Impact of Intangibles on Firm Value: An Empirical Evidence from European Public Companies[1]

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Abstract

This paper examines the value relevance of intangibles expressed by R&D expenditures and intangible fixed assets, and other variables with the firm value. Using the regression approach for 1 520 observations in years 2011 – 2015, we found out that R&D expenses to total assets can significantly explain market to book value ratio of selected companies. Results of our analysis indicate the more accelerated increase of firm value with the increase of R&D expenses to total assets in comparison with the increase in relation to other regressors. An interesting fact is that intangible fixed assets to total assets are not statistically significant, indicating that the market does not evaluate passive strategy of externally acquiring intangible assets instead of their own development.

Keywords: *intangible assets, intangible-intensive firms, R&D expenses, intangible fixed assets, ROTA rank measure*

JEL Classification: M21

Introduction

Today's economies strongly depend on the creation, distribution, and use of knowledge, much more so than ever before. Knowledge is anchored in a skilled workforce, sophisticated processes, customer relationships or unique organizational designs and brands. No one would question that an experienced employee brings more value to the firm than a newly hired one. Well established organizational processes are recognizably more value able than disorganized management. Such considerations, however, raise the question: How to evaluate that

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difference? We can review all employee investments, we can look at the proportion of the profit an employee brings to the company, and we can compare profits of well and inappropriately managed firm. But will this be the reliable measurement procedure?

Intangible assets lack physical substance and do not have a financial embodiment. Valuation of this kind of assets is difficult and uncertain. Intangible assets usually relate to innovations implementation, technology development or marketing activities. Their importance in different companies varies, however it is proved that intangible assets (usually in combination with other tangible assets) are among the main drivers of competitive advantage and corporate profit (Zambon, 2003). Economists recognize the growing contribution of intangibles in GDP growth in the long run, as discussed in Corrado, Hulten and Sichel (2006). We can differentiate between externally acquired and internally generated intangible assets. Whereas the first group is always evaluated in their purchasing price, it is much more difficult to evaluate internally generated intangible assets.

The increase in the amount of corporate intangible assets influences the firms' behaviour. One of the current trends is that intangible assets become the main shifting channel of profit shifting and transfer pricing manipulation. Affiliates from high-tax countries pool their profit via tax-optimized royalty payments at their subsidiaries, mainly located in tax havens. Market prices for such royalty payments usually do not exist and this leads to possible manipulation of transfer prices. Belz, von Hagen and Steffens (2016) aimed to explain the differing results of performed empirical research on the relationship between R&D expenses and effective tax rate applying meta-regression analysis. They consider the relative effect of two main factors affecting effective tax rate and conclude that one-third of the effect of R&D intensity in the tax burden of the firm might be caused by tax accounting treatment, whereas two-thirds are affected by profit shifting. Other firms try to relocate their intangible assets to countries with lower corporate taxes. Dischinger and Riedel (2011) examine low-tax affiliates of multinational companies and find evidence on higher intangible assets holdings in affiliates with lower corporate tax relative to other affiliates.

Obviously, the feature of intangibility is related to several problems of valuation of internally generated intangible assets. Those are divided into two groups: identifiable and unidentifiable intangible assets. If we look closer at the published literature, we see that one group of authors tends to neglect unidentifiable intangible assets for the reason of their difficult quantitative expression. In such a case, they usually rely on balance sheet item "intangible fixed assets", which covers all intangible property holdings, such as patents, licenses, copyrights or trademarks. Such an asset has to fulfil mandatory conditions of IFRS (International

Financial Reporting Standards) to be recognized on balance sheet. Another group of authors focuses their attention on R&D expenses. When we consider R&D expenses to be an indicator of intangible intensity, the uncertainty of future economic benefits is very high and very often they do not end up successfully. As they do not fulfil the IFRS condition about the exact identification of future economic benefits, it is usually not possible to capitalize them. The valuation of intangible assets is especially important for the pricing of mergers and acquisitions. The only exception is therefore made for business combinations, when it is possible to capitalize in-process R&D expenses of the acquired firm. And the capitalization of R&D expenses is another frequently discussed topic in this field.

The paper is organized as follows. First, theoretical background of the researched topic and main definitions are introduced. Second, we describe data used for our analysis and briefly characterize applied econometric methods. In the third part, empirical results of the performed analysis are presented. To conclude, main findings are summarized.

