R&D disclosures and earnings management

The moderating effects of IFRS and the global financial crisis

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Abstract

Purpose – The purpose of this paper is to examine the effect of Research and Development (R&D) disclosures on earnings management practices.

Design/methodology/approach – This study has been conducted by using a longitudinal archival data set of French companies belonging to the CAC All-Tradable index and instrumental variable estimations.

Findings – The results of the research highlight the moderating effect of International Financial Reporting Standards (IFRS) adoption and the financial crisis in this relationship. It also shows that R&D disclosures are negatively associated with earnings management. The findings also show that the IFRS adoption is complementary in its monitoring role of managerial behavior in reducing earnings management in the presence of R&D disclosures. Furthermore, this study finds that the negative effect of R&D disclosures on earnings management is more prevalent during the global financial crisis.

Originality/value – This study examined the consequences of the voluntary disclosure of R&D information in the French context. It introduces a measurement for the disclosure of R&D activities in annual reports through the construction of an R&D disclosure index.

Keywords Financial crisis, IFRS, Earnings management, R&D disclosure

Paper type Research paper

1. Introduction

Research and Development (R&D) activities are a major component of intangible assets and intellectual capital. R&D investments are economic investments that play an important role in improving products and creating value for the firm and its shareholders. They are considered as a valuable source of economic growth (Gelb, 2002). However, investors have difficulty in assessing R&D efforts effectively (Lev and Zarowin, 1999). These activities raise the issue of their accounting recognition, which is not always obvious given the complexity of assessing cash flows and the high level of uncertainty associated with this type of investment. The need for voluntary disclosures on this type of assets then becomes crucial for a better market valuation of the firm and to attract potential investors.

Therefore, voluntary disclosure of intellectual capital, especially its R&D activities, is a rich and prolific research field. However, studies addressing this type of disclosures are scarce and inconclusive (McCracken *et al.*, 2018; Nekhili *et al.*, 2012, 2016). This study aims at investigating the voluntary disclosure of R&D information by establishing an R&D disclosure index. Particularly, it examines the effect of such disclosures on managerial decisions regarding earnings quality, i.e. earnings management practices.

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Financial disclosures are considered as an important research area that has attracted numerous accountancy scholars over the past few decades (Noh *et al.*, 2019). Voluntary disclosure on R&D is essential for a better valuation of firm performance and to attract potential investors. It is also interesting to consider the consequences of such disclosures on managerial decisions, among them the decision to initiate earnings management practices. R&D disclosures are voluntary disclosures and are then associated with a richer informational environment and corporate transparency. They are considered as a corporate governance device able to monitor opportunistic managerial behavior and leads to lessen their discretionary power (Jensen and Meckling, 1976). According to the agency theory perspective, this is likely to reduce their propensity to manage earnings to favor their own interests at the expense of shareholders' ones.

Moreover, financial scandals (e.g. Enron, Worldcom, Xerox [...]) have undermined confidence and cast a serious doubt on the production process of accounting and financial information. These scandals have emphasized the importance of a quality assessment of this type of information. Some empirical studies show that non-recognition of intellectual capital aggravates information asymmetry between managers and shareholders, hence resulting in a poor assessment of the company and its future earnings (Ali *et al.*, 2012). The problem of information asymmetry associated with this type of disclosure raises the question about the necessity to disclose on R&D activities to improve earnings quality and reduce earnings manipulation by managers.

Furthermore, the adoption of International Financial Reporting Standards (IFRS) in European countries, starting from January 2005, aimed at harmonizing the companies' financial statements and ensuring the utility and comparability of financial information in the international context. The conceptual framework of the IFRS has stressed on the reliability and relevance of financial information. Regarding the disclosure of R&D information, researchers have proved that intangible assets are better valued under IFRS than those under the local standards. Indeed, Boulerne and Sahut (2010) and Oliveira *et al.* (2010), in the French context and in Portugal, respectively, have shown that IFRS allow investors to better integrate intangible assets into the companies' values and consequently improve the informational content of their earnings. This is driven by the fact that IFRS are generally more detailed compared to the local accounting norm. It is then important to test the moderating effect of IFRS adoption on the relationship between R&D disclosures and earnings management.

Earnings management practices were also affected by the global financial crisis. The latter had affected world markets and was characterized by strong information asymmetries because of the uncertainty associated with these shortfall periods. The crisis has then led to a significant decrease in earnings quality (Persakis and Iatridis, 2015, 2016). We then investigate the effect of the financial crisis on the relationship between voluntary R&D disclosures and earnings quality, assuming that during these recessions' periods companies disclose more information to reduce the informational gap and have a better quality of their earnings.

The contribution of this study is threefold. First, we contribute to the accounting literature by highlighting the opportunity to disseminate R&D information to the market to improve earnings quality. Indeed, R&D activities are important for actual and potential investors for their investment decisions. Second, we construct an R&D disclosure index over 12 years by compiling scores from the existing literature of Botosan (1997), Entwistle (1999) and Jones (2007) and by adding specific items to the French context. Third, this paper provides a longitudinal study covering pre- and post-IFRS adoption periods and pre- and post-crisis periods. This allows to put forward the moderating effects of these exogenous shocks on the relationship between R&D disclosures and earnings management. To the best

of our knowledge, this the first study that highlights the effect of R&D disclosures on earnings management under IFRS and crisis settings.

