

# R&D-Based Earnings Management and Accounting Performance Motivation

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**Abstract** R&D treatment could be influenced by earnings management purposes due to the flexibility allowed in the R&D accounting standards. This paper attempts to determine whether discretionary R&D treatments are motivated by financial performance or can be constrained by board independence. The study is conducted on a sample of 410 firm-year French companies investing heavily in R&D in the period 2007-2011 and accounting data are collected from the Worldscope database. Using two logistic regression models, results show that the French companies do not tend to capitalize the R&D expenditures in order to smoothen the results but rather tend to cut the R&D expenditures in order to achieve earnings targets. However, the hypothesis that independent directors reduce R&D manipulation is not supported.

**Key words** Earnings management, R&D capitalization, R&D cut, board independence

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## 1. Introduction

There is substantial evidence that managers engage in earnings management (Healy, 1985; Healy and Wahlen, 1999; Fields *et al.*, 2001; Kothari, 2001). 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.

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). Accounting treatment of R&D expenditures is a controversial issue allowing subjective accounting choice to managers. While R&D capitalization is not allowed in the USA, R&D accounting treatment is a management decision in France. French accounting regulations give firms the managerial choices made upon the R&D accounting treatment - capitalization or expensing -, the amount of R&D investment, the R&D presentation and the content of R&D information disclosed in annual reports. These accounting choices are defined as R&D accounting policy. Therefore, R&D accounting policy fit with a double logic of optimization of accounting treatment and financial communication of R&D expenditure (Casta, 1997; Lamrani, 2010; Rebai, 2011). In this regard, former studies look to R&D

capitalization or R&D adjustment and no work focuses on these two R&D accounting policies simultaneously. The majority of R&D studies on earnings-management motivations derive from the positive theory of accounting (Watts and Zimmerman, 1986) but there is a paucity of studies that indicate that R&D decision is motivated by performance incitation.

This paper analyzes the factors explaining the discretionary treatments of R&D expenditures. 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.

Specifically, this study involves the accruals earnings management through R&D capitalization, the real earnings management through R&D investment adjustment, and the corporate governance through board independence. It points out simultaneous the R&D capitalization and the R&D cut. The aim of this paper is to determine whether discretionary R&D treatments are incited by financial performance and can be constrained by board independence. To this end, the study is conducted on a sample of 410 firm-year French companies investing heavily in R&D in the period 2007-2011 and accounting data are collected from the Worldscope database. It uses two logistic regression models to test the effects of the performance and board independence on R&D manipulation. Empirical results show that the French companies do not tend to capitalize the R&D expenditures in order to smooth the results and they tend to cut the R&D expenditures in order to achieve earnings targets confirming the studies of Osma (2008) and Dumas (2012). However, the hypothesis that independent directors reduce R&D manipulation is not supported. Our research contributes to the literature by providing further evidence that, in French context, R&D cut is a strategic decision influenced by earnings management to boost performance whereas R&D capitalization is not affected by financial performance.

The remainder of the paper is organized as follows: Section 2 discusses the theoretical background relating R&D manipulation to performance target and board independence and develops the study hypothesis. In section 3, the paper identifies data and estimation models. Section 4 presents empirical results. Section 5 discusses the implications of this paper, as well as areas for further research.

## **2. R&D, target performance and board independence**

### **2.1. R&D capitalization and Earnings smoothing**

Given the subjectivity in the choice of R&D accounting costs, previous researches provide evidence for earnings management (Nelson et al., 2003; Chambers *et al.*, 2003; Callimaci and Landry, 2003; Koch, 1981; Markarian *et al.*, 2008; Seybert, 2010; Stadler and banal, 2010). The decision to capitalize development costs is de facto discretionary because auditors will typically not challenge a manager who asserts that the criteria are not met (Smith *et al.*, 2001).

Studies view income-smoothing as an opportunistic practice (Gordon, 1964; Raffournier, 1990) and especially as an incentive to discretionary capitalization of R&D costs (Markarian *et al.*, 2008; Oswald and Zarowin, 2008; Triki and Halioui, 2013). The income-smoothing hypothesis suggests that managers aspire to reduce earnings fluctuations (Drira, 1999; Markarian *et al.*, 2008; Fudenberg and Tirole, 1995). Among prior studies, Oswald and Zarowin (2008) using a sample of U.K. firms that engaged in R&D activities during the 1990s, explain the R & D capitalization by earnings variability in electronically and software industries and by earnings profitability in engineering industry. These results are also confirmed by the Oswald's (2008) study.