1. Theoretical Background

The fact that the topic of intangibles and intellectual capital is very popular and important is highlighted by the evidence that since the Millennium, the European Commission, through its different Directorates General, commissioned a number of studies and set up various expert groups devoted to various issues in the area. The most relevant of them are:

- The Intangible Economy – Impact and Policy Issues, Report of the European High-Level Expert Group on the Intangible Economy for DG Enterprise, October 2000 (Eustace et al., 2000);
- Study on the Measurement of Intangible Assets and the Associated Reporting Practices, prepared by the University of Ferrara, the Stern School of Business, and the University of Melbourne for DG Enterprise, April 2003 (Zambon et al., 2003);
- Report on the Feasibility of a Pan-European Enterprise Data Repository on Intangible Assets, prepared by Mantos Associates in association with IASCF and Athena Alliance for DG Enterprise, November 2004 (Mantos, 2004);
- Reporting Intellectual Capital to Augment Research, Development & Innovation in SMEs (RICARDIS), prepared by the High-Level Expert Group on RICARDIS for DG Research, June 2006 (EC, 2006);
- Creating a Financial Market for IPR, prepared by the University of St. Gallen and the Fraunhofer Institute for DG Enterprise, December 2011 (Bader et al., 2011);

• Final Report from the Expert Group on Intellectual Property Valuation, Luxembourg: Publications Office of the European Union, 2014 (Fuehrer et al., 2014).

According to results of the MERITUS project, the definition and classification of intangible assets is still a very open issue (Sánchez et al., 2001). From the practical perspective, firms seem to group intangible assets into three main categories – human capital, structural capital and relational capital. Human capital refers to skills, competencies, knowledge, experience, capabilities, and expertise of firm employees. Investments in employees usually take the form of salaries, training and education. Firms very often seek out experienced individuals, who bring know-how to the firm. Structural capital is also denoted as organizational or internal capital and includes all knowledge within the firm that is embedded in processes, databases, information system, organizations culture and is not tied to concrete employees. Intellectual property represents an identifiable part of the structural capital.

When a firm is able to meet all the requirements for its issuance, it can be sold in the form of intellectual property rights. The last group represents external capital built by relationships with third parties – most often, it is about the relationship with customers and suppliers. Examples might be brand names, marketing strategies or trademarks.

From another point of view, firms also distinguish between intangible resources and intangible activities. Intangible resources are the static term and we can perceive them as assets in a broad sense, which incorporates all intangible capacities of the firm likely to create the value in the future. Montresor, Perani and Vezzani (2014) describe intangible assets in a broad sense as everything that is non-physical and thus not touchable and focus on their identification via survey. This definition does not coincide with the IFRS definition, which requires identifiability and controllability. If an intangible asset does not fulfil the conditions and cannot be recognized as an asset, IAS 38 requires the expenditure on this item to be recognized as an expense when it is incurred (International Accounting Standards Board, 2016).

On the other hand, intangible activities comprise all dynamic investments to purchase or generate intangible assets. Intangible assets in the form of patents, copyrights, licenses, or trademarks can be acquired separately or in a business combination by purchase or by internal generation, e.g. through R&D efforts, marketing research, or investments in organizational capital (Ashton, 2005). In this paper, we focus in more detail on two specific financial statements' items: intangible fixed assets from the balance sheet and R&D expenses from the profit and loss account.

1.1. Definition of Intangible Fixed Assets

Group of identifiable intangible assets that are not dealt with in another IFRS is specified in IAS 38 and consists of the comprehensive list of different types of intangible assets. First of all, an asset has to fulfil all criteria listed under IAS 38:

1. *Identifiability* – an intangible asset is identifiable when it is separable (we are able to separate the value of an asset from other assets), and when it arises from contractual or other legal rights,
2. *Controllability* – an economic entity has the power to control an intangible asset if it is able to obtain economic benefits that arise from an asset,
3. *Future economic benefits* – an intangible asset creates future economic benefits if increasing revenues or decreasing costs result from the use of an asset (International Accounting Standards Board, 2016).

