Effect of a Capitalisation of Intangible assets on a Company's Profitability.

Written by: Nadiya Plyeshkova

429260

Thesis Supervisor: Agapi Fytraki

Abstract

Due to the ongoing controversy surrounding an optimal accounting policy for internally generated intangible assets and the convergence project by US GAAP and IAS/IFRS, it was decided to focus on finding a reliable policy for accounting for intangible assets. Central question of the research is: "*What is the relationship between the capitalised amount of intangible assets and the company's financial performance?"* This makes us wonder if intangible assets such as Research and Development (R&D) are relevant enough to be capitalized, or if it is more reasonable to expense them. The research focuses on the effect of an introduction of IAS 38 and identifies whether a potential capitalised amount of spending on R&D has a significant effect on the net income and return generating factors that are considered by investors. Fixed effect models have been used to conduct regression analyses and a dummy variable symbolising a break was created to check for a significance of the effect of an introduction of IAS 38.

It was found that an introduction if IAS 38 has a significant effect on the reported values of intangible assets, however, there was no significant effect of this introduction on net income. It was concluded that an increase in the value of intangible assets leads to a larder profitability due to the positive coefficients in the conducted regressions. Therefore, it is suggested to capitalise a part of the internally generated assets for the firms accounting under US GAAP in the same way as firms under IFRS do. This research contributes to studies a fresher look on the debate with more up-to-date figures. It also allows to check for a longer lasting effect post an introduction of IAS 38.

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1. Introduction

1.1 Research topic

In the large, well-developed organisations intangible assets can constitute to the relatively high reported value. However, IFRS guidelines for recognition or disclosure of the intangible assets, particularly internally generated assets, can be prone to some management manipulation. This paper focuses on issues related to the accounting standard for intangible assets IAS 38. Prior to an introduction of IAS 38, recognition of the intangible assets was not consistent and often resulted in large differences between the market value of an entity and its recorded net assets (Jenkins and Upton, 2001). Therefore, this research attempts to evaluate any significant difference between the reported value of intangible assets before and after the introduction of IAS 38.

Moreover, an important focus of this paper is on the accounting for internally generated intangible assets, as such assets as Research and Development (R&D) must meet a very strict criteria that evaluates whether an asset will have a future economic benefit (Wyatt, 2008). Finally, inspired by the research of Markarian et al. (2008) capitalisation of intangible assets is analysed from the economic perspective. Namely, the relationship between the profitability of the company, measured in terms Net Income, Earnings per Share (EpS) and Dividends per Share (DpS), and the rate of capitalisation of R&D costs.

Overall, the primary aim of this research is to evaluate an effect of the capitalised amount of intangible assets on the profitability of the company and to test if there was a significant effect of introduction of IAS 38 on the reported values of the intangible assets and the Net Income of the company.

1.2 Problem, motivation and research objectives

Over the years there was an ongoing debate over the best way to determine the optimal recognition for internally generated assets. This study contributes to this debate by providing empirical and theoretical analyses of R&D cost capitalization. Moreover, this research is scientifically relevant because it provides modern analyses of the accounting for intangible

assets, as most of the research was conducted approximately a decade ago, therefore, not incorporating the most recent data and such a major events as the financial crisis of the years 2008-2009. Furthermore, not much previously conducted research focuses on optimal merging between IFRS and US GAAP specifically in terms of intangible assets.

Results of this paper can be used in the future analyses on the recognition of internally generated intangible assets. If results are to be significant, this research could also help to improve comparability and verifiability of financial statements. This would provide investors with more clear, verifiable and consistent information and could help firms in attracting a better financing. Finally, management of the companies can use the information obtained from this research to ensure the wellbeing of the enterprise by finding the optimal level of investment in the R&D.

Section 1.1 mentions that the general aim of this research is to provide a comprehensive evaluation of the effect that the capitalised amount of intangible assets has on the profitability of the company. Therefore, based on the aim of the research the research question was formulated:

What is the relationship between the capitalised amount of intangible assets and the company's financial performance?

Moreover, as there are multiple issues that are desired to be addressed by this research, a set of sub-questions was formulated to gain a better understanding of the underlying issues related to the recognition of intangible assets:

1. *Is there a significant difference in the reported values for intangible assets before and after the introduction of IAS 38?*
2. *Is higher growth rate of the investment in R&D associated with higher growth of Earnings per Share (EPS)?*
3. *Does the reported amount of intangible assets have an effect on the likelihood of investment?*

1.3 Research methodology

This paper consists of a literature review and a statistical analysis of the data. Literature review is used to evaluate and summarise previous research done in the field of accounting for intangible assets. Three data sets were created to focus on the accounting for intangible assets under US GAAP, IFRS and a combination of two datasets. Panel data based on the period of 20 years for over 70,000 firms was analysed and fixed effect models were created. Moreover, a dummy variable was used to see if there was a significant break in the reported values of intangible assets due to an introduction of the new accounting system. Finally, fixed effect regression models were created to see if the amount of R&D expenditures have influenced the profitability of the companies.

1.4 Thesis outline

Throughout this paper, the following structure is used. First, in the theoretical framework existing relevant research on the recognition of intangible assets is evaluated. Based on this, four hypotheses are formulated supporting the research question. Subsequently, the data section presents a description of extraction and adjustment of the data as well as a description of the variables used. The later section contains the methodology which describes the techniques used to analyse the data. Afterwards, the results are presented in line with the hypotheses stated in the theoretical framework. Finally, paper answers the central question in the conclusion, discusses obtained results and describes the current limitations and suggestions for future research.

2. Theoretical framework

2.1 US GAAP and IASB on intangible assets.

IAS 38 Intangible Assets defines intangible assets as a non-monetary assets that do not have physical substance and are identifiable. Assets are identifiable if they are either separable or are created by the previous obligations or legal rights. Recognised intangible assets are initially measured at cost and amortised on a systematic basis over their useful lives, unless the asset has an indefinite useful life and is not amortised in that case.

Under the US GAAP, R&D costs are expensed immediately as prescribed by SFAS No. 2 (FASB, 1974). The full expensing of R&D expenditures was rationalized by the FASB as there was no consistent evidence about an effect of R&D expenditures on the profitability of the company. The uncertainty associated with the future earnings of R&D investments and the unclear economic value of the R&D assets is as well a sufficient reason for conservatism (Kothari et al., 1998). However, it is important to note that an immediate expensing of R&D costs required in the US threats an introduction of a reporting bias, represented by Lev et al (1999). Lev is known to be a strong supporter of the capitalisation of intangible assets and his other works are going to be discussed further in the theoretical framework.

The International Accounting Standards Board (IASB) describes requirements for internally generated assets, namely, R&D expenditures in IAS 38 that had to be adopted by firms in the year 2005. According to this standard, research expenditures should not be capitalized and development costs could be recognized as an asset only if the company fulfils six following requirements:

(1) It is technically possible to complete the intangible asset for use or sale;
(2) the firms intends to complete the asset for sale or use;
(3) firm must be able to use or sell the asset;
(4) firm must be sufficiently sure that an asset will cause economic benefit;
(5) there must be sufficient resources for the completion of the asset and its sale or use;
(6) firm is able to measure the benefits.

A lot of research has been done based on the difference in the accounting standard between US GAAP and IFRS. Most of the research discussed in the following sections is in favour of the partial capitalisation of R&D expenditures in a similar way, as required by IASB because it allows for a better matching between the costs and benefits of the investment in R&D. Based on the previous research, four hypotheses are formulated that focus on the profitability of the company and the benefits of investment in R&D.

2.2 Formulation of Hypothesis 1 and Hypothesis 2

Wyatt (2008) states that even though expenditures on R&D are value relevant for the firm, their reliability in estimating the future profitability is by far lower than the one for tangible assets. Moreover, it is important to note that the debate about companies' engaging in the earnings manipulations through cutting the R&D expenditures to increase profits has recently been raised within the convergence project between the US GAAP and IFRS. Paper by Markarian, Pozza and Prencipe (2008) contributed to that debate by providing an empirical evidence on the motivations for R&D cost capitalization. They assume that the capitalization decision of R&D expenditures is based on two main reasons: income smoothing and debt contracting. They use sample of Italian firms that use standards that allow for similar flexibility of capitalization of R&D costs as IAS. Based on the results, they support the current position of FASB, that the capitalization of R&D expenditures does not lead to more information for investors, however, causes earnings manipulations by managers.

Stolowy, Haller and Klockhaus (2001) in their paper address a different approach towards an effect of IAS 38. Instead of making backwards looking analyses they try to see what are the potential effects of implementation of IAS 38 from the point of view of the year 2001 on the example of two economically and accounting-vise similar countries. They highlight the difficulty of international harmonization in their paper and the idea of alternative interpretation of the standard by different countries. Concluding the paper they suggest an extensive disclosure of additional information in order to eliminate the problem of an international accounting disbalance.

