RESEARCH AND DEVELOPMENT EXPENSES UNDER IFRS MANDATORY IMPLEMENTATION: A VALUE RELEVANCE APPROACH

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ABSTRACT: *The paper focuses on the degree to which the accounting treatment of R&D expenditure is stock price informative following the adoption of IAS. Therefore, using recent data of French listed companies, starting from the year in which IFRS were applied, 2005-2015, the present study examines the value relevance of the different R&D accounting treatments. Unlike evidence regarding the pre-IFRS period in France, we find that the capitalized portion of R&D is not correlated with market values, suggesting that under IFRS mandatory implementation, R&D assets are not value relevant. The expensed portion of R&D is positively related to market values only for manufacturing companies. Accordingly, we conclude that IFRS implementation has implications on the valuation of R&D expenditure by investors in French firms.*

1. INTRODUCTION

Since the mandatory implementation of International Financial Reporting Standards (IFRS) by listed European companies in 2005, the consolidated financial statements are published in accordance with international accounting standards. The main goal is to provide a common accounting language and ensure greater consistency in the presentation of accounting information in response to the growing internationalization of financial markets. In some European countries such as Germany, Austria and Switzerland, the adoption of international standards was voluntary before 2005. This was not the case for French companies, and the possibility of preparing their accounts according to rules other than national standards, Generally Accepted Accounting Principles (GAAP), was not included in the law. It therefore seemed appropriate to study the consequences of the introduction of IFRS on French companies.

Our objective is to highlight the effects on market value of accounting treatment for a specific asset class, namely the research and development (R&D) expenses, given it is affected by the mandatory change. Before IFRS adoption in France, the rules impose the

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immediate recognition of R&D expenditure as a cost, unless the R&D project meets certain conditions. The French rules (GAAP) stipulate that R&D expenses can be exceptionally an intangible asset only if they relate to a specific individual project with a real chance of technical success and economic profitability and whose costs can be obviously determinate. Nevertheless, since 1 January 2005, the accounting treatment of R&D expenditure under IAS[2] 38 becomes different. Actually, the capitalization of R&D expenses, which was an option treatment under French GAAP, has become an obligation under IFRS. The capitalization of R&D expenses is a consequence of the standard's requirements and not manager's choice. As a result, the development phase of an intangible project should be recognized once six criteria are met[3].

In the accounting literature, the controversy over intangible assets and particularly R&D expenditure has been present in the accounting debate since several decades (Aboody and Lev, 1998; Lev and Sougiannis, 1996; 1999). Numerous studies provide evidence about the relevance of capitalized R&D expenditure during the period before the transition to IFRS. Zhao (2002) shows that R&D expenses are not value relevant, while Oswald (2008) proves little difference between the value relevance of the expensed and capitalized portion of R&D expenditure. However, few studies have investigated the period following the mandatory adoption of IFRS. We can mention the study of Shah et al. (2013) that examines the value relevance of R&D expenditure in the periods before and after IFRS in the UK. More recently, Gong and Wang (2016) estimate the changes in the value relevance of R&D expenses for periods pre-IFRS and post-IFRS adoption in countries that previously mandated immediate expensing against those that allowed optional capitalization of R&D expenditure ones.

Indeed, there are studies that have investigated the value relevance of R&D expenses in France. Ding and Stolowy (2003), for instance, reveal the lack of relevance regarding the decision to capitalize R&D expenses in relation to the market value of the French company. Later, Cazavan-Jeny and Jeanjean (2006) provide evidence suggesting that R&D expenditure, in France, are negatively associated with market value. Nevertheless and to the best of our knowledge, there is no study focusing on the post-IFRS period in France. On that basis, we contribute to the R&D accounting literature by adding an empirical study examining the value relevance of R&D assets and expenses after the mandatory transition

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2 International Accounting Standards.

3 **IAS 38 Development Capitalization Criteria stipulate:** "*An intangible asset arising from development (or from the development phase of an internal project) shall be recognized if and only if, an entity can demonstrate all of the following:*
(a) The technical feasibility of completing the intangible asset so that it will be available for use or sale.
(b) Its intention to complete the intangible asset and use or sell it.
(c) Its ability to use or sell the intangible asset.
(d) How the intangible asset will generate probable future economic benefits. Among other things, the entity can demonstrate the existence of a market for the output of the intangible asset or the intangible asset itself or, if it is to be used internally, the usefulness of the intangible asset.
(e) The availability of adequate technical, financial and other resources to complete the development and to use or sell the intangible asset.
(f) Its ability to measure reliably the expenditure attributable to the intangible asset during its development."

to IFRS in France, where companies are required to activate whether the capitalization criteria are met compared to the discretion available in the past.

