International Business Research; Vol. 9, No. 6; 2016
ISSN 1913-9004 E-ISSN 1913-9012
Published by Canadian Center of Science and Education

What R&D Assets Say about Firm Profitability

Pierluigi Santosuosso

Correspondence: Pierluigi Santosuosso, School of Economics, Sapienza University of Rome, Rome, Italy. Tel: 39-6-4976-6460. E-mail: pierluigi.santosuosso@uniroma1.it

Received: March 7, 2016 Accepted: March 14, 2016 Online Published: April 7, 2016

doi:10.5539/ibr.v9n6p64 URL: http://dx.doi.org/10.5539/ibr.v9n6p64

Abstract

Research and development (R&D) activities are usually considered a key factor for achieving superior performances. Using a sample of 11,897 manufacturing Italian firms, we examine the relationship between R&D expenditure that is capitalized as an intangible asset and some proxies of firm profitability over a period of four years in order to explore whether R&D assets can help investors in the identification of profitable firms. Contrary to expectations, this paper found a negative and/or an insignificant association between R&D assets and proxies of firm profitability. Although there are several possible explanations for this result, what we learn from this study is that R&D assets are not on average a reliable indicator for detecting profitable firms. Research findings revealed that firms with R&D assets appear to be not so profitable, large and levered.

Keywords: research and development, intangible assets, firm profitability, Italian firms

1. Introduction

The correlation between research and development (R&D) expenditure and the economic performance of firms has been addressed by academics for different research purposes. Examples of issues examined by empirical studies are the riskiness of R&D initiatives from a bondholders' perspective (Shi, 2003), the externalities of R&D activities (Chen, Chen, Liang, & Wang, 2013), the behavioural theory of the firm (O'Brien & David, 2014), the rounding phenomenon (He & Tian, 2014), the free cash flow hypothesis (Szewczyk, Tsetsekos, & Zantout, 1996), earnings management (Shust, 2015), the role of firm size (Ciftci & Cready, 2011), the effects of R&D announcement (Chan, Martin, & Kensinger, 1990; Yeh, Shu, Ho, & Su, 2012) and the responses to short term earnings targets (Garcia Osma & Young, 2009). Last but not least, one of the best known discussions is related to the value relevance of earnings and the accounting treatment of R&D expenditure (for a review of early studies, see for example Loudder & Behn, 1995; Lev & Zarowin, 1999). In particular, several studies have argued that a positive relation between R&D expenditure and stock market return would suggest the need to consider R&D expenditure as an intangible asset rather than recognise it as an expense when it is incurred (e.g., Hirschey & Weygandt, 1985; Kothari, Laguerre, & Leone, 2002; Goodwin & Hamed, 2006). On the other hand, the uncertainty of economic benefits which is inherent in R&D initiatives should suggest a conservative approach to the accounting treatment of R&D expenditure. The debate continues about this matter and the uncertainty of future earnings associated with R&D expenditure, as addressed by several empirical studies (Chan, Lakonishok, & Sougiannis, 2001; Kothari, Laguerre, & Leone, 2002; Shi, 2003; Amir, Guan, & Livne, 2007; Eberhart, Maxwell, & Siddique, 2008).

In this paper, we examined a sample of 11,897 manufacturing Italian firms. 99% of the sample is composed of unlisted companies. R&D expenditure was included as an intangible asset in the balance sheet of one third of firms (33,69 %) between 2011 and 2014. Examples of R&D assets are development costs of new products, for retail customers and/or for orders received from clients during the year or in previous years. The relation between R&D expenditure that is capitalized as intangible assets and some proxies of firm profitability is not examined in this paper in order to find evidence related to the future economic benefits of R&D expenditure, but rather to investigate whether R&D assets provide an indication for selecting profitable firms. In particular, we tested the aforementioned association by examining the average values of the proxy variables of R&D assets and firm profitability over the same term between 2011 and 2014 using two sets of regression analyses. The logistic regression model was firstly used to identify the main characteristics that distinguish firms that have capitalized R&D expenditure from firms that have recognised them as expenses. The ordinary least squares regression was then used to examine whether R&D assets, together with other explanatory variables, affect firm profitability.