Based on a sample of French-listed companies from 2001 to 2012 and on the instrumental variable method, the results show that R&D voluntary disclosures constrain managers to manipulate earnings and lead therefore to better earnings quality. Regarding the moderating roles of IFRS and the financial crisis, the findings show that the negative relationship between voluntary R&D disclosures and earnings management is more prevalent under IFRS adoption. Voluntary disclosures on R&D activities and the IFRS adoption are complementary on their effect on mitigating earnings management practices. The findings also show that in times of crisis executives manage their earnings to mask true performance and minimize the negative market reaction to unexpected changes in earnings. However, in the crisis period, voluntary disclosures on R&D are negatively associated with earnings management. Indeed, earnings management undergone during the period of the financial crisis can be lessened, in particular, by improving the transparency of the informational environment.

Our paper is organized as follows: Section 2 presents the theoretical framework and hypotheses. Section 3 focuses on methodological aspects followed by results and discussion in Section 4. Section 5 concludes the paper.

2. Theoretical frameworks and hypotheses

2.1 Earnings management and R&D voluntary disclosures

Studies focusing on R&D activities as an intellectual capital component generally have their theoretical foundations in economic theories, such as the agency theory and signaling theory (Beattie and Thomson, 2007). The existing literature has shown that voluntary disclosures about intellectual capital enhances the firm's value in the financial market (Abdolmohammadi, 2005; Gerpott *et al.*, 2008; Vafaei *et al.*, 2011; Nekhili *et al.*, 2016). In this regard, empirical studies have shown that non-recognition of intellectual capital exacerbates the information asymmetry between managers and external shareholders (Aboody and Lev, 2000). This leads to a poor assessment of the firm and its future profits by market participants (Ali *et al.*, 2012).

According to Cormier and Ledoux (2012), the value of a firm cannot be established without considering its intangible capital, including R&D activities. The R&D expenses are recognized as expenses, despite their value creation. As a result, the lack of disclosure on this type of capital would tend to decrease earnings quality, especially in industries that are investing heavily in the R&D dimension, e.g. telecommunications.

Using a sample of Taiwanese firms in the high-tech industry, Liang and Yao (2005) show that traditional financial information does not provide any significant explanatory power in terms of the firm's market value, which indicates the need to voluntarily disclose information for a better assessment of firm value. Accordingly, due to the non-recognition of investments in intellectual capital as assets, voluntary disclosure is a key to achieve a higher quality of earnings and reduce earnings manipulations. Managers, especially those in high technology sectors, are interested to disclose information about their intellectual capital, including R&D activities, to lessen the problem of their financial information distortion.

Empirically, Maaloul and Zéghal (2015) have tested the relationship between the about intellectual capital disclosures and the informative content of accounting earnings. Using a sample of 126 American companies in 2009, these authors show that firms in the high-tech industry disclose more information about their intellectual capital. These firms have significant investments in intellectual capital that are not included in their financial statements given the lack of accounting recognition as assets under current accounting

standards. Consequently, these companies voluntarily disclose information on their intellectual capital to prevent the shortcomings in the financial information and thereby to improve the quality of their earnings.

To sum up, previous theoretical and empirical studies on voluntary disclosure in general (Karajeh, 2019) and on voluntary disclosure of R&D information, in particular, are in favor of its positive effect on the earnings earning management. Schrand and Verrecchia (2004) argue that a poor informational environment exacerbates managerial discretion, leading to earnings management practices. The negative effect of voluntary disclosures on earnings management in Singapore is also proved by Cheng *et al.* (2004). Hunton *et al.* (2006) show that regular information about the firm performance is linked with more detection of earnings management practices. Ji *et al.* (2017) show that voluntary disclosure about internal control is negatively associated with earnings management.

Hence, the preceding discussion leads us to assume a negative effect of information disclosure regarding R&D activities and earnings management. Our first hypothesis is then as follows:

H1. There is a negative relationship between voluntary disclosure of R&D and earnings management.

2.2 Moderating effect of International Financial Reporting Standards adoption

The emergence and development of multinational concerns, the growth of international financial markets and changes in investors' behavior have contributed to the internationalization of the economic activity. Accordingly, financial information has spread across national borders. However, financial information understanding on an international level is hampered by a number of factors, namely, the diversity of accounting principles and rules governing the reporting in different countries. This drove organizations, such as the International Accounting Standards Board (IASB), to harmonize the accounting and financial reporting standards in different countries to improve the usefulness and comparability of financial information in the international context. In the European markets, this has resulted in a mandatory application of IFRS by companies listed on the regulated European exchange markets, from January 2005.

Advocates of the International Financial Reporting Standards assume a positive effect of the IFRS adoption on the accounting information's quality, claiming that these improve the information's relevance and reliability and therefore their usefulness for investors (Daske *et al.*, 2008). However, Tsalavoutas *et al.* (2012) argue that international standards do not necessarily lead to a higher information quality.

Empirical accounting studies have examined how IFRS provide additional relevant information and improve the power of information included in financial statements. According to Barth *et al.* (2008), the implementation of IFRS limits the accounting alternatives and improves the company's ability to report accounting figures that better reflect its financial performance and the economic situation. As a consequence, the application of these standards reduces the discretionary behavior of managers to manipulate earnings.

Other research works indicate that subsequently to the adoption of IFRS there were a decrease in information asymmetry and capital cost (Armstrong *et al.*, 2010). In the European context, Chiha *et al.* (2013) show that earnings obtained via IFRS are more relevant than those prepared according to the French accounting standards. Iatridis (2010) focuses on the adoption of IFRS in the UK and find that the introduction of IFRS has reduced the level of earnings management and improved the relevance of accounting data. In

Malaysia, Wan Ismail *et al.* (2013) show that the quality of financial information is higher after the IFRS adoption compared to the pre IFRS adoption period. Oz and Yelkenci (2018) also prove that IFRS adoption constraints earnings management practices.