In this regard, Lev and Zarowin (1999) provide that it is necessary to control the industry effects in any study on the R&D costs, because these expenses are specific to the nature of sectors. Companies operating in different sectors have different behaviors in terms of investment in R&D. As a consequence, the second objective of this study is to examine the separate value relevance of R&D across manufacturing and nonmanufacturing sectors in the post-IFRS period. To pursue these objectives, we employ recent data by focusing on the fiscal years from 2005 to 2015 of listed French firms with R&D activity. We find that the capitalized portion of R&D is not related to market values, with no significant differences across manufacturing and nonmanufacturing firms. Nevertheless, the expensed portion of R&D is positively related to market values of manufacturing companies.

The remainder of the paper is structured as follows. Section 2 exposes the R&D treatment, related literature and the development of the research hypotheses. Section 3 presents the details of the research methodology, related valuation models and the data selection process. Section 4 provides the results of the empirical analysis and discussion of the main findings. Finally, Section 5 concludes the study.

2. INSTITUTIONAL BACKGROUND, PRIOR LITERATURE, AND HYPOTHESES

2.1. R&D EXPENSES TREATMENT : BEFORE VS. AFTER IFRS ADOPTION

The accounting treatment of R&D expenditure is controversial at an international level. For example, International Accounting Standard (IAS 38) permits the capitalization of development expenditures when certain conditions are met, whereas the US GAAP adopts a stricter approach to the issue. Indeed, the Financial Accounting Standards Board (FASB), which initially authorized the activation of R&D expenditure, adopted an approach in October 1974 with SFAS No. 22 (FASB 1974, §12), which requires all R&D expenses are expensed during the period of their commitments. The only exception is SFAS No. 863, which concerns software. The same approach was adopted in 1998 by the Business Accounting Deliberation Council, requiring Japanese firms to cover all their R&D expenditure. However, certain national accounting standards such as the French one, offer some flexibility to allow the capitalization of R&D costs when certain conditions are simultaneously fulfilled, namely:
- The product is well defined ;
- The feasibility of the product is confirmed ;
- The related costs can be identified ;
- The costs can be covered through the revenues generated by the exploitation of the project.
- The firm intends to market the product.

The French regulations concerning the treatment of R&D expenditure have undergone numerous changes for the consolidated financial statements. Since 2005, all listed companies in the European Union (EU) have been obliged to prepare their annual reports in accordance with international standards (IFRS/IAS). The revised IAS 38 distinguishes between a "research phase" and a "development phase". Research costs must be recognized as an expense when incurred. The revised IAS 38 (§55) considers that a company cannot demonstrate the existence of an intangible asset during the search phase of a project that will generate probable future economic benefits. Nevertheless, development costs are recognized as assets, if and only if the company can demonstrate simultaneously a set of conditions. Actually, IAS 38 Development Capitalization Criteria stipulate: "An intangible asset arising from development (or from the development phase of an internal project) shall be recognized if and only if, an entity can demonstrate all of the following: "

a. The technical feasibility of completing the intangible asset so that it will be available for use or sale.
b. Its intention to complete the intangible asset and use or sell it.
c. Its ability to use or sell the intangible asset.
d. How the intangible asset will generate probable future economic benefits. Among other things, the entity can demonstrate the existence of a market for the output of the intangible asset or the intangible asset itself or, if it is to be used internally, the usefulness of the intangible asset.
e. The availability of adequate technical, financial and other resources to complete the development and to use or sell the intangible asset.
f. Its ability to measure reliably the expenditure attributable to the intangible asset during its development."

Although the accounting treatment of R&D expenditure under IFRS appears similar to French GAAP, there is an important disparity. Actually, IFRS requires the capitalization of the R&D expenditure which meets specified criteria, while the French GAAP provides an option to capitalize that R&D expenditure.

2.2. RELATED LITERATURE ON THE VALUE RELEVANCE OF R&D EXPENSES AFTER IFRS TRANSITION

Even today, the accounting treatment of R&D expenses still a sensitive issue. Most of the empirical studies focusing on the value relevance of R&D costs investigated the period before the implementation of IFRS (e.g. Zhao, 2002; Ding and Stolowy, 2003; Cazavan-Jeny and Jeanjean, 2006). However, research that has examined the issue of the value relevance of R&D expenditure (capitalized or expensed) in considering the post-IFRS effects is limited. At this day, the related major studies can be summarized in Tsoligkas and Tsalavoutas (2011), Shah et al. (2013) and Gong and Wang (2016).