Paper by Chalmers, Clinch and Godfrey (2008) investigates an effect of Australian firms switching from the GAAP to IFRS in the year 2005 and its effect on the reported value of intangible assets. They state that there is no evidence that IFRS conveys more information that is useful for investors than the GAAP does in relation to aggregate intangible assets. However, there is a support towards an idea that IFRS provides more valuation-relevant information concerning the goodwill than the GAAP standard does. Nevertheless, paper omits analyses of the most relevant aspects of our research, namely, accounting for internally generated assets such as R&D.

Paper by Cheung, Evans and Wright (2008) discusses, as well, the adoption of IFRS in Australia with a specific focus on the case of IAS 38 Intangible Assets. The paper as well as ours projects expected effect of the introduction of IAS 38 on reported intangible assets and on key financial measures. The comparison of those valued under IFRS and GAAP is conducted. It is important to note that an effect of an adoption of IAS 38 is Australia is expected to be different from what can be observed in the countries that have been accounting previously under the standard similar to IAS 38. As companies accounting under Australian GAAP had to derecognize a significant amount of internally generated assets due to the standard adoption. Methodology, however, is similar to what is applied in this research. No significant results were found because, according to the researchers, a lot of entities continued a speculation of the intangible asset recognition which has significantly downgraded the effect of an introduction of IAS 38.

Olivera, Rodrigues and Craig (2010) evaluate the value relevance of the reported amount of intangible assets for the companies listed on the Portuguese stock market. In their analyses, panel data is used to evaluate an effect of the implementation of IAS 38 on the relevance of intangible assets for investors. They have found that values of intangible assets are significantly correlated with the stock prices. Moreover, overall increased value relevance of goodwill, intangible assets and R&D expenditures after an introduction of IAS 38 was found.

In order to test if the introduction of IAS 38 had a significant effect on the value of intangible assets as was discussed by Cheung, Evans and Wright (2008) and Stolowy, Haller and Klockhaus (2001), Hypothesis 1 was formulated:

Hypothesis 1: "There is a significant difference in the reported values for intangible assets before and after the introduction of IAS 38."

Furthermore, in order to see if an introduction of the IAS 38 had a significant effect on the financial performance of the companies (Chalmers, Clinch and Godfrey, 2008; Markarian, Pozza and Prencipe, 2008; Olivera, Rodrigues and Craig, 2010), Hypotheses 2a and 2b have been formulated as follows:

Hypothesis 2a: "An introduction of IAS 38 had a significant effect on the reported values of Net Income of the companies."

Hypothesis 2b: "IAS 38 has significantly improved the matching between capitalised amount of Intangible Assets and the reported Net Income"

2.3 Formulation of Hypothesis 3 and Hypothesis 4:

An increasing difference between market and book values of the firms have attracted a lot of attention from the researchers in accounting field, mostly starting in the late 1990s (Lev & Zarowin, 1999; Lev, 2001; Lev and Radhakrishnan, 2003). In his research, Lev (2001) has recoded that over the period 1977-2001, market to book values of 500 US corporations researched have increased from just above 1 to 5 on average. This result has implied that approximately 80% of the company value is not reflected in the financial reports. Such a mis-match can be explained by the fact that in the recent years the production of material goods in no longer the main source of an economic value, but intellectual capital defines the company's performance. Edvinsson and Malone (1997) state that intellectual capital is comprised of two components: human capital and structural capital which consists of databases, brands, customers, processes and systems, both of them comprise a part of the intangible assets of the firm, but are not necessarily reported on the balance sheet.

Lev and Radhakrishnan (2003) have modelled a function of a sales prediction based on the factors such as fixed assets, number of employees and R&D capital by using a sample of approximately 250 companies. They have obtained the results stating that the amount of R&D capital significantly contributes to the performance of the firm in terms of sales. This further proves a

need to capitalise part of the expenditures on R&D in order to provide better matching between the expenditures and the returns.

Bontis et al. (2000) have conducted analyses based on two industry sectors in Malaysia, in order to check for the relationship between intellectual capital and financial performance of the companies. They have concluded that irrespectively of the industry, larger development in structural capital has a positive relationship with a financial performance of the company. This is in line with the findings developed by Riahi-Belkaoui (2003) who has recorded a significant positive relationship between the amount of intangible assets the firm has and the financial performance based on the sample of 81 American firms.

Chen, Cheng & Hwang (2005) provide an empirical evidence of a positive relationship between the intangible assets of Taiwanese listed companies and the profitability of those companies. They conclude that investors place higher value on firms with better intellectual capital efficiency and that those firms achieve greater profitability and the revenue growth. Throughout their paper they stress an importance of intangible assets for the company's value and criticise the USGAAP for restraining most intellectual capital from being recognised. They conclude however, that disregarding the restrictions, investors still grasp the invisible value of intellectual capital.

Even the research that has been conducted significantly earlier was already interested in the relationship between an investment in R&D and the firm's returns. Paper by Hirschey and Weygandt (1985) has showed that R&D and Advertising expenditures have a long lived benefit for the company. The results represent a positive effect of the R&D expenditures on the market value of the firm and firm's eventual profits. Therefore, they conclude that the values on those expenditures should be capitalised.

Healy, Myers and Howe (2001) have examined trade-offs between relevance and objectivity of the accounting information concerning R&D reporting. They consider as a significant advantage of their paper the fact that instead of focusing on the stock prices, which was commonly used in the previously done research (Hirschey and Weygandt, 1985; Wasley and Linsmeier, 1992; Eccher, 1995; Lev and Sougiannis, 1996), they are focusing on economic values such as for example company earnings. This has inspired us to follow the similar method and instead of stock

prices to use Net Income, EpS and Dividends per Share (DpS). As the conclusion, Healy et al. state that successful-efforts method should be used for capitalisation of R&D expenditures, because the correlation between this method and economic returns is larger the either of a full-cost or cash-expense methods.

Based on the previous research conducted with regards to the effect of the amount of capitalised intangible assets on the firm's profitability (Weygandt, 1985; Chen, Cheng & Hwang, 2005; Lev and Radhakrishnan, 2003), following hypothesis was formulated:

Hypothesis 3: "Larger investments in research and development lead to an increase in profitability of the firms."

Moreover, specifically with regards to the relevance of internally generated assets for investing decisions (Aboody & Lev, 1998; Lev & Zarowin, 1999; Healy, Myers, & Howe, 2002; Monahan, 2005), hypotheses 4a and 4b were formulated and tested further in this research:

Hypothesis 4a: "Capitalised amount of R&D is significantly reflected in the values of Dividends per Share for the companies accounting under US GAAP."

Hypothesis 4b: "Capitalised amount of R&D is significantly reflected in the values of Earnings per Share for the companies accounting under US GAAP, IFRS and on the Global level."

3. Data

In order to test the hypothesis and answer the research question, data was obtained. Two separate data sets were created to focus on the accounting for intangible assets under US GAAP and IFRS separately. Moreover, a combined dataset was created that focused on the firms world-wide disregarding the location and accounting standard.

3.1 Data sample for IFRS

First data set for the non-US firms was obtained from the Compustat Global via Words database. This dataset was selected as it excludes North American countries which account under the US GAAP standard or comparable standards. The values are used to test the hypothesis related to the break in data due to the change in the IFRS, namely an implementation of IAS 38 Intangible Assets. Moreover, differences in accounting for intangible assets, namely Research and Development, differs significantly under IFRS and GAAP. Testing the differences between the values would allow to see if there is a consistent pattern.

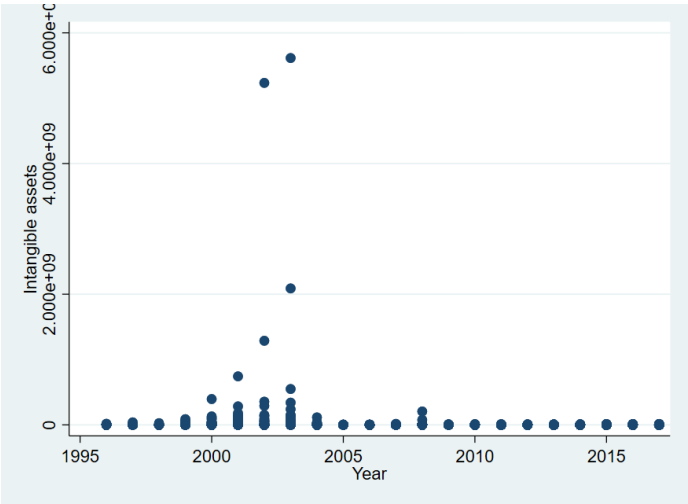
Non-US data set contains observations for 47,104 firms on the international market for the period from 1997 to 2017, however, some companies have data for only shorter periods of time due to later start or early discontinuity of operations. Dataset includes 26 key variables used in analyses. Most relevant for the research are the following variables: *Total Intangible Assets, Research and Development Expenses, Total Assets, Financial Year, Goodwill, Total Expenses, Amortisation of Intangible Assets, Net Income, Earnings per Share and Dividends per Share.* Descriptive statistics of the abovementioned variables and the rest of the variables can be found in the Table 1 (Appendix A). Moreover, Table 1 shows the description of each variable and the name that was used for it while creating models and in the descriptions.