For their part, Callimaci and Landry (2003) study a sample of software Canadian companies and indicate that the choice of accounting for R&D expenditures between capitalizing and expensing is motivated by two earnings management incentives: smoothing the results and avoiding any violation of the debt's restrictive clauses.

Markarian *et al.* (2008) also examine whether Italian listed companies use R&D cost accounting as a tool for earnings-smoothing and for violating debt covenants reducing. Results for the 2001-2003 periods support the earnings-smoothing hypothesis and don't support the financial leverage hypothesis. Italian firms that have decreased profitability, as measured by return on assets compared to the average of the previous two years, are more likely to capitalize R&D expenditures than the ones that have increased profitability.

Robustness tests, introducing variables related to corporate governance characteristics, firm characteristics, and industry characteristics don't affect the results.

Markarian *et al.*'s findings are later supported by other studies. Persson and Fuentes (2011) conduct a R&D study, based on a sample of Swedish listed firms, to examine whether income-smoothing takes place through R&D accounting as provided by the paper of Markarian *et al.* (2008). The regression analysis supports the income smoothing hypothesis and indicates that the larger the fluctuations are in ROA, the stronger the relationship with income smoothing behaviour. Thi *et al.* (2009) also analyze the interaction of signaling and earnings management of discretionary R&D capitalization. Using German listed firms for the period 2001-2006, the regressions results are consistent with Markarian *et al.*'s findings. They also show that profitability represents an opportunistic determinant for R&D capitalization, only in the cluster of high level of earnings management.

In the French context, evidence of the use of R&D capitalization for earnings-smoothing purposes has been recently studied by Triki and Halioui (2013). Using French data for 2007-2008, the results of the logistic regression show that companies listed on the Euro-next Paris tend to capitalize R&D expenditures to smoothen the results and to reduce the risk of violating debt covenants.

According to this way, the choice of capitalizing R&D expenditures is motivated by earnings smoothing objective. In line with previous literature, this study tests whether the decision to capitalize expenditure is affected by profitability incentives and we develop the following hypothesis:

**Hypothesis 1.a:** *There is a negative relationship between a firm's change in profitability and reported R&D capitalization.*

## **2.2. R&D cut and Earnings thresholds**

There exists evidence that in countries where the capitalization of assets is not allowed, firms manage their income by the amount of R&D expenditures (Perry and Grinaker, 1994). Previous research provide evidence for the use of managerial investment decisions as instruments for achieving income objectives not only in USA (Baber *et al.*, 1991; Perry and Grinaker, 1994; Bange and DeBondt, 1998; Bushee, 1998), but also in other countries where firms have accounting R&D flexibility. Studies view earnings thresholds as incentives to discretionary R&D investment adjustment. Interestingly, Degeorge *et al.* (1999) identify three earnings threshold that drive earnings management: reporting profits, performance relative to the prior comparable period and performance relative to analysts' earnings projections. A number of studies provide evidence that managers intentionally decrease R&D investments to meet the first two thresholds mentioned by Degeorge *et al.* (1999).

In this context, Baber *et al.* (1991) assume that decisions to invest in R&D are influenced by earnings management incentives. Using a sample over the period 1977-1987, the study group the sample firms into three mutually exclusive cases (1) current income before tax and R&D is less than the income objective (2) current income before tax and R&D exceeds income objective (3) current income exceeds income objective by cutting R&D investments. Results show that in the last case R&D investment is significantly less than the other cases. Such evidence is consistent with the hypothesis that the reduction of R&D investment is influenced by managers' objective to meet or to beat the income objective.

Bushee (1998) also analyzes R&D investment manipulation to meet short-term earnings goal and the influence of institutional investors on the myopic investment behavior in R&D. The sample covers all American firms for the period 1983-1994, with pre-R&D earnings that are below the prior year's level, but by an amount that could be reversed by reducing R&D. Inspired by the models of Baber *et al.* (1991) and Berger (1993), the logit model regression reveals that earnings declines' affect R&D cut and the institutional investors' effect in reducing pressure for this myopic behaviour.

Later, Mande *et al.* (2000) shows that in the Japanese context managers adjust R&D investments to smoothen profits. Roychowdhury (2006) also examines earnings management through real activities manipulation for all firms in COMPUSTAT between 1987 and 2001. He reports that firms can increase earnings by reducing discretionary expenditures such as R&D, advertising, and maintenance.