Tsoligkas and Tsalavoutas (2011) assess value relevance of R&D in the UK after IFRS mandatory implementation. The results reveal that the capitalized portion of R&D is positively related to market values, which implies that the stock market absorbs these

assets to successful projects promising future economic benefits. Nevertheless, they report a negatively correlation between expensed R&D costs and market value under IFRS, supporting the idea that theses portions of assets do not reflect any future economic benefit and should be expensed. Consequently, the transition to IFRS induced implications for the valuation of R&D expenditure in the UK.

Afterward, Shah et al. (2013) continue the research of Tsoligkas and Tsalavoutas (2011), limited to the first three years post-IFRS (2006-2008), by extending the sample period to seven years after adopting IFRS, 2005-2011. This study also examines the impact of the size of companies and sectors on the value relevance of R&D during the period between 2001 and 2011 in the UK, by separating the periods before and after IFRS. The results affirm the value relevance of the capitalized R&D costs in the 11 years of the sample period. However, no improvement is recorded at the R&D capitalized value relevance in the post-IFRS period. Large companies have a higher relevance of the R&D expenses capitalized than small firms. However, the sector specification does not appear to have a significant effect on the relevance of R&D costs.

Recently, Gong and Wang (2016) test whether the nature of differences between national GAAP and IFRS rises to differential changes in the value relevance of R&D expenses after the adoption of IFRS across nine countries[4], covering pre-IFRS and post-IFRS periods during 1997–2012. They find that the value relevance of R&D expenses declines after IFRS adoption in countries that previously mandated immediate expensing or allowed optional capitalization of R&D expenditure. They do not find change in the value relevance of R&D costs for countries that convert from the mandated capitalization of R&D expenditure to IFRS. However, even Gong and Wang (2016) integrate the French context in the group of the countries examined, their study presents a subtle limitation. Actually, they have not available data on capitalized R&D assets. As a result, one cannot draw conclusions about how different accounting treatments of R&D, capitalization versus expensing, affect the value relevance of R&D costs.

Therefore, we will try to contribute to the existing literature on accounting by examining whether there is a value relevance of R&D costs (expensed or capitalized) in the post-IFRS period in France for a recent sample of 11 years during 2005-2015. Moreover, this study provides evidence on industry membership impact by investigating potential differences in the relevance of R&D expenditure (expensed or capitalized) between manufacturing companies and nonmanufacturing ones.

2.3. HYPOTHESES DEVELOPMENT

Stark (2008) and Wyatt (2008) argue that the adoption of IFRS would decline the value relevance of R&D treatment. The point of view advanced by Stark (2008) is that the

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4 The nine countries are Australia, Finland, France, Germany, Netherlands, Norway, Sweden, Switzerland, and the UK. These countries adopted IFRS since 2005.

adoption of IFRS would eliminate discretion in the treatment of R&D expenditure, so would remove a useful way that companies communicate information to stock markets. The capitalization of R&D expenditure was treated as a signal to the market to indicate the quality of R&D spending. Under French GAAP rule, opting for capitalization reflects a management decision for the purpose of transmitting a signal on their profitable R&D projects for the market and distinguishes themselves from competitors. Actually, the major difference between pre-IFRS and post-IFRS, in particular IAS 38, is that in the former case, management has discretion to choose to either capitalize or expense the development costs, while in the latter case, managers are required to capitalize R&D expenditure (development costs) once certain criteria are met. In other words, reported R&D expenses are effectively value relevant under the optional capitalization rule, and not in the context of a mandatory adoption. This argument is consistent with that of Wyatt (2008), who suggests that the most discretionary elements of intangible assets are the most relevant, due to discretion in the accounting treatment. As a result, we expect an absence of the value relevance of R&D expenses after the mandatory capitalization rule.

H1. R&D expenditure (expensed or capitalized) has no value relevance in the post-IFRS period.

