Investment in Intangible Assets and Their Impact on Companies' Capitalization

Jozef Glova[1], Alena Andrejovská[2]

[1] Technical University of Košice
Faculty of Economics, Department of Banking and Investment
Nemcovej 32, 042 00 Košice, Slovakia
E-mail: jozef.glova@tuke.sk

[2] Technical University of Košice
Faculty of Economics, Department of Finance
Nemcovej 32, 042 00 Košice, Slovakia
E-mail: alena.adrejovska@tuke.sk

Abstract: *R&D expenses are an important part of the manufacturing industry investment. Therefore, based on empirical evidence we analyse the effect of firm's intangibles in manufacturing industry expressed as R&D expenses as well as investment in intangible assets on firm value. We have found out that increasing investment in the R&D causes an increase in the market capitalization. Our analysis expresses that firm with higher intangible investment tends to have higher market capitalization and that investment in intangible assets is rewarded in the form of higher intangible capital as a part of the market capitalization.*

Keywords: *intangible assets, R&D expenses, intangible fixed assets, manufacturing industry*

JEL codes: G32, M21, M41

1 Introduction

Today's economies strongly depend on the creation, distribution, and use of knowledge much more than ever before. Knowledge is anchored in a skilled workforce, sophisticated processes, customer relationships or unique organizational designs and brands. No one would argue that experienced employee brings more value to the firm than the newly hired one. Well established organizational processes are recognizably more valuable than disorganized management. Such considerations, however, raise the question: How to evaluate that difference? We can review all employee investments, we can look at the proportion of the profit an employee brings to the company, 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 embodi-ment. Valuation of this kind of assets is difficult and uncertain. Intangible assets usually relate to innovations implementation, technology development or marketing activities. Their location within the company is different, it is however proved that intangible assets (usually in combination with other tangible assets) belong to the main drivers of competitive advantage and corporate profit. Economists recognize the growing contribution of intangibles in GDP growth in the long run as discussed in Corrado et al. (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' be-haviour. 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 et al. (2016) aimed to explain 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 an 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. As mentioned by Sánchez et al. (2001), according to results of the MERITUS project, the definition and classification of intangible assets is still a very open issue. 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 em-ployees. Investments in employees have usually form of salaries, training and educa-tion.

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 et al. (2014) and Glova et al. (2018) describe intangible assets in a broad sense as everything, what is non-physical and thus not touchable and focus on their identification via survey. This definition does not coincide with 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 in-curred as provided by International Accounting Standards Board. On the other hand, intangible activities comprise all dynamic investments to purchase or generate intangible assets. Intangible assets in form of patents, copyrights, licenses, or trade-marks 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 as mentioned by Ashton (2005) or Glova and Mrazkova (2018). In this paper, we focus more in detail on two specific financial statements' items: intangible fixed assets from the balance sheet and R&D expenses from the profit and loss account.

2 Methodology and Data

We investigate the sample of 141 European public listed companies in Manufacturing industry for the year 2019 from database Amadeus. For the purposes of panel data modelling, observations for the time period 2015 – 2019 are analysed. Initial data sample consisted of 1089 observations, however, due to missing values for R&D expenses and intangible fixed asset, we had to exclude almost 87 percent of observa-tions. As concluded by Montresor et al. (2014), 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.

Our data sample covered manufacturing industry, where sufficient intangible fixed assets and R&D expenses reporting data were available. Our data are very heterogeneous, with big standard deviations. Median value is significantly lower than mean values, what means that there are always several big firms which highly affect average values. The analysed data sample is the combination of cross-section and time series data. Panel data modelling is used frequently also in connection with intangible assets as we can find in Kijek (2014); Filatotchev and Piesse (2009); Contractor et al. (2016); or Chen et al. (2005). We consider this method to be suitable for the analysis of the effect of intangible assets on market capitalization. Our panel model has the form:

$$MCapit = \beta_0 + \beta_1 R\&D_{it} + \beta_2 IA_{it}, \quad (1)$$

where MCap denotes market capitalization, R&D denotes R&D expenses, and IA denotes intangible fixed assets of an i-th firm in time t, and β_0 is an intercept and β_1 and β_2 are regression coefficients. All our variables are significantly positively correlated and excluding

one of them from the model would cause omitting variable bias and therefore inconsistent estimates.

3 Results and Discussion

We started our analysis by analysing typical panel data model with many individual observations across several time periods. Cross-sectional dimension of our data frame covers 141 individual firms from manufacturing industry. Time series dimension involves five years, from 2015 to 2019. Applying a Chow test for the poolability of the data suggests considering panel data structure of the model. Time effects are statistically significant. To decide whether fixed or random effects model is more appropriate, Hausman test has been applied, according to which fixed effects model is more relevant. As the model suffers from serial correlation and cross-sectional de-pendence, we applied heteroscedasticity robust variance-covariance matrix to esti-mate unbiased regression coefficients under asymptotic properties.