For their part, Osma and Young (2009) employ positive earnings and positive earnings growth as two measures of target earnings and the procedure designed by all of Baber *et al.* (1991), Perry and Grinaker (1994), Bushee (1998), Cheng (2004) and Oswald and Zarowin (2008). Based on a large sample of UK firms

during the period 1989 through 2002, their results indicate that managers cut R&D in response to earnings target.

In the French context, the only study about myopic R&D investment is conducted by Dumas (2012) over the period 2001-2010. The author assumes that managers manipulate R&D investments to meet earnings targets including zero earnings, previous period's earnings, and analyst forecasts. Testing the impact of the three earnings target on the variability of investment in R&D of French firms, the results shows that managers intentionally adjust R&D to achieve earnings profit and to a lesser extent the result earnings level, but they do not establish a link between R&D and analysts' forecasts.

Accordingly, the adjustment of R&D expenditures is motivated by earnings targets. In line with previous literature, this study tests whether the decision to cut R&D investments is affected by profitability incentives and we develop the following hypothesis:

**Hypothesis 1.b:** *There is a positive relationship between earnings target (zero earnings, previous period's earnings) and R&D investment decrease.*

From our two partial assumptions H1.a and H1.b, we formulate our general assumption:

**Hypothesis H1:** *discretionary R&D treatments depend on the existence of target-performance incentive.*

### **2.3. R&D manipulation and Board independence**

Corporate governance plays a fundamental role in monitoring management's behaviour. In particular board independence is at the centre of this decision making and control system (Fama and Jensen, 1983; Dechow *et al.* 1996). Independent directors are successful in constraining accounting accruals manipulation (Dechow *et al.*, 1996 ; Beasley, 1996 ; Peasnell *et al.*, 2000, 2005 ; Klein, 2006) and improving financial information reporting (Cheng and Courtenay, 2006 ; Cheung *et al.*, 2006; Nasir and Abdullah, 2004; Patelli and Principe, 2007; Lim *et al.*, 2007; Laksmana, 2008; Felo, 2009; Chen and Jaggi, 2000; Cerbioni and Parbonetti, 2007). Recent studies examine whether independent directors are associated with a lower extent of R&D manipulation:

Among studies on the determinants of R&D capitalization, Markarian *et al.* (2008) examine the relationship between characteristics of firm corporate governance and firms' decisions to capitalize R&D costs. The study shows that Italian firms tend to use R&D cost capitalization for earnings-smoothing purposes and confirm income smoothing hypothesis. Controlling for ownership structure, board size and board independence, the results indicate that the proportion of independent directors on the board are weakly related to the decision of R&D cost capitalization. For his part, Osma (2008) does not find any significant correlation between board independence and R&D capitalization in Italian firms.

Among studies on the determinants of R&D investment, Dong and Gou (2010) examine the influence of corporate governance on R&D investment intensity. Based on a sample of Chinese companies, test results show a positive and significant correlation between the number of the independent outside directors and R&D investment. This finding supports the view of Baysinger and Hoskisson (1990) stipulating that independent outside directors could improve the R&D investment in companies for their long-term orientation (and lead to the upgrade of corporate innovation capabilities).

Osma (2008) also seeks to explain cutting R&D spending by short-term earnings pressures. Using a sample of UK non-financial firms between 1989 and 2002, results show that the probability of cutting R&D is sensitive to failure to report positive earnings and earnings growth and that this manipulation (cutting R&D in the presence of short-term pressures) is reduced in presence of board independence.

Recently, Affes and Ben Romdhane (2011) analyze whether independent directors simulate or inhibit the opportunities of real earnings management (reducing discretionary expenses, Sales management, and assets disposal management). Based on Tunisian data for the period 2003-2007, the study finds that independent directors play an inhibitive role for practicing reducing discretionary expenses and for discretionary assets disposal.

In line with these conclusions, this study tests whether an increase in outside directors reduces discretionary R&D treatments and we develop the following hypothesis:

**Hypothesis 2:** *There is a negative relationship between board independence and discretionary R&D treatments (R&D capitalization and R&D cut).*

From our second assumption H2, we formulate our partial assumptions:

**H2.a:** *There is a negative relationship between board independence and R&D capitalization*

**H2.b:** *There is a negative relationship between board independence and R&D cut*

### **3. Methodology of research**

#### **3.1. Sample data**

France provides a natural context for checking our assumptions because as the accounting standards in France allow the choice between capitalization and expensing R&D costs and offer the ability to choose the amount of R&D investment. To examine R&D accounting policy, we use all French R&D intensive companies for the 5-year period from 2007 to 2011. This list is provided by the European commission Economics of Industrial Research and Innovation (EIRI). The sample involves financial data from the Worldscope database. After eliminating financial firms and those whose data is empty or insufficient, the final sample includes in sum 410 firms-year.