The remainder of the paper is organized as follows: the second section presents the research hypothesis and the main related literature, the third section describes the sample selection and the survey methodology, the fourth section reports on the research findings and the last section gives concluding remarks.

2. Research Hypothesis and Related Literature

Firms included in our sample may capitalize R&D expenditure when future economic benefits are expected from an internal project. More specifically, for the listed companies included in the sample (109 companies), the International Financial Reporting Standards (IAS 38, 2014) requires that expenditure on research has to be recognised as an expense when it is incurred, while development expenditure may be capitalized as an internally generated intangible asset if it generates probable future economic benefits. For the unlisted companies included in the sample (11,788 companies), Italian accounting standards prohibit the capitalization of basic research, but allow applied research and development expenditure (OIC 24, 2015) to be recognised as an asset if a firm can demonstrate future economic benefits. According to Italian civil law (Civil Code, article 2426) and to Italian accounting standards (OIC 24, 2015), R&D assets were allocated on a systematic basis over their useful life, for a period not exceeding five years. As from 1 January 2016, all expenditure on research is now recognised as an expense while development expenditure is allocated, as general rule, on a systematic basis over their useful life according to the EU Directive 2013/34 and the Italian Legislative Decree 2015/139.

As a result of the above mentioned accounting standards, we expect a positive or at least an insignificant relationship between R&D expenditure recognised as an intangible asset and firm profitability. More specifically, this hypothesis was tested by examining a contemporaneous relationship between the average values of proxy variables of R&D assets and firm profitability over a period of four years. Although data about the amount of R&D assets were available, we considered average values since it was unknown how many projects each firm had developed, when R&D expenditure related to each project was capitalized for the first time, subsequent expenditure recognised as an asset or acquired in a business combination, how long the useful life of each project was, the amortisation method, the amortisation period and impairment losses. Unlike many other researches, we also examined a sample almost entirely made up of unlisted firms.

Our expectation is not in contrast with research findings provided by a large number of empirical studies, although our analysis differs from other research for several aspects. To our knowledge, numerous studies have documented a positive relationship between R&D expenditure, measured as R&D intensity (e.g., Lev & Sougiannis, 1996; Guo, Lev, & Shi, 2006) or R&D changes (e.g, Penman & Zhang, 2002; Eberhart, Maxwell, & Siddique, 2004), and future abnormal returns using samples of listed companies. In particular, empirical research has revealed a positive correlation between R&D expenditure and future stock market return (Hirschey & Weygandt, 1985; Bublitz & Ettredge, 1989; Lev & Sougiannis, 1996; Al-Horani, Pope, & Stark, 2003; Eberhart, Maxwell, & Siddique, 2004; Lev, Radhakrishnan, & Ciftci, 2006; Ali, Ciftci, & Cready, 2012) and/or between R&D expenditure and other economic measures, such as abnormal operating performance following R&D increase (Eberhart, Maxwell, & Siddique, 2004) and the subsequent growth in sales (Franko, 1989). A negative contemporaneous association was also found between increases in R&D expenditure and excess stock returns (Chambers, Jennings, & Thompson II, 2002) confirming the undervaluation of firms' equity that apply conservative accounting procedures (Lev, Sarath, & Sougiannis, 2005).

Although no conclusions have yet been reached, two main explanations have been suggested for these results. First, a risk-based explanation suggests that future returns are a reward for bearing risk associated with R&D activity. Second, the above mentioned relationship could have a mispricing explanation due to the market's underestimation of the earnings benefits from R&D expenditure and an overstating of earnings expectations when R&D assets decline (for a review, see also Lev, & Sougiannis, 1999; Chambers, 2011). In addition to these two main explanations, there is also an alternative hypothesis according to which the positive future returns should depend on other components unrelated to R&D expenditure, although present in firms with R&D activities (Donelson & Resutek, 2012).