In order to use the data some adjustments had to be made after extraction. *GV Key* variable which shows the official code of the company was converted from string to numerical to use in the analyses as the company identifier. 2198 duplicates and 29 undefined values were removed from the dataset. Moreover, companies that had no data available for the most relevant variables were removed from the data set. Furthermore, some of the variables contained variables that

contradicted common wisdom. Therefore, variables that were showing negative values of assets were dropped out of the dataset.

In order to test hypotheses 1 and 2 about break in the data caused by an implementation of IAS 38 an additional variable was created called *IAS*. Variable *IAS* was taking a value of 1 when the *Year* was 2005. Moreover, it is expected that the financial crisis of the 2008-2009 has affected the values of profits and reported intangible assets, therefore, a dummy variable *Crisis* was created that takes a value 1 if the year is 2009.

Finally, a variable *Intangible Assets* is used for analyses, however, it was decided to also use a proxy for potential R&D capitalisation rate as a R&D Expenses/Intangible assets in case if all R&D expenditures were to be capitalised. Moreover, it was found in the previous research that approximately 20% of the R&S costs are capitalised under IAS 38, whereas it still remains 0% under US GAAP, disregarding the capitalisation of software expenditures (Aboody and Lev, 1998; Wyatt, 2008).



Intangible assets were plotted on the graph against the financial year (Figure 1). On the graph it was visible that there are some abnormally high variables reported for intangible assets for the years 2000-2005. However, the reported values were consistent with the information that prior to the introduction if IAS 38 values were spread and inconsistent. To assure the normality, a natural logarithm of the variable was taken. The normality of the distribution was evaluated through the visual analysis and the natural logarithm was taking where required. Moreover, we take an assumption that the data are normally distributed due to its large scale.

3.2 Data sample for US GAAP

Data for US-based firms were obtained from the Compustat North America (via WRDS), database which consists of annual and quarterly report data of listed American and Canadian companies.

Specifically this data was found in order to analyse the patterns and relationships for the North American market based firms which account under US GAAP or comparable standards. In order to use the data for the analyses, it had to be transformed into panel data. Moreover, in order to conduct any statistical analyses, data was cleared from duplicates and undefined variables. Overall, 25325 duplicates ad 771 undefined values were removed. Moreover, some companies had empty values for years which were consequently filled in. There were 20 variables originally obtained for the 27283 US and Canada based firms. An important assumption taken for the purposes of data analyses is that all the firms in the "US-based" data set account under US GAAP. In Canada IFRS was permitted from the year 2011, which is after the introduction of IAS 38 (2005). Because Canadian companies are permitted to account under US GAAP since the year 2003, and according to the IASB Canadian GAAP is almost identical to US GAAP in terms of accounting for intangible assets

Years used in the "US-based" data set are 1997-2017. Most significant variables used in the research are *Total Intangible Assets, Net income, Total expenses, Goodwill, Earnings per Share, Dividends per Share, Research and Development Expenses, Total Assets, Financial Year*, other variables can be found in a Table 2 (Appendix A). As well as for the Table 1, description of the variables as well as the descriptive statistics are provided in the table. Variables that were showing negative values of assets were dropped out of the dataset in order to meet the assumption of being realistic. Moreover, data was checked for normality and natural logarithms of *Net Income* and *Intangible Assets* were taken to avoid outliers influencing the results.

3.2 Data sample for US GAAP and IFRS combined

Third data set was constructed by combining two datasets after adjustments. Data for 873 companies had to be removed from the joined dataset as it was a duplicate based on *GV Key* identifier. Moreover, natural logarithm of *Net Income* and *Intangible Assets* was taken to avoid outliers and trending.

4. Methodology

Analyses based on the panel data were performed in this paper in order to test the hypotheses. Throughout the paper, a 5% significance level was used. Robust standard errors and a 5% significance level were used. One of the important goals of this assignment is to check in there is a break in the data for the non-US based companies at the point of introduction of the IAS 38. This can be done by testing the hypothesis 1:

"There is a significant difference in the reported values for intangible assets before and after the introduction of IAS 38."

It is expected to see a significant effect of an introduction of IAS 38 on the reported values of *Intangible Assets*. In order to test that, as was already mentioned in the section 3.1, a dummy variable *IAS* was created and the significance of the coefficient was analysed.

Change in the reported amounts of the intangible assets, meaning that recognition of intangible assets can have a crucial effect on the image of the company. A significance of the break is evaluated by taking it as an independent variable in the regression with the dependant variable of an intangible assets. At the same moment controlling for another factors that could influence the change, such as profits, lagged values of *Intangible Assets, Industry Sector* and other variables.

Based on the Hausman test which evaluates the consistency of an estimator when comparing to an alternative, fixed effects morel was selected for the regression. Details of the models are discussed in the section 5. Results. Fixed effects model is a statistical model in which the parameters fixed and non-random. It refers to the regression model in which the group means are non-random as opposed to a random effects model where the group means are random sample from the population. This is consistent with the fact that data sample presents different companies with follow their patterns. Classical form of the fixed effects regression is as follows:

$$Y_{it}=X_{it}\,\beta+\alpha_t+e_{it} \quad \text{for } t=1,..,T \text{ and } i=1,..,N$$

Where Y_{it} is the dependant variable for a company i at time T, X_{it} is the time variant regressor matrix, β is the parameter matrix, α_t is a time invariant unobservable individual effect and finally, e_{it} represents an error term.

Following from the hypothesis 1 on the change in the values reported in the intangible assts, hypotheses 2a and 2b should be tested:

Hypothesis 2a: "An introduction of IAS 38 had a significant effect on the reported values of Net Income of the companies."

Hypothesis 2b: "IAS 38 has significantly improved the matching between capitalised amount of Intangible Assets and the reported Net Income"

It was decided to check if there has been a significant change in the values reported for the *Net Income* measured for the firms on the non-US market. In order to test a break in the values of *Net Income*, same methodology as in the first hypothesis was used. Moreover, it was decided to check the relationship between the profitability and reported values of the intangible assets under the old standard and under the new standard to see if there is a difference in the significance of the magnitude and significance of the effect. Therefore, two variables were created in the IFRS dataset *Net Income Before* the year 2005 and *Net Income After* the year 2005. With *Net Income* as a dependant variable it was decided to see if significance of the coefficient of intangible assets increases after the year 2005. That would signal an improvement in the matching between company's profitability and the investment on the intangible assets.

To test the hypothesis 3:

"Larger investments in research and development lead to an increase in profitability of the firms."

Regression analyses based on the panel data was performed in both datasets. Because the variable for capitalised R&D expenditures was not available for non-US firms and does not exist for US-based firms due to the regulations, R&D Expenses/Total Intangible Assets was used as a proxy for a possible proportional capitalisation of R&D if allowed, moreover, the variable for 20% of R&D expenses was used in the same way. *Net Income* of the firm was selected as a dependent variable. An explanatory variable was set to be *Proxy of Capitalised R&D Expenses*. In order to

control for a possible omitted variable bias, the assumption was made that any variable can affect the variable of interest, therefore, the initial models included all the variables in the dataset. To obtain the most significant and unbiased model, the least significant variables were dropped in a stepwise fashion, in accordance with the GETS (general to specific) modelling technique, until a model with only significant control variables was obtained.

As was mentioned in the Theoretical Framework, there has been an extensive research done in order to test whether the investment in the research and development is relevant for investors. It is assumed in order to test this hypothesis that investors are only interested in having return on their investment and are not concerned with a non-monetary performance of the firm (such as brand image and Corporate Social Responsibility).

Finally, hypotheses 4a and 4b were tested:

Hypothesis 4a: "Capitalised amount of R&D is significantly reflected in the values of Dividends per Share for the companies accounting under US GAAP."

Hypothesis 4b: "Capitalised amount of R&D is significantly reflected in the values of Earnings per Share for the companies accounting under US GAAP, IFRS and on the Global level."

In order to test the hypothesis 4a a fixed effects model has been created with the DpS as a dependant variable. For the hypothesis 4b three separate fixed effects regressions have been conducted for the US- based firms, Non-US based firms and in the Combined Dataset and had Earnings Per Share as the dependant variable. For these hypotheses GETS modelling technique was used as well as for the previous one. The aim was to see if R&D costs have a significant effect on the company returns.

5. Results

In order to answer the central question and the sub-questions formulated in the introduction, the hypotheses were tested. In this section it is stated if the hypotheses were rejected, or if there was not enough evidence to reject the hypotheses. All of the analyses were conducted in STATA software and were tested against the significance level of 95%.