Another important point of discussion in accounting literature is whether the impact of value relevance of R&D costs is different across diverse sectors. Examining manufacturing versus nonmanufacturing firms, Shah et al. (2008) find positive and significant effects of R&D expenditure on market value for both sectors. Nevertheless, Shah et al. (2009) reveal clear-cut sector effects, and present that, compared to nonmanufacturing companies, manufacturing ones are likely to adopt an intensive investment in R&D strategy to maximize their market value. Actually, Ho et al. (2005) explain that manufacturing and nonmanufacturing firms are likely to adopt a different mix of R&D and advertising investments because of the differences in their relative impacts. They argue that while nonmanufacturing firms benefit most from advertising investment for value creation purposes, manufacturing ones are likely to choose a more R&D-intensive strategy beside advertising investment to maximize their market value. Later, and by splitting R&D expenditure into capitalized and expensed portions, Shah et al. (2013) report that, in the case of the big companies, capitalized R&D portion is positively and significantly related to market value for both nonmanufacturing and manufacturing sectors. However, when the coefficient for nonmanufacturing sector is significant and negative, it is insignificant for manufacturing sector. On the other hand, capitalized R&D is positively significantly related to market value of the small manufacturing companies, but there is a negative and significant relationship between expensed R&D and market value for nonmanufacturing firms.

 As a result, one would not draw consistent conclusion, on the bases of the mixed findings above, confirming if manufacturing or nonmanufacturing firms are associated with a higher R&D relevance.

H2. The industry membership has no effect on the value relevance of R&D expenditure.

3. RESEARCH DESIGN

3.1. METHODOLOGY

To examine the value relevance of accounting figures, we follow most prior studies (Cazavan-Jeny and Jeanjean, 2006; Oswald, 2008; Tsoligkas and Tsalavoutas, 2011; Shah et al., 2013) that have adopted Ohlson valuation model (1995). The idea is based on the principle that firms' accounting numbers are judged to be 'value relevant' if they are significantly related to their market value (Beaver, 2002). Actually, Ohlson considers the market value of a company as function of book value of equity and expected future residual income. Consequently, the fundamental Ohlson (1995) valuation framework will be the bench mark model throughout the study. In its simple form, the market value of a company is represented by a linear function of its book value of equity and net income:

$$MV_{it} = \alpha_0 + \alpha_1 E_{it} + \alpha_2 BV + \varepsilon_{it} \qquad (1)$$

Where, MV_{it} is the market value for company i at time t (the market capitalization of the company), which is measured four months after the end of the year for each company[5]. E_{it} is the earnings of company i at time t. BV_{it} stands for book value of equity of company i at time t. ε_{it} is an error term.

Barth et al. (2001) highlight that the main advantage of Ohlson model is that earnings and book value of equity can be divided to examine the value relevance of separate accounting numbers. In our study, we follow prior research (Cazavan-Jeny and Jeanjean, 2006; Tsoligkas and Tsalavoutas, 2011; Shah et al., 2013) and we decompose accounting incomes into: (1) earnings before R&D expenses and (2) the amount of expensed R&D. Similarly, we divide book value of equity into (1) the book value before capitalized R&D and (2) the amount of R&D in the assets. Therefore, the impact of capitalized R&D and expensed R&D on market value is isolated from earnings and book value of equity and the following equation is formed:

$$VM_{it} = \beta_0 + \beta_1 AE_{it} + \beta_2 ABV_{it} + \beta_3 CapRD_{it} + \beta_4 ExpRD_{it} + \varepsilon_{it} \qquad (2)$$

Where, MV_{it} is the market value for company i at time t. AE_{it} is the adjusted earnings for firm i in year t, before the processing of R&D expenditure. ABV_{it} represents the adjusted book value of equity for firm i in year t, which is net of capitalized R&D. $CapRD_{it}$ is the annual amount of capitalized R&D costs. $ExpRD_{it}$ is the annual amount of expensed R&D costs. ε_{it} is an error term.

In order to control the model for heteroscedasticity problem, MV, AE, ABV, $CapRD$, $ExpRD$ variables are deflated by the number of outstanding shares. Barth and Kallapur (1996) and Barth and Clinch (2009) show that the number of outstanding shares is an

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effective proxy to capture the effect of scale[6]. By this way, we measure all variables of the regressions on a *per* share basis.