Regarding R&D activities, the rare literature on this field shows that intangible assets are more valued according to IFRS. It is in this respect that Boulerne and Sahut (2010) in the French context and Oliveira *et al.* (2010) in the Portuguese one show that IFRS allow investors to better integrate intangible assets into the companies' value and thus improve earnings quality.

We then assume that the effect of voluntary R&D disclosures on earnings management is more prevalent after IFRS adoption in France. Our second hypothesis is as follows:

H2. The relationship between voluntary disclosure on R&D and earnings management is more prevalent under IFRS.

2.3 Moderating role of the financial crisis

The global financial crisis of 2008 was an unusual event with a complex impact on financial reporting practices. It is obvious that the macroeconomic circumstances have an impact on earnings quality. Several studies have investigated the effect of the financial crisis on one or several measures of earnings quality (Lisboa and Kacharava, 2018; Ebrahimi *et al.*, 2017).

Earnings management as an inverse measure of earnings quality has been given attention by researchers who examined the financial crisis impact on this measure. Filip and Raffournier (2014) measure the level of earnings management of firms, from 16 European countries, over the period from 2006 to 2009. The authors provide evidence that earnings management has decreased significantly in the years of crisis and that this trend is confirmed in most countries. We can also consider that in times of crisis the market is more inclined to tolerate bad performance (Ahmad-Zaluki *et al.*, 2011). As a result, companies are less motivated to engage in earnings management activities. Other research works examine the crisis effect on the earnings quality measurement by accounting conservatism. These research works show that managers are more conservative in times of crisis (Francis *et al.*, 2013).

It is relevant to point out that one of the major problems during the global financial crisis was the market's lack of liquidity, caused by investors' lack of trust (Lin *et al.*, 2014). The lack of trust has been associated, at least in part, with information asymmetry between uninformed managers and investors (Lin *et al.*, 2014), which has significantly increased the uncertainty with regard to the company's state. Indeed, information asymmetry is exacerbated during the financial crisis. Managers concerned about the investors' trust have powerful incentives to provide reliable financial information. This is consistent with the literature showing that the disclosure of more credible earnings reduces information asymmetry and subsequently enhances investors' trust and market performance (Teoh and Wong, 1993). The preceding discussion leads to the following hypothesis:

H3. The relationship between voluntary R&D disclosures and earnings management is more prevalent under crisis.

3. Research design

3.1 Sample and data

Our initial sample consists of all companies belonging to the CAC All-Tradable index over the 2001-2012 period. From this sample, we remove financial, real estate, insurance companies and companies with missing data or outliers. This selection procedure has resulted in an unbalanced sample of 341 firms and 4092 firm year observations (see Table I).

The studied period (2001-2012) is particularly interesting because it covers the years before and after the adoption of IFRS. This period also makes it possible to test the moderating effect of the global financial crisis of 2008-2009 because it extends from the pre-crisis period to the post-crisis period.

Data on R&D disclosure were hand-collected from annual reports and reference documents that were obtained from the AMF website (Autorité des Marché Financiers) and from companies' websites. Accounting and financial information was available in the Worldscope database.

3.2 Definition and measurement of variables.

3.2.1 Measuring earnings management We measure earnings management using discretionary accruals derived from the Jones modified model of Dechow *et al.* (1995) and the Raman and Shahrur (2008) model. These models estimate discretionary accruals through their residuals.

The Jones (1995) modified model is estimated as follows:

$$ACCT_{i,t}/A_{i,t-1} = \alpha_1 1/A_{i,t-1} + \frac{a_2(\Delta Sales_t - \Delta Receiv_t)}{A_{i,t-1}} + \frac{\alpha_3(PPE_t)}{A_{i,t-1}} + \varepsilon_{i,t} \quad (1)$$

$ACCT_t$ = total accruals of firm i in year t computed by subtracting operating cash flows to net income;
$A_{i,t\text{-}1}$ = total assets in year $t-1$;
$\Delta Receiv_t$ = change in receivables from t to $t-1$;
$\Delta Sales_t$ = change in sales from t to $t-1$;
PPE_t = gross property, plant and equipment for year t; and
$\varepsilon_{i,t}$ = estimated values of discretionay accruals.

The Raman and Shahrur (2008) model is estimated as follows:

$$ACCT_{i,t}/A_{i,t-1} = \alpha_1 1/A_{i,t-1} + \frac{a_2(\Delta Sales_t - \Delta Receiv_t)}{A_{i,t-1}} + \frac{\alpha_3(PPE_t)}{A_{i,t-1}} + \frac{\alpha_4(ROA_{t-1})}{A_{i,t-1}} + \frac{\alpha_5(MTB_t)}{A_{i,t-1}} + \varepsilon_{i,t} \quad (2)$$

MTB_t = market value to book value;
ROA_{t-1} = return on assets of year $t-1$; and
$\varepsilon_{i,t}$ = estimated values of discretionary accruals.