On a balance sheet, these assets are represented by an item intangible fixed assets, which summarizes all purchased and under certain circumstances also a small group of internally generated intangible assets. Thus, an intangible asset can be reported on a balance sheet as a long-term asset at the value of historical cost minus accumulated amortization only if it is purchased externally. There are some exceptions when also internally generated intangible asset might be recognized and reported on a balance sheet. For example, an asset arising from development phase can be recognized, if it is possible to distinguish between the research phase and the development phase and after fulfilling several conditions (e.g. proven technical feasibility, intention to complete an asset, ability to use or sell an asset, available sources of financing, measurable expenditures in the development phase). Another exception is the case of in-house R&D expenses acquired via business combination. Items intangible fixed assets and R&D expenses are related to each other. Balance sheet item intangible fixed assets encompasses all intangible assets that fulfilled IAS 38 conditions for being recognized as intangible assets. If an asset is not able to fulfil the conditions or we are not able to distinguish between costs of research and costs of development activities, expenses incurred have to be immediately expensed and became a part of R&D expenses. This is very often the case of internally generated intangible assets, for example, goodwill.

1.2. Definition of R&D Expenses

For decades, R&D expenses have been used as a proxy for intangible assets and their market value effect has been examined (Griliches, 1981; Hirschey, 1982). Schreiner (2007) discusses that investing in research and development is a major productive input for a large number of firms, particularly those operating

in science and technology related industries. He also adds that by examining the value relevance of R&D expenses, several studies from authors like Amir and Lev (1996); Lev and Sougiannis (1996); Aboody and Lev (1998; 2000); Chan, Lakonishok and Sougiannis (2001); Lev, Nissim and Thomas (2002); Eberhart, Maxwell and Siddique (2004); Guo, Lev and Shi (2006); or Nelson (2006) provide striking evidence to view R&D as an investment rather than an expense. We could dispute if adding back R&D expenses to EBIT or net income yields "higher quality" earnings and has so much better information content for investors and their estimates of business value. Aboody and Lev (2000) consider R&D expenses to be a major contributor to information asymmetry and insider gains. Usually, the process of research and development is secret and no information is provided to third parties. There is also no organized market for R&D expenses, which allows us to value them correctly. R&D expenses are treated differently under different accounting frameworks. While IAS 38 mandate the capitalization after meeting certain criteria, GAAP and SFAR strictly restrict it. Wang et al. (2016) observed the effects of different accounting choices (capitalization or expensing of R&D) and different implications in China. However, in the majority of cases, R&D expenses might not be capitalized and are immediately expensed. Expensing should eliminate the capitalizing of projects that are not likely to survive. On the other hand, Cifri and Darrough (2015) argue that obligatory expensing may indicate financial distress of the firm, even if this is not the truth. As a result, analysts' forecasts might be biased. Evidence has been found for example by Amir, Lev and Sougiannis (2003), or Barron et al. (2002). According to Huang and Zhang (2011), over-represented downward revisions and under-represented upward revisions are characteristic for firms with higher R&D expenses. Hsieh, Hui and Zhand (2016) show that when there is a high information asymmetry in a market, better readability of analysts' reports positively influences stock prices.

1.3. Motivation of Research

Empirical analysis conducted under the MERITUM project activities support the general idea that intangible assets are relevant to capital markets. Case studies and econometric analysis within the project found that R&D expenses, as well as human resources, are related to the value of the firms (Sanchéz et al., 2001). In the past, the relationship between R&D expenses and market value has been extensively analyzed. Sougiannis (1994) found a significant impact of R&D expenses on reported earnings and market value of equity. R&D expenses are frequently used as the proxy variable for innovation intensity (e.g. He and Wintoki, 2016; Di Cintio, Ghosh and Grassi, 2017) or intangible intensity

(e.g. Borisova and Brown, 2013; Peters and Taylor, 2017) of the firm. Griliches (1981) finds a significant positive effect of past R&D expenses on market value. One of the latest papers written by Nemioglu and Mallick (2017) investigates the impact of R&D activities and managerial practices in the pre- and post-crisis period on firm performance measured by profit margin. They find better benefits for firms focusing jointly on both activities.