#### **3.2. Variables**

To verify our hypotheses, we model the probability that firms will manipulate R&D treatment, conditional on the existence of target-performance incentives and board independence. Our first model explains the R&D capitalization decision as a function of a firm's change in profitability and board independence. Our second model explains the R&D cut decision as a function of a firm's earnings target and board independence. According to the literature, there are many controlling variables that may drive discretionary R&D treatment.

##### **3.2.1. Dependent Variables**

In the two models, our variables of interest are respectively (1) the R&D capitalization variable which is assigned a value of one if the firm capitalizes fully or partially R&D costs and zero otherwise (Ding *et al.*, 2004; Oswald and Zarowin, 2008; Tutticci *et al.*, 2007; Percy, 2000; Loulou and Triki, 2008), (2) the R&D cut variable which is assigned a value of one if R&D spending is lower than previous period spending and zero otherwise (Osma, 2008).

##### **3.2.2. Independent Variables**

To test our hypothesis H1.a, we use the variability of results  $\Delta ROA$ , which is the change in return on assets from one year to another. The studies conducted by Markarian *et al.* (2008) and Triki and Halioui (2013) applied respectively on a sample of Italian companies for the years 2001, 2002 and 2003 and French companies for the years 2007 and 2008 find a negative relationship between the variability of changes in income and the capitalization of R&D expenditures. We expect a negative coefficient of  $\Delta ROA$ .

To test our hypothesis H1.b, we use the target earnings pressure (Press), which is the positive earnings (Zero-Press) or the positive earnings growth (Growth-Press) (Osma, 2008; Osma and Young, 2009; Oswald and Zarowin, 2008). Zero-Press is assigned a value of one if last period's earnings were less than or equal to zero and zero otherwise. Growth-Press is assigned a value of one if period's earnings change is less than or equal to zero and zero otherwise. We expect a positive coefficient of Press (Zero-Press and Growth-Press).

To test our second hypothesis H2 (i.e., the relationship between board independence and R&D manipulation), we calculate a firm's board independence (BDIND), which is the fraction of independent directors on the board (Osma, 2008; Markarian *et al.*, 2008). Board independence is associated with a lower extent of earnings management (Osma, 2008; Affes and Ben Romdhane, 2011; Eng and Mak, 2003; Gul and Leung, 2004). We expect a negative coefficient of BDIND.

##### **3.2.3. Control Variables**

Following past research, we identify additional firm characteristics that are likely to influence the R&D treatment. Current profitability is an indirect control for the R&D capitalization (Aboody and Lev, 1998; Mande *et al.*, 2000, Ding *et al.*, 2004, Tutticci *et al.*, 2007). Firms with low profitability can be motivated to capitalize R&D costs in order to signal their future situation and improve their performance (Markarian *et al.*, 2008; Gaeremynck and Veugelers, 1998; Loulou and Triki, 2008; Tutticci *et al.*, 2007). We expect a negative relationship between ROA and the extent of R&D capitalized costs (model1).

In keeping with other studies (Osma, 2008; Osma and Young, 2009; Wang and D’Souza, 2006), we control for R&D cutting by including lagged change in R&D ( $RD_{t-1}$ ) as a proxy of investment opportunity, change in sales ( $\Delta SALES$ ) as a proxy of firm growth and change in the capital expenditure ( $\Delta CAPX$ ) as a proxy of investing activities (cycle maturity). We expect that firms with high change in investment are more likely to cut R&D and firms with high growth and those with high maturity are less likely to cut R&D (model2).

Moreover, we include in our two models other control variables in order to examine the effects of earnings-management incentives on R&D treatment manipulation:

Leverage ratio (LEV), which is firm's total debt divided by total assets, is a proxy for debt-covenants incentives to manipulate (Duke and Hunt, 1990; Daley and Vigeland, 1983). Hence, firms with high LEV are more likely to capitalize R&D (Daley and Vigeland, 1983; Aboody and Lev, 1998; Thibierge, 2001; Callimaci and Landry, 2003) and to cut R&D (Osma, 2008; Osma and Young, 2009). We expect the coefficient of LEV to be positive in the two models.

