to gain greater autonomy to manage earnings and contributes to increase the wealth transfer from shareholders to managers. This view is inspired from the studies of Lambert (1984), Hughes and Schwartz (1989) and Trueman and Titman (1989). Dhaoui (2008) uses a sample of 250 companies including all companies provided by the SBF 250 French index market whose financial statement data are available for the five-year period from 2002 to 2006. In sum, the sample includes 460 firm-year observations. The data used in the testing model is identified from the "Ernstrade" database. Results show that geographic diversification intensity increases informational asymmetry and earning management and that the managers use this asymmetry to increase their own wealth and destruct that of the shareholder.

Accordingly, managers' preference for one R&D accounting choice or the other (on the balance sheet or on the income statement) and for R&D investment variation reflects an earnings management strategy. We formulate the hypothesis as follows:

Hypothesis 2. The R&D may be a tool to earnings management.

4. Methodology of research

4.1. Sample data

This paper includes all companies provided by the CAC ALL TRADABLE French index market in December 2012 whose financial statement data are available for the five-year period from 2007 to 2011. The sample involves data from the Worldscope data base. After eliminating financial firms and those whose data is empty or insufficient to calculate the accruals, the final sample includes in sum 302 companies in 2011. The hypothesis should be tested on a sample of R&D intensive companies. The CAC ALL TRADABLE is divided by activity: test sample including R&D intensive companies (107 companies) and control sample including non R&D intensive companies (195 companies). A company is classified into the first of these groups if it belongs to the list of R&D intensive companies. This list is provided by the European commission Economics of Industrial Research and Innovation (EIRI). Test sample includes 107 companies spread in 9 different sectors especially technology 28.97%, industry 24.30%, Consumer cyclical 18.69% and healthcare 15.88%. Test Estimation of accruals model parameters, will be conducted on the control sample for the period 2007 to 2011.

4.2. Earnings management measure

There is substantial evidence that managers have incentives to engage in earnings management by manipulating accruals and real activities. Much of the current research on earnings management employs mainly accrual-based measures as a proxy of the extent of earnings management. A priori, accruals fail to reflect and take account of the real operational activities. However, the findings of a recent study conducted by Zank (2011) are consistent with the hypothesis that managers use real and accrual manipulations as substitutes. It shows a positive correlation between real manipulation and the cost determinants of accrual manipulation, and a negative correlation between accrual manipulation and real manipulation. Thus, the use of accrual is appropriate and relevant for measuring R&D manipulation.

Healy (1985) has been the first to use accruals as a proxy of earnings management. He defines accruals as the difference between reported earnings and cash flows from operations. Accounting earnings are decomposed into cash flows from operations, non discretionary accruals (NDAC) and discretionary accruals (DAC). The total accruals (TAC) include discretionary and non-discretionary accruals. The discretionary

accruals are adjustments selected by managers. The non-discretionary accruals are accounting adjustments mandating by accounting standards. The earnings management may be limited only to the discretionary accruals. So, discretionary accruals are the difference between the total accruals and the non-discretionary accruals ($DAC = TAC - NDAC$) (Jeanjean, 2002).

Jeanjean (2002) presents an overview of the various accrual models used to estimate managers' accounting discretion (Healy, 1985; DeAngelo, 1986; Dechow and Sloan, 1991; Jones, 1991; Jones modified by Dechow *et al.*, 1995). The Jones (1991) model is the most widely used model in studies. It relates total accruals (TAC) to the change in sales (Sales) and the level of gross property, plant and equipment (PPE) and all variables are deflated by lagged total assets (A) to reduce the heteroscedasticity problem. The model is presented below:

$$TAC_{i,t}/A_{i,t-1} = a_0 (1/A_{i,t-1}) + a_1 (\Delta SALES_{i,t}/A_{i,t-1}) + a_2 (PPE_{i,t}/A_{i,t-1}) + \epsilon_{it} \quad (1)$$

This study adopts the Jones' (1991) model amended by a performance indicator (ROA) as Kothary *et al.* (2005) model in order to align its methodology with the literature (Rebai, 2011; El Mir and Seboui, 2005; Djama *et al.*, 2011). The model of Jones (1991) modified by ROA is presented below:

$$TAC_{i,t}/A_{i,t-1} = a_0 (1/A_{i,t-1}) + a_1 (\Delta SALES_{i,t}/A_{i,t-1}) + a_2 (PPE_{i,t}/A_{i,t-1}) + a_3 ROA_{i,t-1} + \epsilon_{it} \quad (2)$$

Where: $TAC_{i,t}$: total accruals for firm i in period t ; $A_{i,t-1}$: total assets for firm in period $t-1$; $\Delta SALES_{i,t}$: sales change for firm in period t ; $PPE_{i,t}$: net property, plant and equipment for firm in period t ; $ROA_{i,t-1}$: return on assets for firm in period $t-1$; $\epsilon_{i,t}$: the error term.