In this paper, we focus on two main issues: pertinence of intangible assets for explaining market capitalization value of the firm and comparison of an influence of capitalized and expensed intangible assets. We want to investigate whether firms with the higher proportion of intangible assets on total assets also have the higher market to book value ratio. As the measures of intangible assets, intangible fixed assets (capitalized intangible assets) and R&D expenditures are used. In order to control for the size of the firm, we scaled both variables by total assets. The question of capitalization or expensing of intangible assets is frequently discussed. Sougiannis (1994) defines an indirect impact of capitalized R&D expenses reflected in earnings and expects it to resist in the future. Abeysekera (2016) performed an experiment where he investigated whether analysts make the same forecasts about the future stock price for firms with expensed and capitalized intangible assets with the same probability of future economic benefits. He followed an experiment with trained student participants performed by Luft and Shields (2001) who concluded that expensing intangible assets decreases the accuracy of profit predictions. In contrast, Abeysekera (2016) summarizes that the probability of forecasting error is lower for experienced analysts, and in the presence of earnings, forecasts are expensed and capitalized intangible assets economically equivalent.

Pfarrer, Pollock and Rindova (2010) suggest addressing future research on the influence intangible assets may have on firm outcomes by affecting the behaviours of the firms possessing the assets. Our focus is to investigate the contribution to market capitalization value assigned to intangible fixed assets and R&D expenses. In both cases, we assume firms to have higher market to book value ratio with increasing proportion of intangible fixed assets or R&D expenditures on total assets, respectively. Active investments in research and development might quite rationally indicate that the firm will continue to perform the valuable behaviour in the future. Intangible fixed assets are an indicator of either past successful R&D activities or might have been bought to improve the performance of the firm and ensure its profitability and sustainability.

However, we can propose that whereas both R&D expenses and intangible fixed assets are likely to have a positive effect on firm's value, the effect will be stronger for R&D intensive firms. This might be caused by higher uncertainty

level in case of R&D investments, as even though they are expensed, they might but do not have to be successful. As the result of previous thoughts, we define two hypotheses:

H1: *R&D expenditures scaled by total assets have a significant positive effect on market to book value ratio.*

H2: *Intangible fixed assets scaled by total assets have a significant positive effect on market to book value ratio.*

2. Data and Methodology

We investigate the sample of 304 European public listed companies, which reported profit within the whole period of years 2011 – 2015 from the database Amadeus. For the purposes of quantile regression modelling, only the observations for the year 2015 are analyzed. The initial data sample consists of 4 799 observations. However, due to missing values for R&D expenses and intangible fixed asset, we had to exclude almost 90% of observations.

T a b l e 1

Geographic Structure of Data Sample

	Sample		**Population**	
Country	Count	Proportion (%)	Count	Proportion (%)
Belgium	9	2.1	84	3.46
Germany	65	15.5	410	16.87
France	100	23.9	551	22.67
Great Britain	127	30.3	941	38.71
Switzerland	62	14.8	159	6.54
Luxembourg	1	0.2	3	0.12
Sweden	41	9.8	235	9.67
Turkey (European portion)	14	3.3	48	1.97

Source: Own calculation.

As concluded by Innobarometer 2013, the share of EU firms reporting R&D expenses on their balance sheet as intangible assets is the highest in comparison with those of US and Japan (Montresor, Perani and Vezzani, 2014).

Table 1 summarizes numbers of observations based on their geographic region and consists of countries where the quality of intangible related reporting is the highest. Our frame excludes observations and industries with dissatisfactory data quality or missing data. These countries are known for the high intensity of intangible assets. Sweden and Great Britain are among the most intangible intensive countries (Corrado et al., 2012).

T a b l e 2

Summary Statistics for Industries

NACE, Rev. 2 Sector		Sample		Population	
		Count	Proportion (%)	Count	Proportion (%)
C	Manufacturing	146	34.84	1 092	29.59
G	Wholesale and Retail Trade, Repair of Motor Vehicles	17	4.06	378	10.24
J	Information and Communication	53	12.65	409	11.08
K	Financial and Insurance Activities	50	11.93	783	21.22
M	Professional, Scientific and Technical Activities	145	34.61	891	24.15
N	Administrative and Support Service Activities	8	1.91	137	3.71

Source: Own calculation.