Firms size (LogAsset), which is the natural logarithmic form of the firm's total assets, is a proxy for firm size political costs. Managers of large firms are followed by more analysts limiting the discretionary decisions (Wiedman, 1996; Opler *et al.*, 1999). Large companies are more (less) likely to expense (capitalize) their R&D expenditures (Daley and Vigeland, 1983; Aboody and Lev, 1998; Percy, 2000; Oswald and Zarowin, 2008; Tuttichi *et al.*, 2007; Daley and Vigeland, 1983; Aboody and Lev, 1998; Oswald, 2008; Landry and Callimaci, 2003) and less likely to cut R&D (Opler *et al.*, 1999; Osma, 2008). 2012). We expect the coefficient of LogAsset to be negative in the two models.

Market to book (MKTB), which is the market value of equity divided by its book value, is a proxy for future growth opportunities (Tobin’s Q). Firms that are expected to grow face higher costs for discretionary spending decisions and are less likely to manipulate R&D. We expect the coefficient of MKTB to be negative in the two models.

R&D intensity (RDI), which is annual R&D expenditures divided by total sales (Osma, 2008; Osma and Young, 2009; Ding and Stolowy, 2003; Loulou and Triki, 2008; Charfi, 2006, Nekhili *et al.*, 2012; Dumas, 2012), is a proxy for industry investment opportunity. Firms in growing industries have more successful projects (Aboody and Lev, 1998; Percy 2000), are more followed by analysts (Barth and al., 2001) and are less likely to capitalize R&D and to cut R&D. We expect the coefficient of RDI to be negative in the two models.

### 3.3. Regression models

We use logistic regressions for our analysis. Our first logit model explains the R&D capitalization decision as a function of a firm’s change in profitability (H1.a), board independence (H2.a) and other control variables. Our second logit model explains the R&D cut decision as a function of a firm’s earnings target (H1.b), board independence (H2.b) and other control variables.

$$P(CAP = 1)_{i,t} = a_0 + a_1 \Delta ROA_{i,t} + a_2 BDIND_{i,t} + a_3 ROA_{i,t} + a_4 RDI_{i,t} + a_5 LEV_{i,t} + a_6 LogAsset_{i,t} + a_7 MKTB_{i,t} + \epsilon_{it} \quad (1)$$

Where: RD-CAP: a dummy variable, equal to one if the firm decides to capitalize the R&D expenditures and zero otherwise;  $\Delta ROA$ : the change in return on assets from one year to another; BDIND: the fraction of independent directors sitting on a board; ROA: firm's operating income divided by the total assets of the firm; RDI: the total investment in R&D undertaken by the firm divided by total sales; LEV: total debt divided by total assets Log ASSET: logarithm of the total assets of the firm; MKTB: the market value of equity divided by the book value (Tobin Q).

$$P(CUT = 1)_{i,t} = a_0 + a_1 ZeroPress_{i,t} + a_2 GrowthPress_{i,t} + a_3 BDIND_{i,t} + a_4 RDI_{i,t} + a_5 LEV_{i,t} + a_6 LogAsset_{i,t} + a_7 MKTB_{i,t} + a_8 \Delta RDI_{i,t-1} + a_9 \Delta Sales_{i,t} + a_{10} \Delta CAP_{i,t} + \epsilon_{it} \quad (2)$$

Where: RD-CUT: a dummy variable equal to one if R&D spending is lower than previous period spending, zero otherwise; Zero-Press: a dummy variable equal to one if last period’s earnings were less than or equal to zero, zero otherwise; Growth-Press: a dummy variable equal to one if period’s earnings change is less than or equal to zero, zero otherwise; BDINT: the fraction of independent directors sitting on a board; RDI: the total investment in R&D undertaken by the firm divided by total sales; LEV: total debt divided by total

assets; Log ASSET: logarithm of the total assets of the firm; MKTB: the market value of equity divided by the book value (Tobin Q);  $\Delta$ RDI :  $\ln(\text{R\&D } t-1) - \ln(\text{R\&D } t-2)$ ;  $\Delta$ SALES :  $\ln(\text{SALES } t) - \ln(\text{SALES } t-1)$ ;  $\Delta$ CAPX :  $\ln(\text{CAPX } t) - \ln(\text{CAPX } t-1)$

## 4. Results

### 4.1. Descriptive analysis

Descriptive statistics of main variables appear on Table 1. Nearly half of the firms are classified as R&D capitalizing and the third of firms (37%) as R&D cutting. Independent directors represent only 22% of the board composition. Firms are profitable with an average positive ROA of about 2.515051 and with an increase of about 16% year over year. In general, firms face pressure to meet the target zero (19%) and the target growth (42%). Firms are on growth with positive value for lagged change in R&D,  $\Delta$ change in sales and change in the capital expenditure. We find that firms expense 46% of sales on R&D investments and have important leverage, size, and growth opportunities (with market-to-book variable equal to 1.939347).