3. Sample Selection and Methodology

We examined a sample made up of 11,897 manufacturing Italian firms according to the classification of economic activity provided by the Italian National Institute of Statistics (Istat, Ateco 2007). The manufacturing firms we examined are identified with the classification code labelled with the letter "C". Firms in the sample have a minimum of 10 million euro of annual revenues for the year 2014. The firm sample covers all listed companies on the Italian Stock Exchange that meet these classification criteria. Listed firms included in the sample (109 companies) have to comply with the international accounting standards (IAS 38, 2014), whilst unlisted firms (11,788 companies) have the option, or the obligation in the case of small firms, to comply with the Italian accounting standards (OIC 24, 2015) in accordance with the EU Regulation 1606/2002 and the Legislative Decree 2005/38. Anecdotal evidence suggests that most Italian unlisted companies usually opt to comply with the national accounting standards because of their simpler and easier implementation. Data on the sample firms were obtained from Aida (Bureau Van Dick, 2015).

The amount of R&D expenditure that each firm has capitalized as an intangible asset was measured by dividing the R&D asset by total assets (R&DTA). The average value of R&DTA was then computed for 4 years from 2011 to 2014

or for a shorter period if data were not available. A similar computation was carried out for proxies of firm profitability and for the other proxy variables shown in Table 1. In particular, Panel A of Table 1 shows the descriptive statistics of some of the main characteristics related to the firms that capitalized R&D expenditure (group 1), whilst Panel B presents several variables related to the firms that do not have R&D assets in their balance sheet for the period 2011-2014 (group 2).

Table 1. Descriptive statistics

	Mean	Median	S. Deviation	10th perc.	90th perc.
Panel A – Group 1					
R&DTA	0.013	0.004	0.023	0.000	0.037
INTG	0.041	0.014	0.083	0.002	0.092
FIXA	0.233	0.210	0.165	0.033	0.466
LEV	0.653	0.675	0.187	0.396	0.859
ATURN	1.106	1.026	0.801	0.593	1.644
ROTA	0.034	0.032	0.076	-0.025	0.103
ROA	0.006	0.007	0.071	-0.041	0.063
Employees(1)	238	83	832	30	417
Total assets(2)	75335	24349	327521	9350	125152
Panel B – Group 2					
INTG	0.026	0.005	0.067	0.000	0.061
FIXA	0.214	0.186	0.165	0.023	0.449
LEV	0.582	0.595	0.221	0.279	0.850
ATURN	1.511	1.172	14.556	0.644	2.011
ROTA	0.055	0.045	0.091	-0.011	0.146
ROA	0.025	0.021	0.087	-0.024	0.098
Employees(1)	163	62	608	17	284
Total assets(2)	63367	18787	322426	7129	98904

Note: (1) Average number of employees; (2) Thousand of Euros

Three main features emerged from this analysis. First, firms that have capitalized R&D expenditures are larger than firms that have not recognised R&D expenditure as an asset, as confirmed by the high average number of employees and the amount of total assets. Second, firms that have capitalized R&D expenditure have lower profitability ratios than the other firms included in the sample, as shown by the values of EBIT to total assets ratio (ROTA), net income to total assets ratio (ROA) and assets turnover measured as firms' revenues divided by total assets (ATURN). Lastly, firms with R&D assets present a higher average value in the following indicators than those firms that do not have R&D assets: debts to total assets ratio as proxy of firm leverage (LEV), fixed assets to total assets ratio (FIXA) and intangible assets net of R&D asset to total assets ratio (INTG) as indicators of the main components of firm's assets.

The correlation between R&D assets and proxies of corporate profitability was then carried out on the basis of two sets of correlation analyses. The first set of correlations used the logistic regression model for the entire sample of 11,897 firms. Specifically, we estimated the two following logistic regressions. The use of two correlations has been made to avoid a problem of collinearity between independent variables that incorporate operating income (e.g., ROTA) and net income (e.g., ROA).

$$logit(p) = \beta_0 + \beta_1 ROTA_i + \beta_2 ROS_i + \beta_3 ATURN_i + \beta_4 ITURN_i + \beta_5 LogA_i \quad (1)$$

$$logit(p) = \beta_0 + \beta_1 ROA_i + \beta_2 IMAR_i + \beta_3 ATURN_i + \beta_4 ITURN_i + \beta_5 LogA_i \quad (2)$$