In Table 2, industry stricter of population and our sample is presented. Our data sample covered six industry sectors, where sufficient intangible fixed assets and R&D expenses reporting data were available. From the point of view of the structure of the basic set, the analyzed sectors represented up to 76.89% of the values of all observations. The structure of the representation of the individual sectors as a whole was partly different based on the set and the revized sample (modified set of values).

The results for countries were similar, but the structure was much more respected. In fact, focusing on the completeness of data, we have observed observations for larger countries, with fewer drops. France, United Kingdom and Germany had the most significant presence.

The analyzed data sample is the combination of cross-section and time series data. Panel data modelling is used frequently, also in connection with intangible assets (e.g. Kijek, 2014; Filatotchev and Piesse, 2009; Contractor, Yang and Gaur, 2016; Chen, Cheng and Hwang, 2005). We consider this method to be suitable for the analysis of the effect of expensed and capitalized intangible assets on market to book value ratio. Our panel model has the form:

$$y_{it} = \alpha + \boldsymbol{x}'_{it}\boldsymbol{\beta} + \varepsilon_{it} \tag{1}$$

where y_{it} denotes market to book value ratio expressed by closing price of shares times number of shares divided by total assets MTB, is the vector of explanatory variables, is the vector of regression coefficients, represents random individual or time effects and (idiosyncratic error) states for error components of the model. We analyze the effects of six variables expressed by research and development expenses scaled by total assets (RDAS), intangible assets scaled by total assets (IntAS), profit (EBITDA) scaled by total assets (ProfitAS), leverage calculated as total liabilities divided by total assets (Lev), firm size expressed as the logarithm of market capitalization (Size) and sales scaled by total assets (SalesAS) on dependent variable expressed by the firm value, specifically open price of the

company's stock times number of shares divided by value of total assets. We do not consider goodwill to be a part of intangible assets IntAS.

In the second step, we apply quantile regression as an alternative to OLS. Quantile regression supposes that the effect of the explanatory variable on dependent variable differs in different points of the dependent variable's conditional distribution. In comparison to OLS estimation method, which models the conditional mean for all dependent variables, this method is more suitable in several specific problem sets (e.g. Eide and Showalter, 1998; Hartog, Pereira and Vieira, 2001; Martins and Pereira, 2004). We do not expect the regression coefficients to be the same for the whole data sample. For this reason and considering the heteroscedasticity problem of our data, we apply the least absolute deviations (LAD) estimation (sometimes denoted also as quantile or median regression) as a complement to least squares estimation method. Using this method has several advantages: it provides a better overview of regression coefficients for different quantiles across our data sample and in comparison to OLS, reduces the weights of larger residuals, so it is much less sensitive to changes in extreme values (Wooldridge, 2006). Dividing the whole data sample into different quantiles gives us a more precise overview of the effects of explaining variables on the dependent variable.

3. Empirical Analysis

Our analysis, in the first step, starts by analyzing typical panel data model with many individual observations across several time periods. Cross-sectional dimension of our data frame covers 304 individual firms. Time series dimension involves a period of five years, from 2011 to 2015. We considered and tested several models based on longitudinal (panel) data, specifically we tested pooled model (PM), fixed effects model (FE), and lastly random effects model (RE). We tested parameters and error terms by means of pooling tests. Because the pooled model may not reflect the exact relationship between market to book value ratio and the particular regressors, we decided to take into account the individual level effects.

Both individual and time effects were statistically significant. We also tested that the homogeneity assumption over the coefficients is established. To decide whether fixed or random effects model is more appropriate, the Hausman test was applied, using which we confirmed our assumption that the fixed effects model is more relevant. As the model suffers from serial correlation, we applied heteroscedasticity robust variance-covariance matrix to estimate unbiased regression coefficients under asymptotic properties.

T a b l e 3

Estimation Results for Fixed-effects Regression Models

Dependent variable: MTB	Model FE
RDAS	7.4031 *
IntAS	0.1947
ProfitAS	2.4568
Lev	2.1177 ***
Size	3.4470 ***
SalesAS	1.5403***
Intercept	–21.9237 ***
R squared	0.5648
F/Wald statistic	45.9700
Prob(F-statistic)	0.0000

Note: *** (**) (*) indicates statistically significant at 0.1 (1) (5) %.

Source: Own calculation.