The model adopted by Jones (1991) distinguishes between discretionary and non-discretionary accruals, in considering that discretionary accruals are measured by the error factor. Once equation (2) is estimated, the coefficients obtained (\hat{a}_0 , \hat{a}_1 , \hat{a}_2 and \hat{a}_3) are used to calculate non discretionary accruals. The non-discretionary accruals measures are obtained from this equation:

$$NDAC_{i,t}/A_{i,t-1} = \hat{a}_0 (1/A_{i,t-1}) + \hat{a}_1 (\Delta SALES_{i,t}/A_{i,t-1}) + \hat{a}_2 (PPE_{i,t}/A_{i,t-1}) + \hat{a}_3 ROA_{i,t-1} \quad (3)$$

Finally, the discretionary accruals measures are obtained by the difference between total accruals (the difference between the net income and the flows) and the non discretionary accruals. The equation is presented below:

$$DAC_{i,t}/A_{i,t-1} = TA_{i,t}/A_{i,t-1} - [\hat{a}_0 (1/A_{i,t-1}) + \hat{a}_1 (\Delta SALES_{i,t}/A_{i,t-1}) + \hat{a}_2 (PPE_{i,t}/A_{i,t-1}) + \hat{a}_3 ROA_{i,t-1}] \quad (4)$$

5. Results

5.1. Accruals estimation

Let's reiterate that the study estimates discretionary accruals using Jones model (1991) modified by ROA (Kothari, 2005). Test Estimation of accruals model parameters, is conducted on the control sample including non R&D intensive companies from CAC ALL TRADABLE French index market during the five-year period from 2007 to 2011.

5.1.1. Partial correlation

A partial correlation provides an index of whether two variables are linearly related if the effects of a third (or more) control variable are removed from their relationship. A partial correlation is a type of Pearson correlation coefficient that can range in value from -1 to +1. Table 1 exhibits partial correlation between the independent variables and the dependent variable "total Accruals". It reveals positive and significant correlation between the coefficients of 3 of the 4 independent variables ($1/TAt-1$, $\Delta CA_{i,t}/TAt-1$, $ROA_{i,t-1}$) and the dependent variable *total Accruals*, indicating a good specification of the model.

Table 1. Partial correlation

TAC _{i,t} /A _{i,t-1}	partial Correlation
1/ A _{i,t-1}	0.3841***
ΔSALES _{i,t} /A _{i,t-1}	0.1579***
PPE _{i,t} /A _{i,t-1}	-0.0535
ROA _{i,t-1}	0.0742**

***, * Significant at 1% and 10%, respectively, P- value in brackets ()

5.1.2. Panel data estimation

Panel data (or longitudinal data or cross-sectional time-series data) is a dataset in which the behaviour of entities is observed across time. To investigate the possibility of using panel data, specification test verify that the model is perfectly identical for all companies or on the contrary each company has its own specificities: it tests the null hypothesis of homogeneity against the alternative hypothesis of fixed effects. Using Fisher test, the p-value for the statistic test P- Value < 5%, which means that the null hypothesis can be rejected and the panel data specification can be accepted. F (197, 717) = 2.98 and Prob > F = 0, 0000 confirms the individual heterogeneity and the overall model is significant.

The study estimates fixed-effects model (each entity has its own time-invariant individual characteristics) and random-effects model (the variation across entities is assumed to be random) and then decides between them. Hausman (1978) tests the null hypothesis that no correlation exists against the alternative hypothesis that there is a correlation. Results of Hausman test (Chi2 (4) = 71.2 Prob > chi2 = 0,000) refute the hypothesis of the absence of correlation between random term and explanatory variables (P-Value < 5%). Estimators of Random Effects are biased, so it would be better to retain estimators of fixed effects that are not biased. The results of table 2 show that the fixed-effects model regression is significant as it is indicated by the coefficient (R² = 17.9%). The total assets and sales variations have a significant and positive impact on the total accruals, while PPE and ROA have a significant and negative impact on the total accruals.