5.1 Hypothesis 1

Hypothesis 1 was formulated as follows: "There is a significant difference in the reported values for intangible assets before and after the introduction of IAS 38." In order to test the hypothesis, the regression analysis based on the panel data was conducted. Fixed effect models have been used for the analyses in order to investigate an effect of the break on the variable Intangible Asset. In order to test for the effect of an introduction of IAS 38, variable *IAS* was created. It is a dummy variable that takes value of 1 when the year is 2005. Moreover, the goal was to eliminate omitted variable bias as much as possible, that is why it was attempted to see the effect of as many variables and possible that could potentially have an effect on the change in value of the assets. Crisis of the years 2008-2009 could possibly also have an effect on the reported values of the intangible assets. That is why, in order to control for a possibility of this break, second dummy variable was created. The variable *Crisis* was taking a value of 1 in the year was 2009. Finally a dummy variable *Postcrisis* was created and was taking value of 1 in the year 2010.

The assumption of the fixed effect models is that there is a fixed individual specific effects are correlated with the independent variables. As the data used was company specific, it was assumed that the individual effects for firm are interesting in themselves. Moreover, fixed effect models would help controlling for unobserved heterogeneity as it is assumed to be constant over time. In this case if the random effect model was to be used it would be not consistent. In order to test the assumptions and identify which method should be used, the Durbin-Wu-Hausman (Hausman specification) test was used. Test evaluates the consistency of the estimator when compared to a less efficient alternative.

First, there has been a basic regression conducted in order to check for a possible effect of the Dummy variables *IAS, Crisis* and *Postcrisis* on the *Ln of Intangibles* (Test 1). It is assumed that this regression suffers from the omitted variable bias (OVB), as there are no control variables in this case. All three variables have given a significant negative result. Even though rho was of 0.77 which shows a high explanatory power, it was reasonable to add more variables in the regression to avoid OVB. Final model for the regression was as follows:

$$\text{Ln of Intangibles}_t = \alpha_t + \beta_0 * \text{Ln of Intangibles}_{t-1} + \beta_1 * \text{Ln of Intangibles}_{t-2} + \delta_0 * \text{IAS}_t + \eta_0 * \text{Crisis}_t + \iota_0 * \text{NI}_t + \phi_0 * \text{Expense R\&D}_t + \mu_0 * \text{Total Assets}_t + \nu_0 * \text{Current Assets}_t + \rho_0 * \text{Year}_t + \varepsilon_t$$

Variable of interest was *Ln of Intangible Assets*, it was decided to take the natural logarithm of the intangible assets in order to meet the assumption of normality as there are some outliers in the data (Figure 1). Fixed effect model gave a significant negative results for the effect of the introduction of IAS 38 on the reported value of intangible assets, p=0.000, which is <0.05 and therefore is significant at 5% level. Effect of *Crisis* on the value of intangible assets reported was, however insignificant with p=0.446. All of the coefficients can be found in the table provided below (Table 4). Even though *Net Income* was not significant, removing the variable was significantly decreasing the rho of the model, therefore, it was decided to keep it. Rho of the regression was 0.82 which means that most of the variation in *Ln of Intangibles* is explained by the model. It is important to mention, that there is still a possibility of an OVB in the results. Model with a full STATA output on the regression and the model used can be found in the Appendix (Model 1, Appendix B).

Ln Intangibles	Coefficient	Std. Err.	t	P>t	95% Confidence interval	
Lag 1.	.315237	.0052336	60.23	0.000	.3049789	.325495
Lag 2.	.0999256	.0050688	19.71	0.000	.0899907	.1098606
IAS	-.0127144	.0289701	-4.50	0.000	-.0694967	.044068
Crisis	.0175056	.0229538	0.76	0.446	-.0274847	.0624959
Net Income	1.99e-09	7.64e-09	0.26	0.795	-1.30e-08	1.70e-08
Expense R&D	-6.04e-07	7.90e-08	-7.65	0.000	-7.59e-07	-4.49e-07
Total Assets	-2.95e-08	2.31e-09	-12.73	0.000	-3.40e-08	-2.49e-08
Current Assets	1.16e-07	8.17e-09	14.2	0.000	1.00e-07	1.32e-07
Year	.0262519	.0015629	16.8	0.000	.0231885	.0293152
Constant	-50.57887	3.135013	-16.13	0.000	-56.7236	-44.43414

Table 4: Regression on Intangible assets. Testing for a break. (Model 1)

The fixed effect was used because the obtained significant probability in the Hausman test (Test 2, Appendix C) was p=0.000 (<0.05) and showed that it was correct to use fixed effect model due to a strong effect on the per company basis. As there is a significant effect of the introduction of IAS 38 on the reported values of intangible assets, the evidence is in the favour of the statement that: "There is a significant difference in the reported values for intangible assets before and after the introduction of IAS 38." Therefore, there is **not enough evidence to reject the first hypothesis** and we can conclude that there is indeed a significant effect of the introduction of the new accounting standard on the reported values of intangible assets.

5.2 Hypothesis 2

To test the Hypothesis 2a: "An introduction of IAS 38 had a significant effect on the reported values of Net Income of the companies." the methodology of the first hypothesis has been repeated. It was tested if there is an effect of the introduction of IAS 38 on the reported valued of the *Net income*. The final obtained model was:

$$\text{Ln NI}_t = \alpha_t + \beta_0 * \text{Ln NI}_{t-1} + \beta_1 * \text{Ln NI}_{t-2} + \beta_2 * \text{Ln NI}_{t-3} + \beta_3 * \text{Ln NI}_{t-4} + \delta_0 * \text{IAS}_t + \eta_0 * \text{Crisis}_t + \iota_0 * \text{Intangibles}_t + \phi_0 * \text{Expense R\&D}_t + \mu_0 * \text{Total Assets}_t + \nu_0 * \text{Current Assets}_t + \rho_0 * \text{ Goodwill}_t + \varepsilon_t$$

For the Model 2 (Appendix B), *Ln Net Income* largely depended on its past values, which were significant up to the fourth lag. It is also visible that an introduction of the new accounting standard does not significantly affect the *Ln of Net Income*. Removing *Total Assets, Intangible Assets or Goodwill* from the model did not make the value of *IAS* significant, therefore, they have remained in the model to show that there is no significant effect of the variables related to intangible assets on the reported values on the net income. Therefore, we can conclude, that introduction of the IAS 38 did not have a significant effect on the reported values of intangible income and there was no significant break in the data.

To test the hypothesis 2b and see if the introduction of IAS 38 has significantly improved the matching of the benefits and costs of the intangible assets, *Net Income* was split in two variables: *Net Income Before* and *Net Income After*. *Net Income Before* was a variable that contained only net income before the year 2005, *Net Income After* has values of net income after and including

the year 2005. It was decided to test if the coefficient of the amount of intangible assets was more significant in one case than another.

Tables 5 and 6 show respectively the regressions for both variables. For the Net Income Before, coefficient of intangible asset had p-value of 0.135 and coefficient of intangible assets for the Net Income After had a p-value of 0.151, which makes them both not significant at 5% level. Based on this finding, no conclusion can be made with regards to the effect of introduction of IAS 38 on the reported valued on net income. As previously, fixed effect models were used based on the Hausman specification test (Test 2, Appendix C), which gave p=0.000, meaning, that there is a need to use fixed effect models other than random effect models for the regressions. Full models (Models 3 and 4) can be found in the Appendix B.

Ln Income Before	Coefficient	Std. Err.	t	P>t	95% Confidence interval	
Current Assets	5.20e-08	6.59e-09	7.90	0.000	-6.69e-09	1.37e-07
Total Assets	-1.15e-08	1.95e-09	-5.91	0.000	-5.34e-08	4.43e-09
Intangibles	1.25e-07	8.71e-08	1.49	0.135	-4.55e-08	2.96e-07
Goodwill	-2.88e-07	1.80e-07	-1.59	0.111	-6.41e-07	6.62e-08
Expenses R&D	-2.54e-07	3.10e-07	-0.82	0.412	-3.58e-07	-4.50e-08
Constant	4.448674	.0089697	495.97	0.000	4.431091	4.466257

Table 5: Net Income before the introduction of the standard (Model 3)

Ln Income After	Coefficient	Std. Err.	t	P>t	95% Confidence interval	
Lag 1.	0.2251824	0.0079035	28.49	0.000	0.209691	0.240674
Crisis	-0.231033	0.0225078	-10.26	0.000	-0.27515	-0.18692
Current Assets	6.53E-08	3.67E-08	1.78	0.075	-6.69E-09	1.37E-07
Total Assets	-2.45E-08	1.47E-08	-1.66	0.097	-5.34E-08	4.43E-09
Intangibles	1.25E-07	8.71E-08	1.44	0.151	-4.55E-08	2.96E-07
Expenses R&D	-2.54E-07	3.10E-07	-0.82	0.412	-8.62E-07	3.54E-07
Constant	3.185388	0.0322856	98.66	0.000	3.122105	3.248672

Table 6: Net Income after the introduction of the standard (Model 4)

As the p-value for *IAS* on the analyses of the effect on net income was not significant (p=0.574) and the results for testing the sub-hypothesis about change in the effect of intangible assets on Net Income were not significant as well (p=0.135 and p=0.151), it can be concluded, that there is no effect of the introduction of the standard on the effect on the *Net Income.* Therefore, there is **enough evidence to reject hypotheses 2a and 2b** which state that an introduction of IAS 38 had

a significant effect on the reported values of *Net Income* of the companies, and that IAS 38 has significantly improved the matching between capitalised amount of *Intangible Assets* and the reported *Net Income*.