Table I. Sample selection procedure

Selection criterion	Firm no.
Companies listed on CAC All-Tradable	515
Financial companies	42
Companies with unavailable data	82
Companies that are no more listed in the studied period	35
Total sample	341
Observations (2001-2012)	4092

3.2.2 Reaserch and Development disclosure index To measure the level of voluntary R&D disclosure, we adapted the disclosure score proposed by Botosan (1997). This score measures the overall level of disclosure as the sum of the scores achieved by five different categories of information. R&D related disclosures include (1) current and future information on spending, (2) inputs, (3) outputs, (4) information on accounting and budgeting and (5) strategy. All of these categories are used in different degrees in Entwistle's (1999) and Jones's (2007) studies. We use the R&D disclosure score (R&D_DISC), from which we compile a list of 37 items that are useful for valuing R&D activities (10 items on the means of R&D, 9 items on operating performance of R&D, 9 items on commercial performance of R&D activities, 4 items on activating R&D, 2 items for R&D funding and 3 items on R&D strategy). As in Cooke's (1992) study, content analysis was conducted to identify whether the information was present or not in the annual reports. To avoid subjectivity in our analysis, we did not weigh any item for R&D information. The last step consists of calculating the level of R&D disclosure. We calculate the dependent variable (R&D_DISC) for each company by dividing its assigned total disclosure score over the potential maximum score (see Appendix).

3.2.3 Control variables. We use a set of firm and industry-specific variables that are deemed to influence earnings quality. These variables include firm size, leverage, growth opportunities, firm performance, ownership concentration and audit quality.

3.2.3.1 Firm size. It is measured by natural logarithm of total assets. According to Watts and Zimmerman (1978), large firms are exposed to more political costs and are likely to manage their earnings. Indeed, these political costs could be subject to information asymmetry. LaFond and Watts (2008) argue that larger firms experience less information asymmetry because they produce more public information. Thus, large firms with lesser information asymmetry may be exposed to lower political costs and are likely to manage their earnings. A positive association is then expected between firm size and earnings management.

3.2.3.2 Firm leverage. It is measured as the total non-current liabilities divided by total assets. Because the demand for earnings quality is partly from debt contracting, particularly, it is argued that highly leveraged firms manage less their earnings to reduce the conflict of interests between shareholders and debt holders. However, Dang *et al.* (2018) argue that there is a positive effect of leverage on discretionary accruals. Highly leveraged firms are likely to manipulate their earnings upward to not violate debt contract covenants. Because the relationship between firm leverage and earnings management is ambiguous, we do not expect the direction of the relationship.

3.2.3.3 Firm growth opportunities. Growth opportunities are measured by the market to book ratio. Klein (2002) and Park and Shin (2004) show that growth opportunities are positively associated with earnings management. Indeed, firms with high growth opportunities are likely to differentiate themselves from low growth opportunities firms by engaging more in earnings management practices. According to Bozec (2008), firms with high growth opportunities are riskier and this will harm earnings quality, leading managers to manipulate their earnings. We then expect a positive effect of growth opportunities on the level of earnings management.

3.2.3.4 Audit quality. It is measured by a dummy variable equal to 1 if the company is audited by a Big4 audit firm and 0 otherwise. Krishnan (2003) emphasizes that audit plays an important role in reducing agency costs by limiting the opportunistic management of earnings. This finding is confirmed by Caramanis and Lennox (2008) and Alzoubi (2018). As a result, we suggest a negative relationship between earnings management and audit quality.

3.2.3.5 Firm performance. The main objective of earnings management is to distort analysts forecast and to mislead investors by giving them wrong information about a firm's true operating performance. Kasznik (1999) and Haw (2004) find a positive relationship between firm performance and the level of abnormal accruals. However, Jaggi *et al.* (2009) find a negative coefficient on accounting performance. Hence, we did not expect the direction of the relationship. We use the return on assets ratio to measure firm performance.

3.2.3.6 Ownership concentration. It is measured by the Herfindahl index of Demsetz and Lehn (1985). Several studies examine the relationship between ownership concentration and earnings quality. Fan and Wong (2002) find a negative relationship between the voting rights of the largest shareholder and earnings quality. Indeed, ownership concentration is linked with a high risk of minority interest's expropriation leading to low levels of earnings quality. Leuz *et al.* (2003) show that controlling shareholders are likely to manipulate earnings for their private benefits. We then expect a positive association between ownership concentration and earnings management.

3.3 Model specification

A two-stage least squares regression (2SLS) model was used to estimate the effects of voluntary R&D disclosure on market-to-book valuation. In an ordinary least squares (OLS) model, R&D disclosure may be a significant determinant of earnings management, but it is also likely that R&D disclosure would be correlated with other characteristics that are themselves related to the market value of equity. Hence, R&D disclosure is an endogenous variable that raises endogeneity concerns. Following Larcker and Rusticus (2010), we adopt an instrumental variable estimation approach to address the endogeneity issue. We use two-stage least squares (2SLS) estimations. In the first stage of the regression, we estimate the relationship between R&D disclosures and their determinants. In the first equation, the dependent variable is the R&D voluntary disclosure index. This variable is explained by governance features, which are considered instruments in our model, and some selected control variables. In the first stage, we estimate:

$$\begin{aligned} ScoreDisc_{it} = {} & \beta_0 + \beta_1 Herfindahl_{it} + \beta_2 Instinv_{it} + \beta_3 propindep_{it} + \beta_4 duality_{it} \\ & + \beta_5 Boardsize_{it} + \beta_6 propwomen_{it} + \beta_7 LogTA_{it} + \beta_8 ROA_{it} \\ & + \beta_9 Leverage_{it} + \beta_{10} R\&D\_cap_{it} + \beta_{11} R\&D\_int_{it} + \varepsilon_{it} \end{aligned} \tag{3}$$

where Herfindahl is the ownership concentration index of Demsetz and Lehn (1985); Instinv is the proportion of institutional investors; Propindep is the proportion of independent directors in the board; Duality is a dummy variable that is equal to 1 if the CEO is also the chairman of the board and 0 otherwise; Boardsize is the size of the board; Propwomen is the proportion of women in the board; LogTA is the firm size; ROA is the ratio of return on assets; Leverage is the ratio of total debts to total assets; R&D_cap is R&D capitalization and R&D_int is R&D intensity.