Table 1. Descriptive statistics

Dichotomous Variables	Frequency (P=1)	Std-Dev	Frequency (P=0)	Std-Dev
RD-CAP	0.5038363	0.0253177	0.4961637	0.0253177
RD-CUT	.3696203	.0243182	.6303797	.0243182
ZeroPress	.1898734	.0248462	.8101266	.0248462
CroissPress	.4177215	.0248462	.5822785	.0248462
Continuous Variables	mean	Std-Dev	min	max
ROA	2.515051	10.84497	-85.67	37.61
$\Delta$ ROA	0.1645459	9.642169	-73.44	75.52
BDIND	0.227216	0.1208518	0	0.8
LEV	21.34424	13.51827	0	70.16
logASSET	3.390843	1.024908	.6063814	5.378062
RDI	.4669735	2.884265	.0003275	40.625
MKTB	1.939347	2.922137	-18.21	48.97
$\Delta$ RDt-1	.0273906	.3509854	-3.36228	1.720852
$\Delta$ Sales	.0493173	.3051971	-1.942366	2.36042
$\Delta$ CAPX	.0103021	.5384756	-2.786651	3.459636

Table 2 (panels A and B) presents for the two models the Pearson correlation between the different variables and demonstrates the absence of multicollinearity problems that may prejudice the results. Table 3 (panels A and B) presents the partial correlations between the dependent and independent variables. Panel A reveals that  $\Delta$ ROA and BDIND are negatively related to capitalization but not significant. These results do not confirm a priori our expectations (H1.a and H2.a). Panel B reveals that ZeroPress is positively related to R&D cut with high level of significance, while ZeroCroiss and BDIND show no significant correlation. The only control variables showing significant correlation are LEV, RDI,  $\Delta$ Sales and  $\Delta$ CAP. At the univariate level, these results should be interpreted cautiously and we next turn our attention to the multivariate regressions.

Table 2. Pearson Correlation

Panel A	RD-CAP	ROA	$\Delta$ ROA	BDIND	LEV	LogASSET	RDI	MKTB
RD-CAP	1							
ROA	0.0513	1						
$\Delta$ ROA	0.0047	0.3612	1					
BDIND	-0.0404	-0.0264	-0.01129	1				
LEV	0.0804	0.0644	-0.0539	0.1337	1			
LogASSET	0.1372	0.3151	-0.00583	0.2726	0.3039	1		
RDI	-0.0176	-0.4247	0.0168	0.0138	-0.1816	-0.1893	1	
MKTB	0.0723	0.0186	0.3715	-0.0464	-0.1281	0.0905	0.0255	1

**Panel B**

	RD-CUT	Z-Press	Z-Croiss	BDIND	LEV	LogAsset	RDI	MKTB	$\Delta$ RDI	$\Delta$ Sales	$\Delta$ CAPX
RD-CUT	1										
ZeroPress	0.2043	1									
ZeroCroiss	0.0533	0.2182	1								
BDIND	0.0328	0.0770	-0.0511	1							
LEV	0.1408	0.0015	0.0906	0.1374	1						
LogAsset	-0.0868	-0.3157	-0.0022	0.2624	0.2967	1					
RDI	0.0028	0.2866	0.0446	0.0150	-0.1801	-0.1898	1				
MKTB	-0.0032	0.0016	0.0223	-0.0507	-0.1306	-0.0847	0.0247	1			
$\Delta$ RDI	-0.0738	-0.0414	-0.0447	0.0304	-0.1092	-0.0221	0.0899	0.0371	1		
$\Delta$ SALES	-0.1534	-0.0184	-0.1414	-0.0137	-0.0958	0.0246	0.2819	0.0555	0.0627	1	
$\Delta$ CAPX	-0.1964	-0.0937	-0.1418	0.0404	-0.0519	0.0978	-0.1299	0.0440	0.1664	0.3303	1