Running a panel model with time fixed effects indicates that R&D expenses con-tribute more to the market capitalization value of the company in comparison with intangible fixed assets. Each 1-euro increase of intangible fixed assets will show up in 2.2-euro increase of market capitalization. Investing 1 euro into R&D will ceteris paribus be represented by 8-euro increase in predicted market capitalization. This model explains the variability of dependent variable of 78 percent.

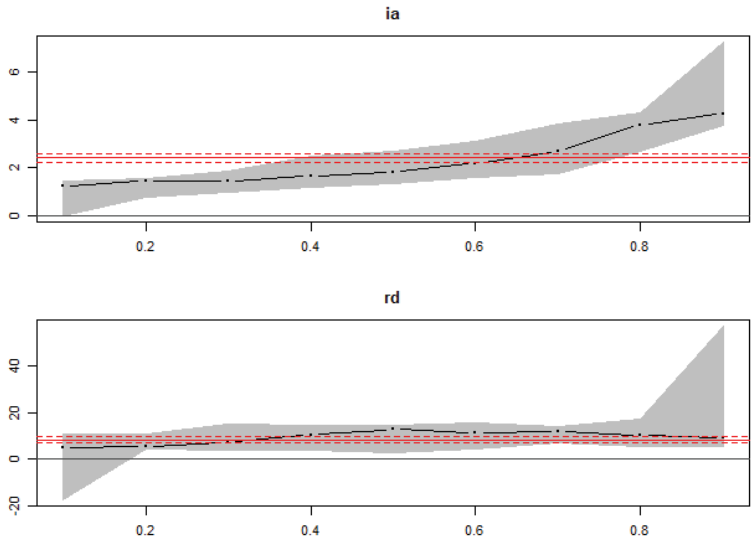
Table 1 OLS and quantile regression results

	OLS	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
Intangible fixed assets	2.667	1.203	1.445	1.806	3.113	4.263
R&D	8.211	5.258	5.552	12.889	12.168	9.089

Source: own calculation

We observe a significant linear relationship between R&D expenses and market value. The plot clearly reveals the tendency of the dispersion of market value which increases along with increasing investments into R&D. The plot also indicates higher density in upper quantiles of our probability distribution. 90-percent quantile includes firms with very low investments into R&D, but having high market capitalization. Such evidence might indicate that R&D expenses are not the only factor, which contributes to market value creation effect. Table 1 summarizes regression coefficients of linear and quantile regression models for the year 2019.

Figure 1 Graphical output of quantile regression modeling



Source: own calculation

In upper graph of Figure 1, we see an OLS result, which presents 2.667-euro increase in market capitalization value after increasing balance sheet value of intangible fixed asset about 1 euro. LAD estimates are changing across different quantiles and we can see, how lower and upper quantiles are well beyond an OLS estimate. Only the small fraction of the values falls into 90 percent confidence band for the OLS regression estimate. We observe the under-the-average effect of intangible assets on market value for lower quantiles and the above-the-average effect of intangible fixed assets in the 75-percent quantile. The bottom graph displays changing regression coeffi-cients of R&D expenses with changing variability of market capitalization. An aver-age increase of R&D expenses by 1 euro will cause 8.211-euro increase of market capitalization. Quantile regression covers changing variability of market value – R&D expenses relationship along the conditional distribution of the market value increase. In the first quantile, R&D expenses tend to be lower than OLS sample value. In the 2nd and 3rd quartile of R&D expenses, the market value does not change a lot. How-ever, for the companies with the highest market capitalization, 90-percent pointwise confidence band for the regression estimate is significantly wider. For the last quartile, we can, therefore, summarize that the variability of R&D expenses 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 not always contrib-ute to their value.

Conclusions

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

Results of our analysis within firms from manufacturing industry indicate the more accelerated increase of market capitalization value with the increase of R&D expenses (ceteris paribus) in comparison with the increase in relation to intangible fixed assets (ceteris paribus). Data sample available for European manufacturing companies was heterogeneous and heteroscedasticity of error terms was present. Pfarrer et al. (2010) conclude, that it is necessary to be careful when presenting findings of the effect of the intangible assets. Additionally, Duriau et al. (2007) point out internal validity issues of large-sample archival research. Our data sample proved the significant effect of R&D expenses on market value. Based on results of quantile regression we can suppose that investments into R&D are the most essential for the manufacturing firms with the middle value of market capitalization. On the other hand, the effect of intangible fixed assets was demonstrably high for quantiles of firms with high market capitalization value. This indicates that capitalizing intangible assets is costly and might be the result of previous successful R&D activities. Low R&D regression coefficient estimates in last quantiles might also indicate that part of R&D expenses of the firms with high market capitalization value has been capitalized, what shifted value on balance sheet account.

Acknowledgments

This research paper was supported by VEGA project No. 1/0673/21.

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