In the second stage, we estimate the following regressions using the fitted values (estimates) of R&D disclosure derived from the first stage:

$$Accruals = \beta_0 + \beta_1 FitScoreDisc_{it} + \beta_2 Herfindahl_{it} + \beta_3 LogTA_{it} + \beta_4 MtoB_{it}. + \beta_5 Leverage_{it} + \beta_6 ROA_{it} + \beta_7 Audit_{it} + \varepsilon_{it} \quad (4)$$

$$Accruals = \beta_0 + \beta_1 FitScoreDisc_{it} + \beta_2 IFRS_{it} + \beta_3 FitScoreDisc_{it} * IFRS + \beta_4 Herfindah_{it} + \beta_5 LogTA_{it} + \beta_6 MtoB + \beta_7 Leverage_{it}. + \beta_8 ROA_{it} + \beta_9 Audit_{it} + \varepsilon_{it} \quad (5)$$

$$Accruals = \beta_0 + \beta_1 FitScoreDisc_{it} + \beta_2 Crisis_{it} + \beta_3 FitScoreDisc_{it} * Crisis + \beta_4 Herfindahl_{it} + \beta_5 LogTA_{it} + \beta_6 MTB_{it} + \beta_7 Leverage_{it} + \beta_8 ROA_{it} + \beta_9 Audit_{it} + \varepsilon_{it} \quad (6)$$

4. Results and discussions

4.1 Descriptive statistics and correlations

Table II presents the descriptive statistics for our dependent variable, i.e. the disclosure score, and control variables. The discretionary accruals, as measured by the modified Jones (1995) model, have an average value of 0.0518, with a minimum of 0 and a maximum of 0.8571. This result indicates a variation in earnings management between French companies. Also, we

	Min	Max	Mean	SD
Panel A: Dependent variable				
Accrual Jones	0	0.8571	0.0518	0.151
Accrual Raman	0	0.9875	0.0629	0.172
Panel B: Independent variables				
ScoreDisc	0	78.125	32.88	25.28
Panel C: Control variables				
Herfindahl	0.006	64.30	16.45	14
LogTA	8.83	27.03	19.08	2.82
MtoB	−26.76	60.71	2.88	4.36
Leverage	0	63.10	14.94	15.82
ROA	−1.43	1.52	0.22	6.2
Audit	0	1	0.47	0.49

Notes: Table V reports panel regression results on a sample of 341 French-listed companies from 2001 to 2012. Accrual Jones are the estimated discretionary accruals using the Jones (1995) modified model. Accrual Raman are the estimated discretionary accruals using the Raman and Shahrur (2008) model. ScoreDisc is the R&D disclosure score. Herfindahl: is an index of ownership concentration. LogTA is the natural logarithm of total assets. MtoB is the market value to book value. Leverage is total debt to total assets. ROA is the return on assets. Audit is a dummy variable that is equal to 1 if the auditor belongs to the Big4 and 0 otherwise

Table II.
Descriptive statistics

found that the discretionary accruals, as measured by the Raman and Shahrur (2008) model are, on average, higher than those revealed by the modified Jones (1995) model with a value of 0.0629 and range from 0 to 0.9875. The averages recorded for French companies are much higher than those recorded in the American context, with a value of 0.02 (Fairfield *et al.*, 2003). This suggests that French companies manipulate earnings more than their American counterparts and therefore have a lower earnings quality.

The disclosure index on Table II has an average of 32.88 per cent, indicating that the sampled companies disclose nearly one-third of the items relating to the R&D activities. This proportion is relatively low and reveals that French companies are quite conservative with regard to the strategic decision of disclosing information on R&D activities. The disclosure index ranges between 0 and 78.12 per cent. This means that French companies are disclosing a maximum of 78.12 per cent of the total items of R&D disclosures.

Regarding firm characteristics, Table II shows that the market to book ratio, i.e. our growth opportunities measurement, presents a positive average of 2.88 with very different values ranging from −26.76 to 60.71 and a standard deviation of 4.36. It is to be noted that less than half of the sampled companies are audited by a large Big4 audit firm. However, 37 per cent of the observations found in the sample correspond to a deficit result recorded by companies.

Table III presents the yearly average values of earnings management measurements from 2001 to 2012. We notice that for both measurements of discretionary accruals estimated by the modified Jones (1995) and Raman and Shahrur (2008) models, average accruals have increased moderately from 2001 to 2005 and are more stable until 2010. However, from 2010, the average accruals have recorded a decline. These results suggest that the adoption of IFRS allowed for the moderation of the discretionary accruals growth and hence the propensity of managers to manipulate earnings. IFRS have reduced the accounting options that were available to managers. These findings are in line with the studies analyzing the effect of the IFRS adoption on earnings management, including that of Iatridis (2010).