For reducing the possibility of industry effects and to test whether there is a significant difference in the value relevance of R&D expenditure across industries (manufacturing firms vs. nonmanufacturing ones), we follow Shah et al. (2009), Tsoligkas and Tsalavoutas (2011) and Shah et al. (2013) by estimating model (2) separately for two sub samples: manufacturing firms versus nonmanufacturing firms. Similarly, we include a dummy variable in the model (2) identifying the industry to which the firm belongs, then the model (3) is expressed as follows:

$$MV_{it} = \delta_0 + \delta_1\, SEC_{it} + \delta_2\, AE_{it} + \delta_3\, AE_{it} \times SEC_{it} + \delta_4\, ABV_{it} + \delta_5\, ABV_{it} \times SEC_{it} + \delta_6\, CAP\_RD_{it} + \delta_7\, CAP\_RD_{it} \times SEC_{it} + \delta_8\, EXP\_RD_{it} + \delta_9\, EXP\_RD_{it} \times SEC_{it} + \varepsilon_{it} \qquad (3)$$

Where, MV_{it} is the market value for company i at time t. SEC_{it} is a dummy variable which is equal to 0 if firm i is a nonmanufacturing one, and equal to 1 if it is a manufacturing one. AE_{it} is the adjusted earnings for firm i in year t, before the processing of R&D expenditure. $AE_{it} \times SEC_{it}$ is the adjusted earnings multiplied by the sector dummy variable. ABV_{it} represents the adjusted book value of equity for firm i in year t, which is net of capitalized R&D. $ABV_{it} \times SEC_{it}$ represents the adjusted book value of equity multiplied by the sector dummy variable. $CapRD_{it}$ is the annual amount of capitalized R&D costs. $CapRD_{it} \times SEC_{it}$ is the annual amount of capitalized R&D costs multiplied by the sector dummy variable. $ExpRD_{it}$ is the annual amount of expensed R&D costs. $ExpRD_{it} \times SEC_{it}$ represents the annual amount of expensed R&D costs multiplied by the sector dummy variable. ε_{it} is an error term. All variables are deflated by the number of outstanding shares.

The sample contains observations on multiple times to different companies. As a result, we use panel data, and according to the Hausman test, the fixed effects model seems most appropriate to our data.

3.2. DATA AND SAMPLE SELECTION

In order to assess the value relevance of R&D expenses after IFRS adoption, we use a sample of French firms listed in the Stock Exchange of Paris over 11 year period 2005-2015. The empirical study focuses on the SBF 120 companies. In order to perform the analyses, we exclude firms in financial sector as their financial statements are published with particular accounting regulations. Then, we identify firms with a R&D activity. We also remove companies that market value, earnings and book value of equity are missed, which give rise to a sample of 36 companies with fiscal year ended after 1 January 2005.

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6 Barth and Clinch (2009) try both book value of equity and number of shares as deflator, and they conclude that employing number of outstanding shares as deflator is more effective to examine the scale effects as compared to book value of equity.

Deflating the variables of the models by the number of outstanding shares certainly produces extreme values. In order to mitigate the effect of extreme outliers, we winsorize the sample variables and ratios at the top and bottom one percentile of their respective distributions.

To recuperate the necessary data, we directly use the electronic sites of companies to download the annual reports (or references) issued by companies or the website of the World Library of Annual Reports (www.annupedia.com). We collect stock prices to assess the market value of sample firms from the ABC Stock Exchange website.

3.3. DESCRIPTIVE STATISTICS

Table 1 presents the sample distribution of the variables included in the study during the period from 2005 to 2015. What really stands out from this table is that expensed R&D costs are, on average, higher than the capitalized R&D expenses. This finding proves that French companies are more likely to expense the costs of R&D than capitalizing them in the period after IFRS mandatory implementation. Moreover, Table 1 reveals that there is a significant disparity in the intensity of R&D expressed by the remarkable difference in standard deviation of the variables CapRD and ExpRD.

Table 1: *Descriptive statistics of variables over the period 2005-2015*

Variable	Number of observations	Mean	Median	Std. dev	Min	Max
MV	396	1.975	1.537	3.549	0.002	39.532
AE	396	1.298	0.831	1.905	-0.064	17.206
ABV	396	0.199	0.092	0.405	-0.903	2.249
CapRD	396	0.018	0.000	0.032	0	0.171
ExpRD	396	0.080	0.024	0.111	0.004	0.611

MV **is the market value.** *AE* **is the adjusted earnings before the processing of R&D expenditure.** *ABV* **represents the adjusted book value of equity net of capitalized R&D.** *CapRD* **is the annual amount of capitalized R&D costs.** *ExpRD* **is the annual amount of expensed R&D costs. All variables are deflated by the number of ordinary outstanding shares.**

Table 2 exposes the descriptive statistics of both R&D variables by industry from 2005 to 2015. The values of CapRD and ExpRD of manufacturing companies are, on average, significantly higher than in the nonmanufacturing sector, which let us conclude that the manufacturing firms spend more in R&D activity that the nonmanufacturing ones.