Table 3. Partial correlation

**Panel A**

	Partial correlation	p
RD-CAP		
$\Delta$ ROA	-0.0232	0.6504
BDIND	-0.0816	0.1101
ROA	0.0146	0.7748
RDI	0.0255	0.6173
LEV	0.0587	0.2509
LogASSET	0.1282**	0.0118
MKTB	0.0915*	0.0731

**Panel B**

	Partial correlation	p
RD-CUT		
ZeroPress	0.1809***	0.0004
ZeroCroiss	-0.0352	0.4909
BDIND	0.0231	0.6509
LEV	0.1209**	0.0175
LogASSET	-0.0604	0.2363
RDI	-0.0888*	0.0815
MKTB	0.0262	0.6075
$\Delta$ RDt-1	-0.0174	0.7335
$\Delta$ SALES	-0.1138**	0.0253
$\Delta$ CAPX	-0.1365**	0.0072

**4.2. Main empirical results**

Table 4 presents the results of estimating equation (1).  $\Delta$ ROA shows negative but not significant association with the R&D capitalization. This finding is not in line with prior researches. It does not support the income-smoothing hypothesis and rejects our hypothesis H1.a. The absence of association between the decision to capitalize and the firms change in profitability can be explained by the good notoriety of the firms' sample. Managers capitalize R&D as an intangible asset only when specific criteria are met, without being affected by earnings management incentives. Our result has policy implication and contributes to this debate by showing that the R&D capitalization allowed by R&D accounting standards is not used as a tool for income smoothing in France and supports the position of IAS/IFRS, which is applied in the European Union (EU) countries since 2005.

BDIND is negatively related to capitalization but not significant indicating that the decision to capitalize is not associated to the board independence. This finding rejects our hypothesis H2.a. A possible interpretation of this result is that capitalization decision is less likely to be subject to careful review by the board of directors. Concerning ROA, we find a significant positive relationship with capitalization, indicating that capitalization is not used for earnings smoothing purposes, and is an indicator of future expected



profitability. The results of this study confirm leverage hypothesis and show that highly leveraged companies choose R&D activation. Other control variables indicate no significant coefficients.

Table 4. Results of the logistic regression model 1

Independent Variables	Coefficient	E.S.	Z	Significance
$\Delta$ ROA	-.0421868	.0447044	-0.94	0.345
BDIND	-4.881954	5.184029	-0.94	0.346
ROA	0.0887324 *	.0514407	1.72	0.085
LEV	0.1490913***	.0347663	4.29	0.000
Log ASSET	0.4734539	.6372103	0.74	0.457
RDI	0.227054	.1690779	1.34	0.179
MKTB	0.0560115	.1885387	0.30	0.766
constant	-4.271425*	2.247659	-1.90	0.057

\*\*\* Significant at 1% \*\* Significant at 5% \* Significant at 10%

Number of observations: N= 391; Log likelihood = -69.290134

Wald chi2(7) = 34.97; Prob > chi2 = 0.000

RD-CAP: a dummy variable, equal to 1 if the firm decides to capitalize the R&D expenditures and 0 otherwise.

ROA: firm's operating income divided by the total assets of the firm.

$\Delta$ ROA: the change in return on assets from one year to another

BDINT: the fraction of independent directors sitting on a board

LEV: total debt divided by total assets

LogASSET: logarithme of the total assets of the firm

RDI: the total investment in R&D undertaken by the firm divided by total sales

MKTB: the market value of equity divided by the book value (Tobin Q)

Table 5 presents the results of estimating equation (2). Growth-Press shows a negative and not significant coefficient implying that earnings decrease (failure to report earnings growth increase) does not lead to R&D investment cuts. This finding does not support thresholds theory about meeting at least previous period's earnings. Zero-Press shows a positive (1.099159) and significant (p=0.001) coefficient. Negative lagged earnings (failure to report profits) leads to R&D investment cuts. This finding support thresholds theory about meeting earnings that are above zero. This result which confirms the view that managers intentionally decrease R&D to achieve earnings profit (to report positive profit) supports partially our hypothesis H1.b.