where,

ROTA = Return to total assets, measured by EBIT to total assets

ROS = Return on sales, measured by EBIT to total revenues

IMAR = Income margin, measured by net income to total revenues

ATURN = Assets turnover, measured by total revenues to total assets

ITURN = Inventories turnover, measured by total revenues to inventories

LogA = Logarithm of total assets

ROA = Return on assets, measured by net income to total assets

The regressions involved the binary dependent variable Y (firms with a R&D asset Y=1; firms with no R&D asset Y=0), where p is the probability between 0 and 1 that the dependent variable will occur and β_p is the *pth* parameter of the logistic model obtained by the method of maximum likelihood. As shown in equations (1) and (2), we considered as independent variables the main proxies of firm profitability. In particular, we examined the following ratios: Return to

total assets (ROA), Return on sales (ROS), EBIT to total assets (ROTA), income margin measured as net income divided by revenues (IMAR), assets turnover measured as total revenues to total assets (ATURN) and inventory turnover measured as total revenues to total inventory (ITURN). We have also considered the logarithm of total assets (LogA) as a proxy variable of firm size since it significantly differentiates firms that have capitalised R&D expenditure as an asset (group 1) from the other firms (group 2). We excluded the number of employees for a problem of collinearity with the logarithm of total assets.

The second set of correlations was carried out using the ordinary least square (OLS) regression taking into account only the subsample of firms with R&D assets (group 1). The subsample was therefore made up of 4,009 firms. In particular, the regression analysis includes different measures of firm profitability. As dependent variables, we alternatively used ROTA, ROA, ROS and IMAR. We considered several explanatory variables in order to analyse how the firms' basic characteristics can help to explain the relationship between firm profitability and R&D assets. In addition to the independent variables shown in equations (1) and (2), we considered intangibles, net of R&D assets, to total assets ratio (INTG) and debts to total assets ratio (LEV).

The regression model is therefore given by:

$$Profit\ (Firm_i) = \beta_0 + \beta_1 R\&DTA_i + \beta_2 INTG_i + \beta_3 LogA_i + \beta_4 LEV_i + \beta_5 ATURN_i + \beta_6 ITURN_i \quad (3)$$

where,

R&DTA = R&D assets divided by total assets

INTG = Intangible assets net R&D assets divided by total assets

LogA = Logarithm of total assets

LEV = Firm leverage, measured by total debt to total assets

ATURN = Assets turnover, measured by total revenues to total assets

ITURN = Inventories turnover, measured by total revenues to inventories

Table 2 presents the correlation matrix related to the variables involved in the analyses. More specifically, Panel A shows the correlations related to the variables examined in the logistic regression specified in equation (1), while panel B indicates the correlations analysed in the logistic regression specified in equation (2). The correlation matrix between variables related to the OLS regression described in equation (3) is reported in Table 3. The results confirm the absence of the multicollinearity problem.

Table 2. Correlation matrix, logistic regression

Panel A. Logit (1)	ROTA	ROS	ATURN	ITURN	LogA
ROTA	1				
ROS	0.0429	1			
ATURN	-0.0187	0.0008	1		
ITURN	0.0002	0.0001	0.001	1	
LogA	-0.1095	0.0022	-0.0803	-0.0046	1
Panel B. Logit (2)	ROA	IMAR	ATURN	ITURN	LogA
ROA	1				
IMAR	0.0415	1			
ATURN	-0.0447	0.001	1		
ITURN	0.0019	0.0001	0,001	1	
LogA	-0.0695	-0.0046	-0.0803	-0.0046	1

Table 3. Correlation matrix, OLS regression

	R&DTA	INTG	LogA	LEV	ATURN	ITURN
R&DTA	1					
INTG	0.0566	1				
LogA	-0.0571	0.1998	1			
LEV	0.1638	0.0245	-0.0983	1		
ATURN	-0.0657	-0.1025	-0.1883	0.0717	1	
ITURN	-0.0142	0.0033	-0.0134	-0.0248	0.0317	1

4. Empirical Results

Table 4 presents the results of the logistic regression for the entire firm sample according to models (1) and (2). The negative coefficient of ROTA (Panel A), ROA (Panel B) and ATURN (Panel A and B) suggests that the probability of having a "firms with a R&D assets" response (Y = 1) increases as the values of these variables decrease. Moreover, in accordance with the descriptive statistics shown in Table 1, firms that have capitalized R&D expenditure are larger than

firms that have not recognised R&D expenditure as an asset, as shown by the positive coefficient of LogA.