5.3 Hypothesis 3

In order to test Hypothesis 3: "Larger investments in research and development lead to an increase in profitability of the firms." Regression analyses have been conducted in both datasets, for North America based firms and the Non-North America based firms. The aim was to check the effect of an increase in the expenditure on Research and Development on the *Net income* of the companies for both data sets. Hausman specification test has been conducted for analyses in both datasets to check if the fixed or random effects model is the most appropriate (Test 3, Appendix C). As the probability in both datasets was p=0.000, fixed effect models were used in both cases.

General to specific (GETS) modelling technique was used. Non-significant variables were removed in order to have only significant variables in the final model. Two models were constructed, one was for *Net Income* in US:

$$\text{Ln NI}_t = \alpha_t + \beta_0 * \text{Ln NI}_{t-1} + \beta_1 * \text{Ln NI}_{t-2} + \delta_0 * \text{Amortization}_t + \eta_0 * \text{Proxy R\&D}_t + \iota_0 * \text{Intangibles}_t + \phi_0 * \text{Revenues}_t + \mu_0 * \text{Total Assets}_t + \varepsilon_t$$

The coefficients and the full description of the model can be found in the Appendix B (Model 5). All the coefficients are significant at 5% level with the largest p-value being 0.028 for *Proxy of R&D* which was still smaller than 0.05.

Model 6 was created for the firms reporting under IFRS:

$$\text{Ln NI}_t = \alpha_t + \beta_0 * \text{Ln NI}_{t-1} + \beta_1 * \text{Ln NI}_{t-2} + \beta_2 * \text{Ln NI}_{t-3} + \delta_0 * \text{Amortization}_t + \iota_0 * \text{Intangibles}_t + \phi_0 * \text{Proxy R\&D}_t + \mu_0 * \text{Total Assets}_t + \rho_0 * \text{Goodwill}_t + \varepsilon_t$$

The coefficients of the variables are provided in the Appendix B. All of them are significant at 5% level.

In both of the models, *Proxy of R&D* had a significant effect on the *Net Income*, therefore, it can be concluded that there is indeed an effect of the R&D spending on the profitability of the firm. However, even though the analyses gave significant result for both, US and Non-US based firms, in the first case, it showed a positive relationship and in the second case it was a very small negative effect. The negative effect can be explained by the fact that a proxy was used based on the expense account which normally decreases the *Net Income*. In order to test of that changes with taking the earlier valued of R&D spending, lagged values of proxy were used in the regression analyses. However, the relationship was still negative. Overall, the evidence does not fully support the hypothesis, however, there is also not enough evidence to reject it. One can say that we cannot reject the hypothesis for the US-based firms, but there is enough evidence to reject the hypothesis for Non-US based firms.

In order to test the overall validity of the hypothesis, a combined dataset was created for both, firms accounting under IFRS and firms accounting under US GAAP. All the necessary adjustments were made before conducting regression analyses in the dataset, starting with the removing the duplicates, namely companies that were in both datasets. Regression analyses were conducted by using the GETS modelling technique in order to obtain the most significant results.

Final model looked as follows **Model 7**:

$$\text{Ln NI}_t = \alpha_t + \beta_0 * \text{Ln NI}_{t-1} + \beta_1 * \text{Ln NI}_{t-2} + \beta_2 * \text{Ln NI}_{t-3} + \delta_0 * \text{Amortization}_t + \phi_0 * \text{Proxy R\&D}_t + \mu_0 * \text{Total Assets}_t + \varepsilon_t$$

The model showed a significant effect of the proxy of R&D costs on the net Income of the company, moreover, the effect was negative as coefficient ϕ_0 = -1.62e-06. Therefore, based on this analysis, one can conclude that there is enough evidence to reject the hypothesis 3, stating that there is a positive relationship between the investment in R&D and the Net Income. Furthermore, the lagged value of Proxy was also giving negative coefficient. Therefore, based on the results, there is **enough evidence to reject hypothesis 3** on the basis of two datasets combined.

5.4 Hypothesis 4

Finally, to test the hypothesis 4a: *"Capitalised amount of R&D is significantly reflected in the values of Dividends per Share for the companies accounting under US GAAP"* and Hypothesis 2b*: "Capitalised amount of R&D is significantly reflected in the values of Earnings per Share for the companies accounting under US GAAP, IFRS and on the Global level,"* two separate regressions have been conducted for the US-based firms, one had *Earnings per Share* as the dependent variable, and second one had *Dividends per Share* as the dependent variable. Later, for the non-US based firms regression on the *Earnings per Share* only was conducted, because the data on dividends was not sufficient to conduct analyses.

In the analyses the GETS modelling technique was used, therefore all the variables besides the constant are significant at 5% level. For the US-based firms, final model for dividends per share does not include the *Proxy for R&D* as it was found insignificant and was dropped in the process (Table 11). Moreover, there was also no effect of the *Proxy for P&D* on the *EpS* for the US dataset (Table 12). Finally for the firms accounting under IFRS there has been found a significant effect of *Proxy of R&D* on the *EpS* with p=0.000 (Table 13).

DpS	Coefficient	Std. Err.	t	P>t	95% Confidence interval	
Lag 1.	0.1922351	0.0042389	45.35	0.000	0.183927	0.2005432
Lag 2.	0.0412601	0.002822	14.62	0.000	0.357289	0.0467912
Amortisation	-0.002259	0.0000396	-5.70	0.000	-0.0003036	-0.0001482
Goodwill	0.0000573	4.19e-06	13.67	0.000	0.0000491	0.0000656
Net Income	0.0000253	4.26e-06	5.93	0.000	0.0000169	0.0000336
Revenues	2.49e-06	1.15e-06	2.17	0.030	2.38e-07	4.75e-06
Constant	0.2110202	0.0054173	38.95	0.000	0.2004024	0.221638

Table 11: Effect on Dividends per Share US (Model 8)

EpS	Coefficient	Std. Err.	t	P>t	95% Confidence interval	
Lag 1.	-.2326361	.0044221	-53.61	0.000	-.2413033	-.2239688
Lag 2.	-.282337	.0045449	-62.12	0.000	-.291245	-.2734291
Lag 3.	-.4420353	.0075281	-58.72	0.000	-.4567902	-.4272804
Constant	8.997595	3.735944	2.41	0.016	1.6752	16.31999

Table 12: Effect on Earnings per Share US (Model 9)

DpS	Coefficient	Std. Err.	t	P>t	95% Confidence interval	
Current Assets	0.0003507	0.0000214	16.41	0.000	0.0003088	0.0003926
Amortisation	0.0048526	0.0012275	3.95	0.000	0.0024467	0.0072585
Total Assets	-0.0000915	7.00e-06	-13.07	0.000	-0.0001053	-0.0000778
Goodwill	0.0058339	0.0002747	21.24	0.000	0.0052956	0.0063722
Intangibles	-0.0060689	0.0003043	-19.94	0.000	-0.0066653	-0.0054724
LN Net Income	27.71325	9.717632	2.85	0.004	8.667046	46.75946
Proxy R&D	0.0224677	0.012259	18.33	0.000	0.0200649	0.0248705
Constant	89.20412	80.31775	1.11	0.267	-68.21579	246.624

Table 13: Regression on EPS for IFRS. (Model 10)

Overall, as the effect of expenditures on research and development was not significant for the US based firms on Dividends per Share, there is **enough evidence to reject** the hypothesis 4a for the US-based firms.

As the evidence based on two different data sets was inconclusive for the hypothesis 4b, the combined dataset was used in order to conduct analyses on the effect of spending on R&D on the EPS. Before conducting the test assumption of the fixed effect model was tested based on the Hausman test (Test 7, Appendix C), and thereafter fixed effect model was used. As can be seen on the Model 11 (Appendix B), the effect of the Proxy R&D and even the lagged values up to a second lag was significant. Therefore, even though an effect of the investment in R&D was not significant for US based companies only, it was significant on the global level. Overall, based on the results, **there is not enough evidence** to reject the hypothesis 4b.

6. Conclusion

6.1 Summary of the findings

This study was aiming to contribute to the existing research on the accounting for intangible assets. Inspired by the introduction of an accounting standard IAS 38, this study has provided theoretical and empirical analyses of the accounting for intangible assets. Core aspect that has caused an interest in this area of analyses was the difference in accounting for intangible assets under IFRS and US GAAP, as IFRS in contrast to US GAAP allows for a capitalization of intangible assets. As was discussed in the paper published by Aboody and Lev (1998), only development costs of the software capitalization are allowed to be capitalized by companied under the US GAAP requirements. The difference between this research and the research previously done is in the time frame used. Most of the previously conducted research that was analyzed in this paper has been conducted more than fifteen years ago. Not only at that point in time less modern analytical techniques were used, but also it did not include such a significant events such as an introduction of IAS 38 in the year 2005 and the financial crisis of the years 2008-2009.