Running a panel data model with time fixed effects indicates that variable RDAS contributes more to the dependent variable MTB in comparison with intangible fixed assets IntAS. Moreover, regression coefficient of variable IntAS was statistically insignificant and we were not able to confirm our hypothesis that there is a relationship between intangible fixed assets scaled by total assets and market to book value ratio.

We see that 1-unit increase of variable RDAS will show up in 7.4-unit increase of variable MTB. RDAS affects the firm value among the most influential variables. This model explains the variability of dependent variable on 56.48%. Within our data sample, our model is not able to confirm the statistical significance of variables IntAS and ProfitAS.

In the second part of our analysis, we performed a quantile regression for the year 2015. Table 4 summarizes regression coefficients of OLS model and quantile regression models for five different quantiles.

T a b l e 4

OLS and Quantile Regression Coefficients

	OLS	Quantile regression				
		$\tau = 0.1$	$\tau = 0.25$	$\tau = 0.5$	$\tau = 0.75$	$\tau = 0.9$
RDAS	**11.5562**	4.1744	8.2415	10.6694	17.4835	15.6716
IntAS	0.8188	0.8392	0.7689	1.4902	1.3458	0.3837
Lev	**1.0451**	0.7255	0.9644	1.0460	1.2940	1.7435
SalesAS	–0.1019	0.1471	0.1679	–0.4904	0.0194	–0.0333
Size	**0.3348**	0.2436	0.2318	0.3235	0.2951	0.1514
ProfitAS	**23.1452**	11.5429	15.4393	16.7103	21.8100	29.1178

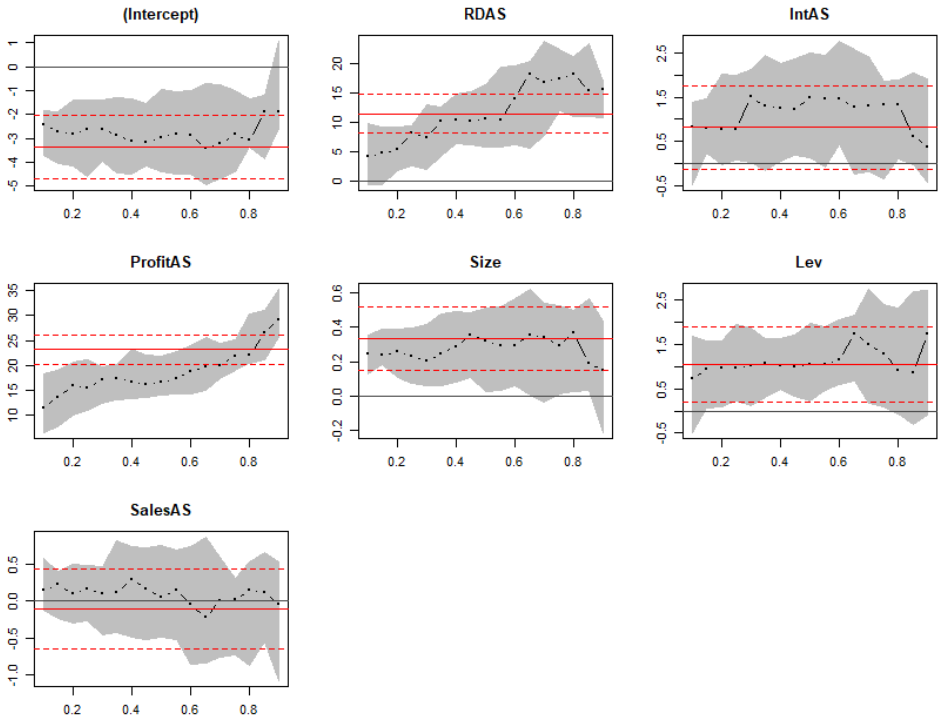
Note: τ represents the quantile of the distribution of variable MTB and for an OLS column. Variables in bold were statistically significant.

Source: Own calculation.