Table 2: *Descriptive statistics of R&D variables by sectors*

Variables	Number of observations		Mean		Std. dev			
	Manu	**Non-manu**	**Manu**	**Non-manu**	**Manu**	**Non-manu**	Difference	P>|t|
CapRD	297	99	0.045	0.009	0.090	0.015	0.036	0
ExpRD	297	99	0.217	0.110	0.292	0.171	0.107	0.001

CapRD represents the annual amount of capitalized R&D costs; *ExpRD* represents the annual amount of expensed R&D costs. All variables are deflated by the number of ordinary outstanding shares.

Table 3 shows the correlations among the regression variables. All independent variables, adjusted earnings, adjusted book value of equity, capitalized R&D costs and expensed R&D costs, are positively related to the dependent variable, market value of equity. We can also notice that these variables have a value of VIF "Variance Inflation Factor" that is less than 10[7], which allow us to conclude that our empirical model does not have a potentially problem of multicollinearity. Furthermore, the highest correlation coefficient is 0.6847, and it is between market value of equity and earnings.

Table 3: *Correlation matrix and VIF*

Variable	**MV**	**AE**	**ABV**	**ExpRD**	**CapRD**	VIF	1/ VIF
MV	1.0000						
AE	0.6847	1.0000				1.96	0.510
ABV	0.5962	0.4428	1.0000			1.65	0.606
ExpRD	0.2265	0.2594	0.2300	1.0000		1.32	0.757
CapRD	0.1632	0.1318	0.1887	0.1998	1.0000	1.21	0.826

MV is the market value. *AE* is the adjusted earnings before the processing of R&D expenditure. *ABV* represents the adjusted book value of equity net of capitalized R&D. *CapRD* is the annual amount of capitalized R&D costs. *ExpRD* is the annual amount of expensed R&D costs. All variables are deflated by the number of ordinary outstanding shares.

4. EMPIRICAL RESULTS

4.1. RESULTS FOR THE VALUE RELEVANCE OF R&D AFTER IFRS IMPLEMENTATION

We test two different models. Model (1) is employed to estimate the fundamental Ohlson's (1995) model explaining market value of equity by earnings and book value of equity. Table 4 shows that the model is statistically significant under 1% level by using F-test. For this basic model, the coefficient on earnings, *E*, is statistically close to 2, and the coefficient on capital equity, *BV*, is roughly equal to 1. Earnings and book value of equity are positively significantly related to market value. This finding is consistent with prior research which

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7 A limit suggested by Gujarati (1995) and Kennedy (1998).

examined the value relevance of R&D in France prior to 2005 (e.g. Cazavan-Jeny and Jeanjean, 2006; Gong and Wang, 2016), indicating that accounting numbers are strongly associated with share prices (adjusted R^2 is relatively high, 65%).

Model (2) is employed to examine the value relevance of R&D expenditure for the sample from year 2005 to 2015 (table 4). It is similar to model (1) except that we isolate the effect of both capitalized and expensed R&D on market value of equity. This decomposed model allows us to highlight the portion of capitalized R&D (CapRD) and expensed R&D (ExpRD). Model (2) has four independent variables, versus two for model (1). The regression is again significant under F-test at 1% level. Overall, adjusted R^2 for model (2) is higher than adjusted R^2 for basic model (1) (65% versus 71%). This improvement in explanatory power of the regression indicates that reporting of R&D is a significant factor in the statistical explanation of market value of equity.

Table 4: *Value relevance of R&D over the period 2005-2015*

Variable	Coefficient	*t* value	P>|*t*|
Basic Model 1			
E	2.084**	2,97	0,004
BV	0.890**	2,61	0,009
Intercept	0.638***	5.22	0,000
F	144	6.38	0.000
Adjusted R²		0.65	
N		396	
Decomposed Model 2			
AE	2. 912***	6,02	0,000
ABV	0.416***	3,22	0,000
ExpRD	2.896***	4,56	0,000
CapRD	-1.332	-0,30	0,081
Intercept	0.719**	2.52	0,002
F	121	7.61	0.000
Adjusted R²		0.71	
N		396	

MV is the market value for company i at time t. *E* is the earnings of company i at time t. *BV* stands for book value of equity of company i at time t. *AE* is the adjusted earnings for firm *i* in year *t*, before the processing of R&D expenditure. *ABV* represents the adjusted book value of equity for firm *i* in year *t*, which is net of capitalized R&D. *CapRD* is the annual amount of capitalized R&D costs. *ExpRD* is the annual amount of expensed R&D costs. All variables are deflated by the number of ordinary outstanding shares. The models are with fixed effects and under control of heteroscedasticity.