In order to answer the research question, four hypotheses were formulated based on the existing literature and were tested in the results section. All the regressions were conducted in the software STATA and in order to conduct the regressions, fixed effect models were used. In accordance with the first hypothesis it was found that there was indeed a significant effect of an introduction of the new standard on the reported valued of the intangible assets. In this way one could conclude, that as the standard has been introduced, the reporting became more consistent and representative of the company's position.

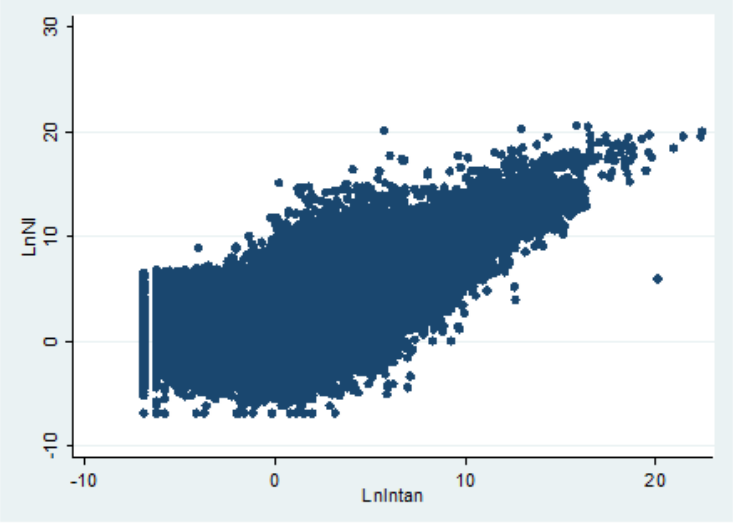
Second hypothesis, however, showed that there has been no significant effect of the introduction of the new standard on the reported values of the net income reported by firms accounting under IFRS. This could be explained by, for example, delayed effect of the standard introduction on the profitability of the company, or the fact that there are a lot of companies that do not have significant intangible assets and therefore an introduction of the standard would not affect any functions of the company. Finally, introduction of the standard could have caused higher expenditures on the audit by firms, therefore offsetting an increase in profitability.

Analyses regarding the third hypotheses showed a negative effect of the spending on R&D on the reported values of the net income. This could be explained by the fact that there is a need to use more lagged values of R&D on the net income, however, in that case risk of having an omitted variable bias is even larger, as more time variant factors have to be taken into consideration. When taking lagged values up to three years of the proxy of capitalised R&D, they have all given negative coefficients. And more than 3 years lags were giving not significant results. Furthermoe, results obtained for US based firms only, were significant and had a positive coefficient which can signal that in increase in a spending on the R&D could lead to a higher reported valued on the net income. This could, however, also be caused by the fact, that there were less companies in the US sample and therefore results are a subject to more statistical biases.

Finally, the fourth hypothesis was focusing on the relevance of the R&D expenditures for inventor's decision making. Eventually, the combined effect on EpS was tested for all companied and not only Proxy for R&D capitalized value was found significant but also the lagged values of the variable were significant up to second lag. Therefore, one can conclude that an investment in the R&D is significant for investors' decision to invest in the company. This is because a lot of investment decisions are based on the returns a company generates.

The findings from the analyses were used in order to answer the research question: "*What is the relationship between the capitalization amount of intangible assets and the company's financial performance?"*

Figure 3: Correlation Net Income and Intangible assets



On the Figure 3 one can see that generally, net income and amount of the intangible assets are moving in the same direction and companies with larger amount of intangible assets tend to have larger net income reported. However, we need to remember that correlation is not causation, namely, the fact that and there can be a reverse

causality, meaning that if companies have larger net income, they are more likely to generate/invest in the intangible assets. Throughout the analyses, however, the coefficient of intangible assets remained positive, therefore, proving that there can be a causal effect even when controlling for the other factors and even for the past values of net income itself. This is in line with the research mentioned previously in the theoretical framework which was arguing for the positive relationship between the profitability and the values of intangible assets (Chin, Cheng & Hwang, 2005; Riahi-Belkaoui, 2003; Firer & Williams 2003; and other).

In the beginning of this research a few issues have desired a specific attention to gain a better understanding of the recognition of intangible assets and therefore were presented in a form of sub-questions. After the conducted analyses we are able to give an answer to those questions. First question was formulated as follows: "*Is there a significant difference in the reported values for intangible assets before and after the introduction of IAS 38?"* It was found that indeed there has been an effect of an introduction of the IAS 38 on the reported values of the intangible assets. This follows the conclusions derived from the paper published by Wyatt (2008) who has analyzed the previous research done on the relevance of the intangible assets post introduction of IAS 38. However Markarian et al. (2008) who analyzed an effect of and introduction of IAS 38 in Italy specifically did not find any significant results. The difference can be explained by the fact that the data from multiple countries was used and was over a longer time period past the introduction of the standard.

Second question was formulated as follows: "*Is higher growth rate of the investment in R&D associated with higher growth of Earnings per Share (EPS)?"* The answer obtained from this research was yes, there is a significant effect of the investment in the R&D by the firms on the EpS up to three lags back, however, there is a negative relationship between the second lagged value of a proxy for R&D capitalization and the EPS. This can be explained by the fact that income of the company needs time to recover from the extensive investment in the research and development. Moreover, Sougiannis (1994) stated that on average an indirect effect of an investment in R&D is a lot larger than a direct effect, meaning that benefits brought by R&D are not directly represented by the actual amount of money put into it but are just reflected in the information throughout the process in the organization which would increase the earnings.

Finally, even though the lagged values of R&D investment did not give a significant coefficient, Hirschey and Weygant (1985) said that an investment in R&D does not necessarily instantly leads to the higher returns, but improves the profitability in the long run.

Last sub-question was based on the both, empirical analyses but also the results of previously done qualitative and quantitative studies that were analyzing behavior of investors: "*Do investors care about the intangible assets reported by the firm?"* In this paper we have taken the same assumption as in the paper published by Ballester, Garcia-Ayuso and Livnat (2003), namely, that investors care only about the return on their investment. The return on investment was measured in this paper by taking dividends per share and earnings per share. There was found not significant effect of the values reported for intangibles on the dividends per share, however, there was a significant effect on the earnings per share as was discussed in the sub-question before. If investors only care about return, then investment of the companies in R&D is beneficial for them. However, one has to distinguish between the long term and short term investors. While long term investors are benefitting from the investment in the R&D, short term investors can end up hurt, as the company has a capital outflow in terms of cash when investing in the development of a new product and a significant expenses at the research stage.

6.2 Implications of the research

There can be three possible applications of this research: for the future research, to be used by the management of the firms and to be used in creating future accounting standards. This research can be used as a foundation for a future study as it includes in depth analyses of the effects of the intangible assets on the firms' profitability based on the large volumes of data. It provides a modern analyses up to the year 2017 for the most firms in the sample. Effect of the intangible assets on the profitability of the company was evaluated based on the two separate accounting areas (IFTS and US GAAP) and also on the general level through the analyses done in the combined dataset.

Management and the board of the company can use the information obtained from this research to ensure the wellbeing of the company by finding the optimal level of investment in the R&D. Moreover, making sure that investors can see the sufficient returns can help the company to

attract larger funding which can be used to increase liquidity and solvency of the company. As from the perspective of the policy, it was argued by Lev (1999), Wyatt (3008) Hirschey and Weygant (1985), Healy, Myers and Howe (2001) and others that the internally generated intangible assets should be capitalized. There is an ongoing discussion in which scientists and management of the companies are trying to argue in favor of capitalization of the intangible assets. This paper also supports a similar view, as there is a positive relationship between the values of capitalized R&D and the reported net income, same type of capitalization of intangible assets under US GAAP as under IFRS should be appropriate.

6.3 Limitations and suggestions for the future research

As was mentioned throughout the paper it is very hard to control for a possibility of an omitted variable bias as there are a lot of factors that could affect profitability of the company on the individual and the global level which were not accounted for. Moreover, the assumption that all the firms in the global data set account under IFRS could be violated for some companies. There was, moreover, a problem with the fact that some companies were mentioned in the IFRS dataset and in the US-based dataset as was found when merging two datasets based on the duplicates. Most of the companies haven't had data for all the time period, which made panel data not balanced. Inflation rates in different countries were disregarded in the analyses. Furthermore, most companies were accounting under significantly different standards before the introduction of IAS 38 which could have affected the significance and general effect of the introduction of the new standard. Finally, in the third and second hypothesis a proxy of the capitalized amount of R&D was used instead of an actual value of the R&D capitalization. Nevertheless, the use of the proxy should not have affect the sign and the significance of the obtained coefficient.

For the future research it is suggested to use more control variables in order to further eliminate a possibility of an omitted variable bias. Larger time range can be used in order to control for up to ten lags back and that can still be an effect of R&D expenditures. It is also suggested to split the data in more than three datasets in order to see if there are factors based specifically on the country and to make sure that only companies that are accounting under IFRS/US GAAP are included in the sample. Moreover, the methodology used by Wei Liao (2008) in order to check

for a structural break at all the observations at the same time can be applied instead of having a dummy variable that represents a potential beak.