4.2 Bivariate analysis

Table IV presents the Pearson correlation matrix between the explanatory variables to check for the absence of the multicollinearity problem between independent and control

Table III.
Earnings management across the studied period

	Accrual Jones Mean	Accrual Raman Mean
2001	0.0603	0.0789
2002	0.0608	0.0808
2003	0.0619	0.0834
2004	0.0613	0.0769
2005	0.0611	0.0611
2006	0.0619	0.0619
2007	0.0572	0.0571
2008	0.0519	0.0569
2009	0.0512	0.0532
2010	0.0321	0.0487
2011	0.0311	0.0484
2012	0.0309	0.0477
Moyenne global	0.0518	0.0629

	ScoreDisc	Herfindahl	MtoB	LogTA	Leverage	Auditor	ROA
ScoreDisc	1	−0.146**	0.0194	0.0112	0.0139	0.0032	0.0128**
		0.0487	0.2140	0.4740	0.3750	0.8390	0.0150
Herfindahl		1	0.1950	0.0511***	0.0193	0.0920	0.0088
			0.2550	0.001	0.0819	0.000***	0.8670
MtoB			1	−0.2590***	−0.0060	0.0303**	0.0279*
				0.000	0.7240	0.0279	0.0700
LogTA				1	0.1439	0.2596***	−0.0160
					0.4560	0.000	0.2250
Leverage					1	0.0316**	0.0193
						0.0436	0.2160
Audit						1	0.2300*
							0.0760
ROA							1
VIF	1.27	1.43	1.99	2.04	1.77	1.32	1.94

Notes: Table IV reports the Pearson correlation matrix on a sample of 341 French-listed companies from 2001 to 2012. ScoreDisc is the R&D disclosure score. Herfindahl is an index of ownership concentration. LogTA is the natural logarithm of total assets. MtoB is the market value to book value. Leverage is total debt to total assets. ROA: is the return on assets. Audit is a dummy variable that equals to 1 if the auditor belongs to the Big4 and 0 otherwise. *, ** and *** are statistical significances at the 10, 5 and 1% levels, respectively

Table IV.
Pearson correlation matrix

variables. The correlations matrix presents the degree as well as the significance of the correlation between the different variables. We notice that the disclosure index is correlated with two control variables, ownership concentration and return on assets. These correlations are significant at the 5 per cent level. Besides the dichotomous variable, audit quality is correlated with the majority of our control variables. However, the correlation degree is not very high, reaching a maximum of 0.2596, which is well below the maximum value of 0.8 indicated by Gujarati (2003). Table IV also reports the VIF values. These range from 1.18 to 2.02 and are therefore well below the critical threshold of 10 set by Neter *et al.* (1989). These results confirm the hypothesis of the absence of the multicollinearity between the explanatory variables.

4.3 Results and discussion

We examine the impact of voluntary disclosure on R&D in annual reports on earnings quality, as well as the moderating roles of IFRS and financial crisis on this relationship. The regression models were based on the method of instrumental variables.

4.3.1 Effect of voluntary disclosure on Research and Development on earnings management. We test the effect of the extent of the voluntary disclosure index on earnings management using both models for accrual estimations. Table V shows that the voluntary disclosure index influences negatively and significantly the level of discretionary accruals. The coefficient is significant at the 1 per cent level for both models. This result suggests that voluntary disclosures on R&D reduce the ability of managers to manage their earnings. This result is consistent with that of Schrand and Verrecchia (2004) who argued that a low transparent environment exacerbates managerial discretion, which suggests that the incentive for earnings management would only be stronger within the least transparent firms. The negative effect of voluntary disclosure on earnings management is consistent also with Cheng *et al.* (2004) who prove a negative relationship between voluntary disclosure and earnings management in Singapore. This result supports our first hypothesis indicating

	Accrual Jones Equation 1		Accrual Raman Equation 2	
	Coef.	*t*	*Coef*	*T*
Constant	0.0253	3.58***	0.0171	3.35***
FitScoreDisc	−0.0721	−3.54***	−0.1368	−2.91***
Herfindahl	0.0006	1.04	0.0169	1.06
LogTA	−0.0029	−3.77***	−0.0023	−2.70***
MtoB	0.00005	1.12	0.0003	0.62
Leverage	−0.0190	−1.88*	−0.0204	−1.93*
ROA	0.0009	1.79*	0.0147	1.97**
Audit	−0.0143	−3.59***	−0.0148	−3.29***
Fisher		3.10***		2.49**
p-value		0.001		0.010
R^2(%)		37.34		36.98
Observations		4092		4092

Notes: Table V reports panel regression results on a sample of 341 French-listed companies from 2001 to 2012. Accrual Jones are the estimated discretionary accruals using the Jones modified (1995) model. Accrual Raman are the estimated discretionary accruals using the Raman and Shahrur (2008) model. FitScoreDisc are the estimated values of the R&D disclosure score. Herfindahl is an index of ownership concentration. LogTA is the natural logarithm of total assets. MtoB is the market value to book value. Leverage is total debt to total assets. ROA is the return on assets. Audit is a dummy variable that equals to 1 if the auditor belongs to the Big4 and 0 otherwise. *, ** and *** are statistical significances at the 10, 5 and 1% levels, respectively

Table V.
Panel regression of R&D disclosure on earnings management

a negative relationship between earnings management and the level of voluntary disclosures.

This result is mainly consistent with the agency theory perspective. The voluntary disclosure is perceived as a way to reduce the gap of information between managers and shareholders and the resulting agency costs. Hence, voluntary disclosures contribute to a decrease in managerial opportunistic behavior and aligns the managers' interests with those of shareholders and those of majority shareholders with minority ones. Indeed, managerial opportunistic behavior can lead them to engage in earnings management practices, which weaken earnings quality. Accordingly, managers are less likely to manipulate their earnings in a transparent R&D informational environment.