Table 2. Estimation results of fixed effects model

Variables	Coefficient
1/ A _{i,t-1}	1.752386***
ΔSALES _{i,t} /A _{i,t-1}	0.060633***
PPE _{i,t} / A _{i,t-1}	-0.0613642***
ROA _{i,t-1}	-.0006609 *
constante	-.0454083 ***
R2	17.9%
F	39.08
prob> F 0.000	0.000

***, * Significant at 1% and 10%, respectively, P- value in brackets ()

5.2. Main empirical results

Our main purpose in this paper is to study the impact of R&D on earnings management. Once coefficients have been obtained for the control sample, the discretionary accruals are calculated for the year 2011 for the R&D intensive companies of CAC ALL TRADABLE (test sample). The discretionary accruals are also calculated for the no R&D intensive companies of CAC ALL TRADABLE (control sample).

Concerning the first hypothesis, we compare the discretionary accruals between R&D intensive companies and no R&D intensive companies. Results of table 3 show that for R&D intensive companies, the discretionary accruals estimated mean represents 1, 8297% of total asset and are statistically different to zero at 5% as it is indicated by student test (H0: accruals = 0, H1: accruals ≠ 0, p = 5 %), while for no R&D intensive companies, the discretionary accruals estimated mean represent 0.74036 % of total asset and are statistically equal to zero. We can then deduct that R&D intensive companies tend to manipulate earnings, while no R&D intensive companies tend to manipulate earnings. Therefore, earnings management is incited by R&D

investment. This point of view confirms the study assumption and explains the results of El Mir and Sboui (2005) and Djama *et al.* (2011). So, R&D increase informational asymmetry and incite managers to manage earnings. We conclude that R&D is an important managerial decision involving accounting manipulation choice. It increases informational asymmetry and managerial discretion. This underlines theoretical assumption of agency theory.

Table 3. Results of discretionary accruals mean

TAC _{i,t} /TA _{i,t-1}	Mean	Std-Dev	t-statistic	p
control sample	.0074036	.1169917	0.8837	0.3780
Test sample	.018297	.0795665	2.3787**	0.0192

** Significant at 5%, P- value in brackets ()

Concerning the second hypothesis, we examine the correlation between discretionary accruals and the level of discretionary R&D for R&D intensive companies. Results of table 4 show a significant and negative correlation at 10% level between discretionary accruals and discretionary R&D as measured by (R&D/CA). Therefore, the companies that invest more in R&D have less incentive to manipulate earnings through discretionary accruals. This negative attitude can be explained by the results of recent studies analyzing the substitution and complementarily principles between accounting and real earnings management and showing a substitution effect (Zang, 2011 ; Graham *et al.*, 2005 ; Bhojraj *et al.* ,2005; Cohen *et al.*, 2008 ; Cohen and Zarowin, 2010; Yao, Zhag *et Zhao*, 2010 ; Yang *et al.*, 2010). We conclude that French companies investing intensively in R&D manipulate earnings through discretionary R&D investment decision substituting for discretionary accruals. This point of view confirms the study assumption and explains past results (Schleifer *et Vichny*, 1989; Hirshleifer, 1993; Thurow, 1993; Narayanan, 1996; Dhaoui, 2008; El Mir *et Seboui*, 2005; Thi *et al.* 2009). This underlines theoretical assumption that R&D reflects an earnings management strategy.

Table 4. Pearson correlation between R&D and DAC

	RD/CA	DAC
RD/CA	1.0000	-0.149*
DAC	-0.149*	1.0000

* Significant at 10%, respectively, P- value in brackets ()

6. Discussion and conclusion

R&D characteristics (firm-specificity, information asymmetry and high uncertainty) and subjective R&D accounting treatment are likely to increase divergence between managers and investors and provide adequate grounds for earnings management. However, much of the current research on R&D examines earnings management through R&D, focusing on detecting the determinants of the choice of accounting for R&D. For this reason, the aim of this paper is to investigate the impact of research and development investment on managers' behaviour. This contributes to the literature by presenting evidence of R&D as an incentive and a tool of earnings management.

The study is conducted on a sample of French companies from CAC ALL TRADABLE investing heavily in R&D in 2011 and accounting data are collected from the Worldscope data base. Earning management is estimated by accrual-based measures, especially the Jones model (1991) modified by ROA (Kothari, 2005). Test Estimation of accruals model is conducted on a control sample, supposed not to be incited to manage earnings, including non R&D intensive companies from CAC ALL TRADABLE from 2007 to 2011.

Empirical results for the year 2011 show that for R&D intensive companies (test sample), the discretionary accruals are statistically different to zero at 5% (as it is indicated by student test), while for non R&D intensive companies (control sample), the discretionary accruals are statistically equal to zero. We can, then, deduct that R&D favours the emergence of an internal climate favourable for increased earnings

management. Results also show a significant correlation between discretionary accruals and discretionary R&D. We can then deduct that R&D are used as a procedure for earnings management

To extend this study, we suggest studying factors explaining the accounting behaviour of R&D intensive companies.

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