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8. Appendix A – Tables

Variable	Name used	Description	Obs	Mean	Std. Dev.	Min	Max
gvkey	GV Key	GV Key	601,292	240658.6	64978.45	1166	327218
fyear	Year	Year	601,292	2008.059	5.852546	1996	2017
act	Total Current Assets	Current Total Assets	373,191	434952.6	7.25E+07	0	3.62E+10
am	Amortisation	Amortisation	372,595	513.6598	28048.27	-15572	9454047
at	Total Assets	Total Assets	401,129	3277309	2.20E+08	0	4.76E+10
gdwl	Goodwill	Goodwill	506,064	14445.56	3408258	0	1.92E+09
intan	Intangible Assets	Intangible Assets	503,977	49630.49	1.15E+07	0	5.61E+09
xrd	Expenses R&D	Expenses R&D	138,737	7347.367	321127.5	-72466	6.12E+07
xt	Total Expenses	Total Expenses	86,388	1593528	8.61E+07	-159445	1.26E+10
eps	EpS	Earnings per share	496,470	267608.2	1.35E+08	-4458564	7.88E+10
nicon	NI	Net Income	428,814	75342.06	2.48E+07	-2.02E+09	1.58E+10
compname	Company number	Identifier variable for a company	601,292	21022.29	12741.09	1	47104
identifier	Identifier	Identifier variable that combines company and year	601,292	240658.8	64978.45	1166.2	327218.2
industry	Industry	Dummy variable for industry	601,292	0.818368	0.385541	0	1
Averintan	Average Intangibles	Average value of intangible assets reported per year	601,292	48101.93	115053.6	2334.049	455176.3
LnIntan	Natural log of Intangibles	Natural log of Intangibles	366,850	3.105382	3.299452	-6.90776	22.4487
IAS	IAS	Dummy variable introduction of IAS	601,292	0.046977	0.21159	0	1
crisis	Crisis	Dummy variable for crisis 2009	601,292	0.053643	0.225312	0	1

postcrisis	Postcrisis	Dummy variable for year 2010	601,292	0.054459	0.226922	0	1
LnNI	Logarithm Net Income	Natural log of NI	307,458	3.771742	2.670828	-6.90776	23.48522
proportionRD	Proportion R&D	xrd/ intan	110,811	69.40191	4349.383	-91.1739	775110
proxiRD	Proxy R&D	xrd*0.2	138,737	1469.473	64225.5	-14493.2	1.22E+07
NIBefore	Net Income before IAS	Net income before introduction of IAS 38	117,610	110920.2	1.08E+07	-2.02E+09	1.35E+09
NIAfter	Net Income after IAS	Net income after introduction of IAS 38	311,204	61896.38	2.84E+07	-1.78E+08	1.58E+10
LnNIBefore	Ln Net Income before IAS	Natural logarithm of Net income before introduction of IAS 38	84,906	3.473298	2.691026	-6.90776	21.02493
LnNIAfter	Ln Net Income after IAS	Natural logarithm of Net income after introduction of IAS 38	222,552	3.885602	2.654259	-6.90776	23.48522

Table 1: Descriptive statistics IFRS dataset

Variable	Name Used	Description	Obs	Mean	Std. Dev.	Min	Max
gvkey	GV Key	GV Key	235,451	80675.38	69493.8	1004	326688
fyear	Year	Year	234,767	2006.886	6.026857	1997	2017
am	Amortisation	Amortisation	140,094	22.963	208.8985	-113.746	25198.48
at	Total Assets	Total Assets	197,233	8728.412	80430.1	0	3771200
eps	EpS	Earnings per share	187,690	-8.53989	37529.56	-8182362	1.26E+07
gdwl	Goodwill	Goodwill	181,970	402.1136	2663.825	0	146583.3
intan	Intangible Assets	Intangible Assets	188,878	630.6435	4185.562	0	225278
intano	Other itangibles	Other intangibles	147,626	270.5615	2236.498	0	169054
ni	NI	Net Income	196,157	143.3702	1289.542	-99289	104821
revt	Revenues	Total Revenues	196,136	2429.91	12291.19	0	496785
xrd	Expenses R&D	Expenses R&D	88,299	97.49123	570.1156	0	22620

dvpsp_f	DpS	Dividends per share	216,474	0.419005	8.610552	0	3660.285
industrdum	Industry	Dummy variable for industry	235,451	0	0	0	0
proxiRD	Proxy R&D	xrd*0.2	88,299	19.49825	114.0231	0	4524
proportionRD	Proportion R&D	xrd/ intan	58,551	8.099084	156.3596	0	25337.5
LnNI	Logarithm Net Income	Natural log of NI	112,312	3.207142	2.391994	-6.90776	11.56001

Table 2: Descriptive statistics US GAAP dataset

Variable	**Name used**	**Description**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
gvkey	GV Key	GV Key	814,335	198167.5	96878.75	1004	327218
fyear	Year	Year	813,789	2007.76	5.923802	1996	2017
act	Total Current Assets	Current Total Assets	365,523	436794.4	7.32E+07	0	3.62E+10
am	Amortisation	Amortisation	497,207	295.1269	22866.58	-15572	9454047
at	Total Assets	Total Assets	579,036	2208395	1.83E+08	0	4.76E+10
gdwl	Goodwill	Goodwill	667,981	10700.65	2966367	0	1.92E+09
intan	Intangible Assets	Intangible Assets	672,595	36426	9969205	0	5.61E+09
xrd	Expenses R&D	Expenses R&D	216,059	4188.708	256813.4	-72466	6.12E+07
xt	Total Expenses	Total Expenses	85,285	1603372	8.67E+07	-159445	1.26E+10
eps	EpS	Earnings per share	663,549	200222.9	1.17E+08	-8182362	7.88E+10
nicon	NI	Net Income	605,831	52501.4	2.09E+07	-2.02E+09	1.58E+10
identifier	Identifier	Identifier variable that combines company and year	590,157	243228.8	61667.66	1166.2	327218.2
industry	Industry	Dummy variable for industry	590,157	0.817225	0.386482	0	1
Averintan	Average Intangibles	Average value of intangible assets reported per year	590,157	47814.89	114736.6	2334.049	455176.3
IAS	IAS	Dummy variable introduction of IAS	590,157	0.04691	0.211445	0	1
crisis	Crisis	Dummy variable for crisis 2009	590,157	0.053786	0.225595	0	1

postcrisis	Postcrisis	Dummy variable for year 2010	590,157	0.054628	0.227253	0	1
LnNI	Logarithm Net Income	Natural log of NI	405,416	3.537222	2.574384	-6.90776	23.48522
proportionRD	Proportion R&D	xrd/ intan	106,609	70.73954	4433.76	-91.1739	775110
proxiRD	Proxy R&D	xrd*0.2	216,059	837.7417	51362.68	-14493.2	1.22E+07
LNintan	Natural log of Intangibles	Natural log of Intangibles	468,023	3.087963	3.19196	-6.90776	22.4487

Table 3: Descriptive statistics combined data set US GAAP and IFRS

9. Appendix B – Models

```
Fixed-effects (within) regression               Number of obs      =     43,815
Group variable: gvkey                           Number of groups   =      9,156

R-sq:                                           Obs per group:
     within  = 0.1823                                         min =          1
     between = 0.4113                                         avg =        4.8
     overall = 0.6361                                         max =         20

                                                F(9,34650)         =     858.06
corr(u_i, Xb)  = 0.5403                         Prob > F           =     0.0000
```