Table 5. Results of the logistic regression model 2

independent Variables	Coefficient	E.S.	Z	Significance
Zero Press	1.099159 ***	.3351516	3.28	0.001
Zero Croiss	-0.1761583	.2440669	-0.72	0.470
BDINT	0.5116447	1.051051	0.49	0.626
LEV	0.022727**	.0098976	2.30	0.022
Log ASSET	-0.1569417	.1387978	-1.13	0.258
RDI	-0.0822191 *	.0463973	-1.77	0.076
MKTB	0.0184248	.0470039	0.39	0.695
$\Delta$ RDt-1	-0.0469552	.338945	-0.14	0.890
$\Delta$ SALES	-1.088043 *	.5241363	-2.08	0.038
$\Delta$ CAPX	-0.6412225*	.2570005	-2.50	0.013
constant	-0.738769	.5065285	-1.46	0.145

\*\*\* Significant at 1% \*\* Significant at 5% \* Significant at 10%

Number of observations: N= 395; Log likelihood = -237.17848

Wald chi2(10) = 34.68; Prob > chi2 = 0.0001

RD-CUT: a dummy variable = 1 if R&D spending is lower than previous period spending, zero otherwise

Zero-Press: a dummy variable=1 if last period's earnings were less than or equal to zero, zero otherwise

Growth-Press: a dummy variable=1 if period's earnings change was less than or equal to zero, zero otherwise

BDINT: the fraction of independent directors sitting on a board

LEV: total debt divided by total assets

Log ASSET: logarithm of the total assets of the firm

RDI: the total investment in R&D undertaken by the firm divided by total sales

MKTB: the market value of equity divided by the book value (Tobin Q)

$\Delta$ RDI:  $\ln(\text{R\&D } t-1) - \ln(\text{R\&D } t-2)$

$\Delta$ SALES:  $\ln(\text{SALES } t) - \ln(\text{SALES } t-1)$

$\Delta$ CAPX:  $\ln(\text{CAPX } t) - \ln(\text{CAPX } t-1)$

The estimated coefficient on BDIND is insignificant, indicating that the decision to cut R&D is not associated to the board independence. This finding rejects our hypothesis H2.b. A possible interpretation of this result is that R&D investment adjustment decision is less likely to be subject to careful review by the board of directors. RDI shows a negative and significant coefficient implying that firms with low investment opportunities tend to choose accounting methods that increase the result.  $\Delta$ SALES and  $\Delta$ CAPX show negative and significant coefficients implying that firms with high growth and high maturity face higher cost of earnings management and are less likely to cut R&D. The results of this study confirm leverage hypothesis and show that highly leveraged companies choose activation. Other control variables indicate no significant coefficients.

## 5. Discussion and conclusion

While prior studies conducted mainly in US, UK and Italy document evidence of discretionary R&D decision among agency theory, this study focuses on discretionary decision concerning the capitalization and the cut of R&D as instruments for achieving performance target. Based on a sample of 410 firm-year French companies investing heavily in R&D in the period 2007-2011, results show that:

French companies do not tend to capitalize the R&D expenditures in order to smoothen the results. This result is not in line with the findings of prior studies (Markarian *et al.*, 2008; Persson and Fuentes, 2011; Triki and Halioui, 2013). It does not support the smoothing hypothesis and our hypothesis H1.a is rejected.

French companies tend to cut the R&D expenditures in order to achieve earnings targets. This finding supports thresholds theory about meeting earnings that are above zero implying that managers intentionally decrease R&D to achieve earnings profit (to report positive profit). This is in line with the findings of Osma (2008) and Dumas (2012) and supports our hypothesis H1.b. Board independence is not a determinant of discretionary R&D decisions implying that R&D treatment decision is less likely to be subject to careful review by the board of directors. This finding rejects our hypothesis H2. (H2.a and H2.b). French companies with high leverage are more likely to capitalize R&D and to cut R&D confirming with leverage hypothesis.

Our research contributes to the literature by providing further evidence that, in French context, R&D cut is a strategic decision influenced by earnings management to boost performance. However, R&D capitalization is not affected by financial performance. We conclude that managers capitalize R&D as an intangible asset only when specific criteria are met, without being affected by earnings management incentives. Our results have policy implication and contribute to this debate by showing that the R&D capitalization allowed by R&D accounting standards is not used as a tool for income smoothing. This implies that income-smoothing hypothesis is not supported in the French context and supports the position of IAS/IFRS, which is applied in the European Union (EU) countries since 2005. These findings highlight that IAS adoption decreases earnings management only through the choice of R&D accounting (and not through amount of R&D expenditures). This suggests that French companies and accounting standard-setters could be more focused on reviewing decisions related to R&D in order to reduce the potential for manipulations through R&D cut. Furthermore, in the light of these results, our validation of the evidence that discretionary R&D treatments are motivated by performance target push us to wonder what impact the discretionary treatments of R&D might have on the firm's market value.

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