In the first column of Table 4, we see OLS results, which state that 1-unit increase of R&D expenditures to total assets will cause an average increase in variable MTB by 11.56 units. In comparison with panel data regression of time period 2011 – 2015, on cross-sectional data for the year 2015, variable SalesAS had a negative regression coefficient and was statistically insignificant, and variable ProfitAS was statistically significant (α = 0.01%). Statistically significant control variables are positively related to dependent variable MTB. In the other columns, we estimated conditional quantile function of variables RDAS, IntAS, Lev, SalesAS, Size and ProfitAS on variable MTB. LAD (Least Absolute Deviation) estimates are changing across different quantiles. The bottom graphs in Figure 1 display changing regression coefficients of explanatory variables with changing variability of variable MTB.

F i g u r e 1

Graphical Output of Quantile Regression Modelling



Source: Own calculation.

We can see, how lower and upper quantiles of variables RDAS and ProfitAS are well beyond an OLS estimate. Only the small fraction of the values falls into 90% confidence band for the OLS regression estimate. We observe the below-average effect of R&D expenditures to total assets on market to book value ratio

for lower quantiles and the above-average effect of intangible fixed assets in the 60% quantile. In the first quantile, R&D expenditures to total assets tend to be lower than OLS sample value. In the 2nd quartile of variable RDAS, the value of MTB does not change a lot. However, for the companies with the highest market capitalization, 90% pointwise confidence band for the regression estimate is slightly wider. For the last quartile, we can, therefore, summarize that the variability of R&D expenses to total assets is the highest for the firms highly valued by the market. We would expect monotonically increasing regression coefficients along with increasing quantile distribution, but possibly, highly valued firms might in some cases perform R&D investments that do not always contribute to their value. Variable IntAS, although statistically insignificant, and control variables Size, Lev and SalesAS fit into 90% pointwise confidence band for an OLS in all quantiles. For the variable ProfitAS, the results indicate that a linear regression might not be the optimal solution to assess the relationship.

Conclusions

A contribution of intellectual capital for creating value became a fundamental interest of the current, fourth stage of intellectual capital research (Dumay, 2014). In our paper, we focus on quantitative analysis of the relationship between explanatory variables used as proxies for intangible assets and market to book value ratio as the dependent variable. Guthrie, Ricceri and Dumay (2012) stress an important distinction between intellectual capital accounting and traditional 'intangible accounting' based only on financial accounting statements. For the purposes of a traditional accounting approach, an asset is not recognized as intangible if it is not capitalized but recognized as an expense (see e.g. Skinner, 2008). We, therefore, apply both capitalized intangible fixed assets and expensed R&D expenses scaled by total assets as our explanatory variables.

As shown in the previous parts, based on empirical evidence, we found significant prominence of standardized intangible fixed assets and R&D expenses for the value of the firm expressed by the market to book value ratio. We aimed to investigate two main issues: market capitalization value effect of intangible assets and the distinction between capitalized and expended intangible assets. We worked with the assumption that intangible assets are the result of research and development process and if the development phase is identifiable and distinguishable or intangible assets are externally purchased. Those assets are capitalized and recognized on the balance sheet under the item called intangible fixed assets. Otherwise, investments are immediately expensed and listed under the item R&D expenses on the profit and loss account.

The results of our analysis indicate the more accelerated increase of firm value with the increase of R&D expenses to total assets (ceteris paribus) in comparison with the increase in relation to other regressors. An interesting fact is that based on our data sample, intangible fixed assets to total assets are not statistically significant indicating that the market does not evaluate passive strategy of externally acquiring intangible assets instead of their own development. The data sample available for European companies was heterogeneous and a heteroscedasticity of error terms was present. Pfarrer, Pollock and Rindova (2010) conclude that it is necessary to be careful when presenting findings of the effect of the intangible assets. Additionally, Duriau, Reger and Pfarrer (2007) point out the internal validity issues of large-sample archival research. Our data sample confirmed hypothesis H1 about the significant positive effect of the proportion of R&D expenditures on total assets on firm value. Regression coefficients were increasing with increasing quantiles of conditional distribution. However, we were not able to confirm the hypothesis H2. Although the regression coefficient of the proportion of intangible fixed assets on total assets was positive, it was not statistically significant. Based on results of OLS and quantile regression, we can suppose that investments into R&D are among our explanatory variables evaluated by the market notably better. On the other hand, not consistent with our second hypothesis, the effect of intangible fixed assets was similar for all quantiles of firms' market to book value ratio, however, statistically insignificant. This indicates that external acquisition of intangible assets is not always evaluated by the market.

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