Model 1: $MV_{it} = \alpha_0 + \alpha_1 E_{it} + \alpha_2 BV + \varepsilon_{it}$

Model 2: $MV_{it} = \beta_0 + \beta_1 AE_{it} + \beta_2 ABV_{it} + \beta_3 CapRD_{it} + \beta_4 ExpRD_{it} + \varepsilon_{it}$

*** and ** indicate statistical significance at the 1% and 5% level, respectively.

The estimation results for the period after adoption of IFRS (2005-2015) show that the variables equity capital and earnings, adjusted for R&D costs, keep their positive relation to the market value, revealing that accounting numbers always provide relevant information even after isolating R&D expenditure.

Focusing on the main variables of interest (*CapRD* and *ExpRD*), table 4 reveals that the coefficient for expensed R&D costs is significant, while it is insignificant for capitalized ones. *ExpRD* have a positive impact on share price, revealing that, from the investors' point of view, these expenses provide relevant information after the adoption of the international IAS/IFRS standards in France. Unlike previous studies (Shortridge, 2004; Tsoligkas and Tsalavoutas, 2011) where market participants perceive that expensed R&D only contains unsuccessful projects that give no future benefit, but reduces the firm's value in the same way as any other cost, these expenses are well appreciated by investors in French market after IFRS adoption.

On the other hand, capitalized R&D costs are not associated with market news. Actually, the results show that *CapRD* costs are negatively but insignificantly related to *MV*. Therefore, R&D capitalization has different effects on price compared to any other asset. Actually, one euro increase in any asset is associated with an increase in share price, whereas one euro increase in a R&D asset has not an effect on share price. The insignificant coefficient reported in Table 4 (coef. = -1.332 ; *t* value = -0.30) means that R&D capitalization is not associated with "good" or "bad" news, suggesting that investors in French companies do not value R&D assets after IFRS implementation, while they did it prior 2005. Actually, Cazavan-Jeny and Jeanjean (2006) report a negative impact of capitalized R&D expenditure on market value for French firms in a period preceding IFRS adopting (1993-2002).

Consequently, we can deduce from this non association between *CapRD* and the market value that, in a period which made mandatory the capitalization of R&D, there is not value relevance of capitalized R&D costs. This result is consistent with our hypothesis H1 implying that R&D reporting does not create value for French firms under IFRS. Our finding is in line with the idea of Stark (2008) arguing that the adoption of IFRS would hinder the value relevance of R&D treatment. Actually, the adoption of IFRS would remove management discretion in the treatment of R&D costs, so eliminating a way that companies use to communicate information to stock markets by choosing between expensing or capitalizing R&D expenditure. Actually since 2005, managers are required to capitalize R&D expenditure (development costs) provided certain criteria are met. In other words, reported capitalized R&D expenses are effectively value relevant under the optional capitalization rule, and not in the context of a mandatory adoption. Our result is also consistent with the idea of Wyatt (2008), suggesting that the most discretionary items of intangible assets are the most relevant due to discretion in the accounting treatment. The finding is in line with Gong and Wang (2016), offering evidence that countries switching from the mandatory expensing or optional capitalization rule to IFRS (the case of France) see decreases in the value relevance of R&D costs as capitalizing R&D expenditure with future economic benefits is mandatory under IFRS.

In summary, it is found that R&D expenses disclosure, regulated by the IAS, contains value-relevant information in the expensed portion of R&D and not in the capitalized one. This finding can be explained by the fact that, once the management discretion is

constrained by the adoption of the IAS, market participants consider and believe more on expensed R&D costs than on the capitalized R&D expenditure.

4.2. RESULTS FOR THE INDUSTRY MEMBERSHIP EFFECTS ON VALUE RELEVANCE OF R&D

Our third model is used to test Hypothesis H2 in order to examine the value relevance of R&D expenses (capitalized or expensed) under the control of industry membership, namely manufacturing and nonmanufacturing. Adjusted R^2 are relatively high and very close in both samples (0.66 and 0.67) indicating the same strong relationship between accounting numbers and share prices whatever the industry. In the case of manufacturing firms, the coefficient of expensed R&D costs (*ExpRD*) is positive and significant, whereas it is insignificant in the case of nonmanufacturing companies.