Table V also presents the results regarding our control variables. These results show the existence of a negative and significant relationship between firm size and earnings management. Large firms tend to limit earnings management practices and provide earnings with quality. This finding suggests that large companies' activities are monitored more closely by financial analysts, which could force them to provide high-quality earnings. Besides, large companies generally produce more information of a higher quality than small ones; thus, they are not inclined to manipulate their accounts. Our finding is in line with previous studies by Bozec (2008) and Jo and Kim (2007). Results also show that leverage is negatively associated with earnings management. This finding is consistent with Dang *et al.* (2018). We can thus conclude that debt reduces the propensity to manage earnings and is therefore negatively related to the level of discretionary accruals. This is consistent with the assumption that debt is one means of mitigating conflict between shareholders and managers and reduces the costs of information asymmetry. This is the disciplinary role of debt, which ensures the monitoring of managers (Jensen, 1986).

Table V also shows that the ratio of returns on assets is positively associated with earnings management at the 5 per cent level, hence supporting the idea that successful companies manage their results to report their private information and attract potential investors. This finding is consistent with Chen *et al.* (2006). Finally, the quality of the external auditor is negatively and significantly associated with earnings management, suggesting that when the auditor belongs to one of the Big4 it is considered as an effective way to control managerial actions. Managers are forced to reduce their aptitudes to manipulate earnings. This result aligns with those of Krishnan (2003) and Caramanis and Lennox (2008) and Alzoubi (2018), emphasizing the role of audit quality in reducing agency costs by limiting the opportunistic management of earnings.

4.3.2 Moderating role of International Financial Reporting Standards adoption. Table VI reports the regressions results regarding the IFRS moderating role in earnings management and R&D disclosures. Table VI shows that the IFRS dummy variable is negatively and significantly associated with the discretionary accruals at the 1 per cent level, suggesting that IFRS adoption reduces managerial latitude by acting negatively on its propensity to manage earnings. This finding suggests that the adoption of these standards reduces the manager's discretionary power to manipulate earnings and thus improves the accounting information quality. Barth *et al.* (2008) state that the implementation of IFRS limits accounting alternatives and improves the company's ability to report accounting figures that better reflect its financial performance and economic situation.

	Accrual Jones Equation 1		Accrual Raman Equation 2	
	Coef.	*t*	*Coef*	*t*
Constant	0.0273	3.62	0.0170	3.25
FitScoreDisc	−0.0868	−1.65*	−0.1378	−1.77*
IFRS* FitscoreDisc	−0.0974	−2.41***	−0.1669	−3.80***
IFRS	−0.2754	−3.26***	−0.0063	−3.25***
Herfindahl	0.0003	0.02	0.0169	1.12
LogTA	−0.0029	−3.72***	−0.0023	−2.61 ***
MtoB	0.0001	0.11	0.0003	0.60
Leverage	−0.0196	−1.79*	−0.0204	−1.88*
ROA	0.0007	2.06**	0.0147	2.10**
Audit	−0.0142	−3.58***	−0.0148	−3.27***
Fisher		2.98***		3.22***
p-value		0.001		0.000
R^2(%)		42.98		42.11
Observations		4092		4092

Notes: Table VI presents panel regression results on the moderating effect of IFRS. Accrual Jones are the estimated discretionary accruals using the Jones modified (1995) model. Accrual Raman are the estimated discretionary accruals using the Raman and Shahrur (2008) model. FitScoreDisc are the estimated values of the R&D disclosure score. IFRS is a dummy variable that equals 1 for the pre-IFRS period and 0 for the post-IFRS period. Herfindahl is an index of ownership concentration. LogTA is the natural logarithm of total assets. MtoB is the market value to book value. Leverage is total debt to total assets. ROA is the return on assets. Audit is a dummy variable that equals to 1 if the auditor belongs to the Big4 and 0 otherwise. *, ** and *** are statistical significances at the 10, 5 and 1% levels

Table VI. Moderating effect of IFRS

The IFRS moderating effect on the relationship between the level of voluntary disclosures on R&D and earnings management is assessed by the interaction of the IFRS variable with the disclosure index. The coefficient of the IFRS * FitScoreDisc variable in Table VI is negative and significant at the 1 per cent level. This result suggests that voluntary disclosures negatively influence earnings management under IFRS. Table VI shows that the relationship between voluntary R&D disclosures and earnings management becomes stronger in the post-IFRS period. This means that the negative effect of R&D disclosures on earnings management is more prevalent after the IFRS adoption period[1].

We can then conclude that voluntary disclosures on R&D play a complementary role with IFRS because both are able to negatively influence earnings management. Thus, these standards, although more restrictive, cannot replace the voluntary disclosure, which remains necessary for a good valuation of the company and for a better quality of earnings. These results support our second hypothesis.

4.3.3 Moderating role of the financial crisis. The results of the crisis moderating role are reported in Table VII. The findings show that the financial crisis positively influences earnings management practices. The positive relationship between the financial crisis and earnings management suggests that the quality of financial information is low during a period of economic recession. Ahmad-Zaluki *et al.* (2011) argue that due to a weak financial performance of the company, managers tend to mask the true performance to minimize the negative market reaction to unexpected changes in earnings. As a result, companies experiencing financial difficulties and uncertainty during economic shortfalls are likely to

	Accrual Jones Equation 1		Accrual Raman Equation 2	
	Coef.	*t*	*Coef*	*T*
Constant	0.0256	0.59	−0.0168	2.77
FitScoreDisc	−0.0746	−2.56***	−0.1344	−1.99**
GFC* FitscoreDisc	−0.0946	−2.67***	−0.2326	−2.22**
GFC	0.0062	2.55***	0.0143	3.14***
Herfindahl	0.0002	0.02	0.0173	1.09
LogTA	−0.0028	−3.66	−0.0022	−2.61***
MtoB	0.0001	0.07	0.0002	0.58
Leverage	−0.0208	−1.65	−0.0213	−1.99**
ROA	0.0002	2.01**	0.0154	2.12**
Auditor	−0.0142	−3.57***	−0.0147	−3.27***
Fisher		3.55***		2.77***
p-value		0.000		0.003
R^2(%)		41.56		42.13
Observations		4092		4092