In order to enlarge upon this issue, firm profitability, R&D assets and other characteristics of firms were then explored using the subsample of firms that have capitalized R&D expenditure according to model (3), where the various measures of firm profitability were considered as dependent variables. In line with the research findings based on the logistic model, OLS regression results shown in Table 5 confirmed the existence of a negative correlation between firm profitability and R&DTA. In particular, a significant negative association was found between R&DTA and ROTA (Panel A), ROA (Panel B) and ROS (panel C), whilst no correlation was found with IMAR (panel D). As expected, firm profitability was furthermore positively correlated with ATURN (Panel A, B and C) whilst, as already highlighted in the logistic regression analysis, a negative correlation was found between proxy variables of profitability and firm size (LogA) (Panel A, B, C and D) and a negative association also emerged for firm leverage (LEV) (Panel A, B and C).

Table 4. Logistic regression results

Panel A. Logit (1)	Estimate	StdError	z value	Pr(>|z|)	
Const	-1.40131	0.219133	-6.3948	<0.00001	***
ROTA	-2.59853	0.267051	-9.7305	<0.00001	***
ROS	0.0632747	0.0905752	0.6986	0.48481	
ATURN	-0.381682	0.0390879	-9.7647	<0.00001	***
ITURN	-4.9798e-05	4.98469e-05	-0.9990	0.31779	
LogA	0.302383	0.0447013	6.7645	<0.00001	***
Panel B. Logit (2)	Estimate	StdError	z value	Pr(>|z|)	
Const	-1.46763	0.219169	-6.6963	<0.00001	***
ROA	-2.55491	0.268345	-9.5210	<0.00001	***
IMAR	0.00868219	0.0122727	0.7074	0.47929	
ATURN	-0.407719	0.0395245	-10.3156	<0.00001	***
ITURN	-4.97938e-05	5.0444e-05	-0.9871	0.32359	
LogA	0.308121	0.044703	6.8926	<0.00001	***

Notes: *** Significant at the 0.01 level,** Significant at the 0.05 level,* Significant at the 0.10 level (two-tailed).

Table 5. OLS regression results

Panel A. Dependent variable: ROTA	Estimate	StdError	z value	Pr(>|z|)	
Const	0.194036	0.0120034	16.1650	<0.00001	***
R&DTA	-0.160161	0.047516	-3.3707	0.00076	***
INTG	-0.0161352	0.0132212	-1.2204	0.22238	
LogA	-0.0139821	0.00240297	-5.8187	<0.00001	***
LEV	-0.168067	0.00587799	-28.5926	<0.00001	***
ATURN	0.0134749	0.00137806	9.7781	<0.00001	***
ITURN	-3.77349e-06	3.24021e-06	-1.1646	0.24426	
Panel B. Dependent variable: ROA	Estimate	StdError	z value	Pr(>|z|)	
Const	0.148073	0.0108879	13.5997	<0.00001	***
R&DTA	-0.121574	0.0431001	-2.8207	0.00481	***
INTG	-0.0480221	0.0119925	-4.0044	0.00006	***
LogA	-0.00805264	0,00217965	-3,6945	0,00022	***
LEV	-0,174441	0,00533173	-32,7176	<0,00001	***
ATURN	0,0107114	0,00124999	8,5691	<0,00001	***
ITURN	-1,71261e-06	2,93909e-06	-0,5827	0,56013	
Panel C. Dependent variable: ROS	Estimate	StdError	z value	Pr(>|z|)	
Const	0.227543	0.0185601	12.2598	<0.00001	***
R&DTA	-0.351719	0.0734706	-4.7872	<0.00001	***
INTG	0.00590988	0.020443	0.2891	0.77253	
LogA	-0.0194696	0.00371554	-5.2400	<0.00001	***
LEV	-0.172762	0.00908872	-19.0084	<0.00001	***
ATURN	0.00425116	0.0021308	1.9951	0.04610	**
ITURN	-3.13713e-06	5.01011e-06	-0.6262	0.53125	
Panel D. Dependent variable: IMAR	Estimate	StdError	z value	Pr(>|z|)	
Const	0.692886	0.161312	4.2953	0.00002	***
R&DTA	-0.88846	0.638558	-1.3914	0.16420	
INTG	0.133578	0.177677	0.7518	0.45221	
LogA	-0.138536	0.032293	-4.2900	0.00002	***
LEV	-0.125043	0.0789931	-1.5830	0.11351	
ATURN	0.00340625	0.0185195	0.1839	0.85408	
ITURN	-2.44879e-07	4.35445e-05	-0.0056	0.99551	