On the other hand, results show that *CapRD* variable is insignificantly correlated with the company's market value for both nonmanufacturing and manufacturing sectors, and there is no significant difference between their coefficients (Table 5). This indicates that R&D does not generate intangible assets for both industries. Overall, our results partially support Hypothesis H2 stipulating that association between R&D expenditure and market value does not depend on activity area. Actually, significant difference between both sectors only exists in expensed R&D portions, as we observe a value relevance of expensed R&D costs for manufacturing firms against to nonmanufacturing sector. The results are similar to Shah et al. (2013) revealing that R&D expenditure is positively related to market value only for manufacturing sector.

Table 5: *Value relevance of R&D - sector effects (model 3)*

	Manufacturing firms		Nonmanufacturing firms		Difference	
	Coefficient	*t* value	Coefficient	*t* value	Coefficient	*t* value
AE	2. 912***	3.02	1.310***	4.25	1.602	1.12
ABV	0.416***	4.22	0.961***	3.11	-0.545	-0.96
ExpRD	2.236***	4.56	3.201	1.13	-0.965*	-1.79
CapRD	-1.963	-1.14	-1.336	-0.98	-0.627	-0.30
Intercept	0.519***	5.28	0.931***	5.33	-0.412	-1.21
F	82***		54***			
Adjusted R²	0.66		0.67			
N	297		99			

MV is the market value for company *i* at time *t*. *AE* is the adjusted earnings for firm *i* in year *t*, before the processing of R&D expenditure. *ABV* represents the adjusted book value of equity for firm *i* in year *t*, which is net of capitalized R&D. *CapRD* is the annual amount of capitalized R&D costs. *ExpRD* is the annual amount of expensed R&D costs. *SEC* is a dummy variable which is equal to 0 if firm *i* is a nonmanufacturing one, and equal to 1 if it is a manufacturing one. All variables are deflated by the number of ordinary outstanding shares. The model is with fixed effects and under control of heteroscedasticity.

Model 3: $MV_{it} = \delta_0 + \delta_1 SEC_{it} + \delta_2 AE_{it} + \delta_3 AE_{it} \times SEC_{it} + \delta_4 ABV_{it} + \delta_5 ABV_{it} \times SEC_{it} + \delta_6 CAP\_RD_{it} + \delta_7 CAP\_RD_{it} \times SEC_{it} + \delta_8 EXP\_RD_{it} + \delta_9 EXP\_RD_{it} \times SEC_{it} + \varepsilon_{it}$

*** and * indicate statistical significance at the 1% and 10% level, respectively.

5. CONCLUSION

The subtle difference between French rule (GAAP) and IFRS regarding the accounting treatment of R&D expenditure is that under IAS 38, the development phase of an internal project shall be recognized as asset if six criteria are met. Therefore, the capitalization of R&D expenses, which was an option under French GAAP, has become an obligation under IAS/IFRS. In this paper, we explore if R&D expenses are value relevant for investors in French companies listed on the SFB 120 after adopting IFRS and for a recent period 2005-2015.

The results indicate that, against the concerns that the adoption of IFRS may lead to more value relevant R&D reporting, the mandatorily capitalized portion of R&D expenditure is not value relevant. This was not the case under French GAAP (Cazavan-Jeny and Jeanjean, 2006). Nevertheless, expensed portion of R&D costs is positively associated with the market value of the firms, revealing that investors don't treat the expensed portion of R&D as an association with unsuccessful R&D projects, as it was revealed by almost all previous studies.

Following the transition to IFRS, there are sector related valuation differences regarding R&D costs in French companies. Actually, the expensed portion of R&D is significantly value relevant only for manufacturing companies. Relating to our findings, we conclude that our results reject the expectations of Barth et al. (2008) and Ball (2006) that IFRS better reflect companies' fundamentals and support the argument advanced by Stark (2008) and Wyatt (2008) that the adoption of IFRS would hinder the value relevance of R&D reporting. The argument behind is that eliminating the discretion to treat R&D expenditure would remove a useful way by which a company conveys information to the stock market (Stark, 2008).

Overall, this research examines the value relevance of R&D expenditure during recent period 2005-20015, which fulfills a gap in the relevant literature for French market. To the best of our knowledge, this is the first study on the value relevance of R&D expenditure involving post-IFRS period in France. A way to research, future studies can develop this issue by examining other interesting markets such as China which in 2007 adopted a set of accounting standards entirely new, Brazil which applied IFRS in 2010, or Canada, India and Korea that have just implemented IFRS in 2011.

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