Notes: Table VII presents panel regression results on the moderating effect of the financial crisis. Accrual Jones are the estimated discretionary accruals using the Jones modified (1995) model. Accrual Raman are the estimated discretionary accruals using the Raman and Shahrur (2008) model. FitScoreDisc are the estimated values of the R&D disclosure score. GFC is a dummy variable that equals 1 for the financial crisis period and 0 otherwise. Herfindahl is an index of ownership concentration. LogTA is the natural logarithm of total assets. MtoB is the market value to book value. Leverage is total debt to total assets. ROA is the return on assets. Audit is a dummy variable that equals to 1 if the auditor belongs to the Big4 and 0 otherwise. *, ** and *** are statistical significances at the 10, 5 and 1% levels

Table VII.
Moderating effect of the financial crisis

manage their earnings to increase their performance. Iatridis and Kadorinis (2009) support this result by the presence of restrictive debt covenants that are partially based on earnings. The propensity to manage earnings reduces the likelihood of violations of these debt covenants during periods of economic recession. Our result is aligned with those of Rusmin *et al.* (2013) and Persakis and Iatridis (2015), showing that earnings quality decreases during the financial crisis in an international context.

The effect of the financial crisis on the relationship between voluntary disclosure and earnings management is assessed using the interaction term between the dummy crisis variable and the voluntary disclosure index. Table VII shows that for both models of discretionary accruals the relation between earnings management and voluntary R&D disclosures is negative and significant at the 1 per cent level during the crisis period[2]. This result means that managers are reluctant to manage earnings in times of crisis because of the voluntary disclosure of R&D information. Indeed, a rich informational environment reduces uncertainty in the market and helps to discipline the manager. This implies that earnings management experienced during the period of the financial crisis can be lessened through a better transparency of the informational environment.

5. Conclusion

Despite the importance of R&D as a driver of value creation and economic growth, it is obvious that investors have difficulty in assessing the R&D effort effectively. Investment in R&D, as a component of intellectual capital, raises the problem of their accounting recognition. The use of voluntary disclosures on R&D activities become then crucial to increase the visibility of the company in the market.

The purpose of this paper was to examine the effect of voluntary R&D disclosures on earnings management. Based on a longitudinal study and the instrumental variable method, the results show that voluntary disclosure of this type of information reduces the ability of managers to manipulate earnings and leads therefore to better earnings quality. Regarding the moderating role of IFRS and the financial crisis, the findings show that the negative relationship between voluntary R&D disclosures and earnings management is more prevalent under IFRS adoption. Voluntary disclosures on R&D activities and the IFRS adoption are complementary in their effect on mitigating earnings management practices. The findings also show that in times of crisis executives manage their earnings to mask their true performance and mitigate the negative market reaction to unexpected changes in earnings. However, in the crisis period, voluntary disclosures on R&D are negatively associated with earnings management. Indeed, earnings management undergone during the period of the financial crisis can be lessened, in particular, by improving the transparency of the informational environment on R&D activities.

This study has investigated one of the consequences of voluntary disclosures of R&D information in the French context. It introduces a measurement for the disclosure of R&D activities in annual reports through the construction of an R&D disclosure index. This index is mainly based on the classification of information on R&D activities of Entwistle (1999). It is also based on a review of the annual reports of French companies to identify the R&D information particularly in the French context.

Future studies could focus on the effect of such disclosures on other aspects of earnings quality, namely, earnings relevance that is a fundamental characteristic of information along with earnings reliability under IFRS.

Notes

1. For robustness checks, we estimate the effect of R&D disclosures on earnings management by splitting the sample according to the pre- and post-IFRS periods. The results not reported here remain unchanged.
2. For robustness checks, we estimate the effect of R&D disclosures on earnings management by splitting the sample according to the pre- and post-crisis periods. The results not reported here are qualitatively the same.

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Appendix

Items on means of R&D	
1	R&D expenses
2	Change in R&D expenses
3	Budget comparison with competition
4	R&D staff
5	R&D infrastructure
6	R&D partnerships
7	Number of employees in R&D programs
8	Number of research units
9	Location of research units
10	R&D expenses per research unit
Items on operating performance of R&D	
1	Ongoing innovations
2	Successful innovations
3	Descriptions of innovation characteristics
4	Licenses
5	Launches
6	Technological position
7	Description of new products
8	Customer satisfaction
9	Conference documentation with analysts
Items on R&D commercial performance	
1	Successes of launches
2	Commercial failures
3	Gains or reinforcements of market shares attributable to R&D
4	New orders or new markets obtained
5	Impact on turnover
6	Impact on the firm's operational productivity
7	Explanation of economic performance due to R&D
8	Prices obtained for R&D work
9	Future potential of innovations
Items on activating R&D	
1	Amounts activated
2	Depreciation method
3	Depreciation period
4	Use of IFRS and/or GAAP in R&D accounting
Items on R&D funding	
1	Classic financing: debt or equity
2	Other funding: grants (grants)
Items related to the strategy	
1	Precision of the type or types of R&D undertaken
2	Description of R&D programs
3	Objectives or role of R&D

Table AI.
R&D disclosure index: Items list