Notes: *** Significant at the 0.01 level,** Significant at the 0.05 level,* Significant at the 0.10 level (two-tailed).

In sum, the negative and/or an insignificant contemporaneous correlation between R&D assets and proxy variables of

firm profitability that emerges using data from the annual report suggests that R&D assets do not appear to be a reliable indicator for detecting profitable firms.

It is more difficult to provide a clear explanation of the research findings if we consider the contradiction between the assumption and the empirical results. On the one hand, firm profitability should be positively affected by R&D activities because of the role that they play in innovation and for the accounting treatment that allows the capitalization of R&D expenditure when future economic benefits are expected in subsequent years. On the other hand, empirical evidence has revealed the existence of a negative and/or an insignificant association between R&D expenditure capitalized as assets and proxies of firm profitability.

In the light of further investigations, we have speculated about some possible interpretations. The first one is that R&D did not have a considerable positive effect on firm profitability. In other words, in contrast with expectations, costs incurred for developing R&D initiatives that are partially or entirely capitalized as assets were not sufficient to achieve real benefits. Second, a plausible explanation might be that firms that capitalized R&D expenditure as internally generated intangible assets were not market leaders but followers in profitability. In other words, firms that have R&D assets were looking for higher performances as a result of their investments in R&D initiatives. Lastly, for both the above mentioned interpretations, a reason that precludes the recognition of a positive relationship could be due to the longer period of time needed to obtain noticeable effects, although the capitalization of R&D expenditure according to Italian accounting standards should give economic benefits in the short or medium period of time. In this sense, this explanation is not in contrast with previous studies where the negative association between excess returns and contemporaneous changes in R&D investment was highlighted (Chambers, Jennings, & Thompson, 2002), revealing the slowness of the market in recognizing the extent of the benefit of R&D initiatives (Eberhart, Maxwell & Siddique, 2004).

5. Concluding Remarks

R&D activities are commonly considered a factor that promotes innovation, skills, growth opportunities and, *ceteris paribus*, firm profitability. This paper examines how R&D expenditure capitalized as an internally generated intangible asset can help investors and other stakeholders in exploring firm profitability by using information taken from the annual report. The correlation between the average value of R&D assets divided by total assets (R&DTA) and some proxy variables of firm profitability between 2011 and 2014 were analysed together with other main firm characteristics for 11,897 manufacturing Italian firms.

Contrary to expectations, this study found a negative and/or an insignificant association between R&DTA and proxy variables of firm profitability, although the capitalization of R&D expenditure according to Italian accounting standards should give economic benefits in the short or medium period of time. More specifically, using the logistic regression model, the probability of having firms with a R&D asset increases as the values of ROTA, ROA and ATURN decrease. Moreover, on the base of the OLS regression analysis, research findings revealed a negative correlation between R&DTA, ROTA, ROA, ROS and ATURN. These results are difficult to interpret in view of the role that R&D plays in economic development. One possible explanation is that R&D expenditure does not have a considerable positive effect on firm profitability. Another plausible interpretation might be that firms with low profitability could be in search of a higher performance by investing in R&D initiatives. In both cases, it cannot be excluded that a positive correlation between R&DTA and proxies of firm profitability could emerge in a longer period of time, where visible effects may be better detected. Future studies on this topic could be done to investigate the reasons for the above mention correlations. In particular, an examination of each single project could outline the effective relationship between R&D assets and firm profitability, overcoming the limitations of this study due to the use of average values. Therefore, if the data are available, a preliminary analysis of the characteristics of projects will be required.

What we learn from this study is that a negative and/or an insignificant contemporaneous correlation between R&D assets and proxy variables of firm profitability emerges using data from the Annual Report. It can therefore be assumed that the R&D asset is not on average a reliable indicator for detecting profitable firms. Moreover, apart from being less profitable, research findings revealed that firms with R&D assets also appear larger and with a leverage ratio greater than the other firms included in the sample.

References

Al-Horani, A., Pope, P. F., & Stark, A. W. (2003). Research and Development activity and expected returns in the United Kingdom. *European Finance Review*, *7*, 27-46. http://dx.doi.org/10.1023/A:1022504029943

Ali, A., Ciftci, M., & Cready, W. M. (2012). Market underestimation of the implications of R&D increases for future earnings: the US evidence. *Journal of Business Finance & Accounting*, *39*(3) & (4), 289-314. http://dx.doi.org/10.1111/j.1468-5957.2012.02282.x

Amir, E., Guan, Y., & Livne, G. (2007). The association of R&D and capital expenditures with subsequent earnings variability. *Journal of Business Finance & Accounting*, *34*(1) & (2), 222-246. http://dx.doi.org/10.1111/j.1468-5957.2006.00651.x

Bublitz, B., & Ettredge, M. (1989). The information in discretionary outlays: advertising, research, and development. *The Accounting Review*, *64*(1), 108-124.

Bureau, V. D. (2015). Retrieved October 12, 2015, from https://aida.bvdinfo.com

Chambers, D. (2011). Discussion of "Is Research and Development mispriced or properly risk adjusted?". *Journal of Accounting, Auditing & Finance*, *26*(1), 117-20. http://dx.doi.org/10.1177/0148558X11400582

Chambers, D., Jennings, R., & Thompson II, R. B. (2002). Excess returns to R&D-intensive firms. *Review of Accounting Studies*, *7*, 133-158. http://dx.doi.org/10.1023/A:1020217817156

Chan, L. K. C., Lakonishok, J., & Sougiannis, T. (2001). The stock market valuation of research and development expenditures, *The Journal of Finance*, *56*(6), 2431-2456. http://dx.doi.org/10.1111/0022-1082.00411

Chan, S. H., Martin, J. D., & Kensinger, J. W. (1990). Corporate research and development expenditures and share value. *Journal of Financial Economics*, *26*, 255-276. http://dx.doi.org/10.1016/0304-405X(90)90005-K

Chen, S. S., Chen, Y. S., Liang, W. L., & Wang, Y. (2013). R&D spillover effects and firm performance following R&D increases. *Journal of Financial and Quantitative Analysis*, *48*(5), 1607-1634. http://dx.doi.org/10.1017/S0022109013000574

Ciftci, M., & Cready, W. M. (2011). Scale effects of R&D as reflected in earnings and returns. *Journal of Accounting and Economics*, *52*, 62-80. http://dx.doi:10.1016/j.jacceco.2011.02.003

Donelson, D. C., & Resutek, R. J. (2012). The effect of R&D on future returns and earnings forecasts. *Review of Accounting Studies*, *17*(4), 848-876. http://dx.doi.org/10.1007/s11142-011-9179-y

Eberhart, A., Maxwell, W., & Siddique, A. (2004). An examination of long-term abnormal stock returns and operating performance following R&D increases. *The Journal of Finance*, *59*(2), 623-650. http://dx.doi.org/10.1111/j.1540-6261.2004.00644.x

Eberhart, A., Maxwell, W., & Siddique, A. (2008). A reexamination of the tradeoff between the future benefit and riskiness of R&D increases. *Journal of Accounting Research*, *46*, 27-52. http://dx.doi.org/10.1111/j.1475-679X.2007.00264.x

Franko, L. G. (1989). Global corporate competition: who's winning, who's losing, and the R&D factor as one reason why. *Strategic Management Journal*, *10*, 449-474. http://dx.doi.org/10.1002/smj.4250100505

Garcia, O. B., & Young, S. (2009). R&D expenditure and earnings targets. *European Accounting Review*, *18*(1), 7-32. http://dx.doi.org/10.1080/09638180802016718

Goodwin, J., & Ahmed, K. (2006). Longitudinal value relevance of earnings and intangible assets: evidence from Australian firms. *Journal of International Accounting, Auditing and Taxation*, *15*, 72-91. http://dx.doi.org/10.1016/j.intaccaudtax.2006.01.005

Guo, R. J., Lev, B., & Shi, C. (2006). Explaining the short- and long-term IPO anomalies in the US by R&D. *Journal of Business Finance & Accounting*, *33*(3) & (4), 550-579. http://dx.doi.org/10.1111/j.1468-5957.2006.00610.x

He, D., & Tian, Y., (2014). Do firms manage research and development expenses? An investigation of the rounding phenomenon in the reported R&D expenses. *Journal of Accounting and Finance*, *14*(5), 138-146.

Hirschey, M., & Weygandt, J. J. (1985). Amortization policy for advertising and research and development expenditures. *Journal of Accounting Research*, *23*, 326-335. http://dx.doi.org/10.2307/2490921

IAS 38. (2014). *Intangible Assets*. London, UK: IFRS Foundation.

Kothari, S. P., Laguerre, T. E., & Leone, A. J. (2002). Capitalization versus expensing: evidence on the uncertainty of future earnings from capital expenditures versus R&D outlays. *Review of Accounting Studies*, *7*, 355-382. http://dx.doi.org/10.1023/A:1020764227390

Lev, B., & Sougiannis, T. (1996). The capitalization, amortization and value-relevance of R&D. *Journal of Accounting and Economics*, *21*, 107-138. http://dx.doi.org/10.1016/0165-4101(95)00410-6

Lev, B., & Sougiannis, T. (1999). Penetrating the Book-to-Market black box: the R&D effect. *Journal of Business Finance & Accounting*, *26*(3), 419-449. http://dx.doi.org/10.1111/1468-5957.00262

Lev, B., & Zarowin, P. (1999). The boundaries of financial reporting and how to extend them. *Journal of Accounting*

Research, *37*(2), 253-385. http://dx.doi.org/10.2307/2491413

Lev, B., Radhakrishnan, S., & Ciftci, M. (2006). The Stock market valuation of R&D leaders. *NYU Working Paper, No. 2451/27475*. Available at SSRN: http://ssrn.com/abstract=1280696.

Lev, B., Sarath, B., & Sougiannis, T. (2005). R&D reporting biases and their consequences. *Contemporary Accounting Research*, *22*(4), 977-1026. http://dx.doi.org/10.1506/7XMH-QQ74-L6GG-CJRX

Loudder, M. L., & Behn, B. K. (1995). Alternative income determination rules and earnings usefulness: the case of R&D costs. *Contemporary Accounting Research*, *12*, 185-205. http://dx.doi.org/10.1111/j.1911-3846.1995.tb00486.x

O'Brien, J. P., & David, P. (2014). Reciprocity and R&D search: applying the behavioral theory of the firm to a communitarian context. *Strategic Management Journal*, *35*, 550-565. http://dx.doi.org/10.1002/smj.2105

OIC 24. (2015). *Attivit à Immateriali*. Roma, Italia: Organismo Italiano di Contabilit à

Penman, S. H., & Zhang, X. J. (2002). Accounting conservatism, the quality of earnings, and stock Returns. *The Accounting Review*, *77*, 237-264. http://dx.doi.org/10.2308/accr.2002.77.2.237

Shi, C. (2003). On the trade-off between the future benefits and riskiness of R&D: a bondholders' perspective. *Journal of Accounting and Economics*, *35*, 227-254. http://dx.doi:10.1016/S0165-4101(03)00020-X

Shust, E. (2015). Does research and development activity increase accrual-based earnings management? *Journal of Accounting, Auditing & Finance*, *30*(3), 373-401. http://dx.doi.org/10.1177/0148558X14560901

Szewczyk, S. H., Tsetsekos, G. P., & Zantout, Z. (1996). The valuation of corporate R&D expenditures: evidence from investment opportunities and free cash flow. *Financial Management*, *25*(1), 105-110. http://dx.doi.org/10.2307/3665906

Yeh, Y. H., Shu, P. G., Ho, F. S., & Su, Y. H. (2012). Board structure, intra-industry competition, and the R&D announcement effect. *Review of Pacific Basin Financial Markets and Policies*, *15*(2), 1-31. http://dx.doi.10.1142/S0219091512500117