LnIntan	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LnIntan						
L1.	.315237	.0052336	60.23	0.000	.3049789	.325495
L2.	.0999256	.0050688	19.71	0.000	.0899907	.1098606
IAS	-.0127144	.0289701	-4.50	0.000	-.0694967	.044068
crisis	.0175056	.0229538	0.76	0.446	-.0274847	.0624959
nicon	1.99e-09	7.64e-09	0.26	0.795	-1.30e-08	1.70e-08
xrd	-6.04e-07	7.90e-08	-7.65	0.000	-7.59e-07	-4.49e-07
at	-2.95e-08	2.31e-09	-12.73	0.000	-3.40e-08	-2.49e-08
act	1.16e-07	8.17e-09	14.20	0.000	1.00e-07	1.32e-07
fyear	.0262519	.0015629	16.80	0.000	.0231885	.0293152
_cons	-50.57887	3.135013	-16.13	0.000	-56.7236	-44.43414
sigma_u	2.3302775					
sigma_e	1.0912259					
rho	.82015106	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(9155, 34650) = 2.46                     Prob > F = 0.0000
```

Model 1: Regression on Intangible assets. Testing for a break.

Fixed-effects (within) regression — Number of obs = 13,192
Group variable: gvkey — Number of groups = 3,771

R-sq:
within = 0.1127
between = 0.9129
overall = 0.8926

Obs per group:
min = 1
avg = 3.5
max = 18

F(11,9410) = 108.61
corr(u_i, Xb) = 0.9215 — Prob > F = 0.0000

LnNI	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LnNI						
L1.	.2662964	.0108422	24.56	0.000	.2450433	.2875495
L2.	.0366546	.0109855	3.34	0.001	.0151207	.0581885
L3.	.0384225	.0103008	3.73	0.000	.0182306	.0586143
L4.	.028538	.0088599	3.22	0.001	.0111708	.0459052
IAS	.0214471	.0381237	0.56	0.574	-.0532837	.0961779
crisis	-.224826	.0282209	-7.97	0.000	-.2801451	-.1695068
act	1.01e-07	2.03e-08	4.96	0.000	6.09e-08	1.40e-07
at	-1.60e-08	1.01e-08	-1.59	0.112	-3.58e-08	3.73e-09
intan	1.60e-07	1.38e-07	1.16	0.245	-1.10e-07	4.30e-07
gdwl	-2.25e-07	1.31e-07	-1.71	0.087	-4.82e-07	3.27e-08
xrd	-8.04e-07	1.77e-07	-4.54	0.000	-1.15e-06	-4.57e-07
_cons	2.822374	.0657053	42.96	0.000	2.693578	2.951171
sigma_u	1.6864049					
sigma_e	.70908482					
rho	.84976489	(fraction of variance due to u_i)				

F test that all u_i=0: F(3770, 9410) = 1.96 — Prob > F = 0.0000

Model 2: Effect of Break on the Value of the Net Income reported

Fixed-effects (within) regression — Number of obs = 10,976
Group variable: gvkey — Number of groups = 4,166

R-sq:
within = 0.0204
between = 0.0240
overall = 0.0177

Obs per group:
min = 1
avg = 2.6
max = 9

F(5,6805) = 28.41
corr(u_i, Xb) = -0.1284 — Prob > F = 0.0000

LnNIBefore	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
act	5.20e-08	6.59e-09	7.90	0.000	3.91e-08	6.50e-08
at	-1.15e-08	1.95e-09	-5.91	0.000	-1.54e-08	-7.72e-09
intan	2.62e-07	1.75e-07	1.49	0.135	-8.18e-08	6.05e-07
gdwl	-2.88e-07	1.80e-07	-1.59	0.111	-6.41e-07	6.62e-08
xrd	-2.01e-07	7.98e-08	-2.52	0.012	-3.58e-07	-4.50e-08
_cons	4.448674	.0089697	495.97	0.000	4.431091	4.466257
sigma_u	2.7613802					
sigma_e	.90960613					
rho	.90211498	(fraction of variance due to u_i)				

F test that all u_i=0: F(4165, 6805) = 19.99 — Prob > F = 0.0000

Model 3: Net Income before the introduction of the standard

Fixed-effects (within) regression — Number of obs = 21,270
Group variable: gvkey — Number of groups = 6,091

R-sq:
within = 0.0592
between = 0.8997
overall = 0.8641

Obs per group:
min = 1
avg = 3.5
max = 12

F(6,15173) = 159.26
corr(u_i, Xb) = 0.9284 — Prob > F = 0.0000

LnNIAfter	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LnNIAfter						
L1.	.2251824	.0079035	28.49	0.000	.2096907	.2406741
crisis	-.231033	.0225078	-10.26	0.000	-.275151	-.1869151
act	6.53e-08	3.67e-08	1.78	0.075	-6.69e-09	1.37e-07
at	-2.45e-08	1.47e-08	-1.66	0.097	-5.34e-08	4.43e-09
intan	1.25e-07	8.71e-08	1.44	0.151	-4.55e-08	2.96e-07
xrd	-2.54e-07	3.10e-07	-0.82	0.412	-8.62e-07	3.54e-07
_cons	3.185388	.0322856	98.66	0.000	3.122105	3.248672
sigma_u	2.0376712					
sigma_e	.76491477					
rho	.87648932	(fraction of variance due to u_i)				

F test that all u_i=0: F(6090, 15173) = 2.86 — Prob > F = 0.0000

Model 4: Net Income after the introduction of the standard

Fixed-effects (within) regression — Number of obs = 20,884
Group variable: gvkey — Number of groups = 3,756

R-sq:
within = 0.1630
between = 0.8923
overall = 0.8566

Obs per group:
min = 1
avg = 5.6
max = 19

F(7,17121) = 476.31
corr(u_i, Xb) = 0.8765 — Prob > F = 0.0000

LnNI	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LnNI						
L1.	.3098466	.0078687	39.38	0.000	.2944232	.3252701
L2.	.1082081	.007137	15.16	0.000	.0942188	.1221974
am	-.0000618	.0000397	-24.72	0.000	-.0001396	.000016
at	-8.88e-07	9.12e-07	-4.37	0.000	-2.68e-06	8.99e-07
intan	5.95e-06	2.03e-06	2.93	0.003	1.97e-06	9.93e-06
proxiRD	.0001927	.0000877	2.20	0.028	.0000209	.0003645
revt	8.36e-06	1.06e-06	7.86	0.000	6.28e-06	.0000104
_cons	2.313336	.0313191	73.86	0.000	2.251948	2.374725
sigma_u	1.3466692					
sigma_e	.71782268					
rho	.77873918	(fraction of variance due to u_i)				

F test that all u_i=0: F(3755, 17121) = 2.85 — Prob > F = 0.0000

Model 5: Model of the factors affecting Net Income for US

Fixed-effects (within) regression — Number of obs = 13,483
Group variable: gvkey — Number of groups = 4,289

R-sq:
within = 0.1765
between = 0.8694
overall = 0.8732

Obs per group:
min = 1
avg = 3.1
max = 19

F(7,9187) = 281.34
corr(u_i, Xb) = 0.8690 — Prob > F = 0.0000

LnNI	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LnNI						
L1.	.3122573	.0106272	29.38	0.000	.2914256	.3330889
L2.	.0347471	.0105432	3.30	0.001	.01408	.0554142
L3.	.0613531	.0089955	6.82	0.000	.04372	.0789862
am	-4.09e-06	7.24e-07	-5.66	0.000	-5.51e-06	-2.67e-06
at	6.38e-08	5.16e-09	12.36	0.000	5.36e-08	7.39e-08
gdwl	-1.53e-07	2.76e-08	-5.54	0.000	-2.07e-07	-9.87e-08
proxiRD	-2.61e-06	5.86e-07	-4.45	0.000	-3.75e-06	-1.46e-06
_cons	2.393299	.0506858	47.22	0.000	2.293943	2.492654
sigma_u	1.4945435					
sigma_e	.704677					
rho	.81812166	(fraction of variance due to u_i)				

F test that all u_i=0: F(4288, 9187) = 1.96 — Prob > F = 0.0000

Model 6: Model of the factors affecting Net Income for IFRS

Fixed-effects (within) regression — Number of obs = 27,940
Group variable: gvkey — Number of groups = 6,961

R-sq:
within = 0.1723
between = 0.8912
overall = 0.8754

Obs per group:
min = 1
avg = 4.0
max = 18

F(6,20973) = 727.90
corr(u_i, Xb) = 0.8863 — Prob > F = 0.0000

LnNI	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LnNI						
L1.	.3273477	.0070954	46.14	0.000	.3134402	.3412551
L2.	.0563634	.0071617	7.87	0.000	.0423259	.070401
L3.	.0780683	.006079	12.84	0.000	.066153	.0899837
am	-6.28e-06	5.70e-07	-11.01	0.000	-7.39e-06	-5.16e-06
at	6.27e-08	5.07e-09	12.35	0.000	5.27e-08	7.26e-08
proxiRD	-1.62e-06	4.91e-07	-3.30	0.001	-2.58e-06	-6.55e-07
_cons	2.107309	.0303968	69.33	0.000	2.047728	2.166889
sigma_u	1.3247705					
sigma_e	.68515165					
rho	.78896679	(fraction of variance due to u_i)				

F test that all u_i=0: F(6960, 20973) = 2.23 — Prob > F = 0.0000

Model 7: Combined dataset effect on Net Income

Fixed-effects (within) regression — Number of obs = 101,876
Group variable: gvkey — Number of groups = 14,623

R-sq:
within = 0.0323
between = 0.3920
overall = 0.1653

Obs per group:
min = 1
avg = 7.0
max = 19

F(6,87247) = 485.74
corr(u_i, Xb) = 0.3949 — Prob > F = 0.0000

dvpsp_f	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dvpsp_f						
L1.	.1922351	.0042389	45.35	0.000	.183927	.2005432
L2.	.0412601	.002822	14.62	0.000	.0357289	.0467912
am	-.0002259	.0000396	-5.70	0.000	-.0003036	-.0001482
gdwl	.0000573	4.19e-06	13.67	0.000	.0000491	.0000656
ni	.0000253	4.26e-06	5.93	0.000	.0000169	.0000336
revt	2.49e-06	1.15e-06	2.17	0.030	2.38e-07	4.75e-06
_cons	.2110202	.0054173	38.95	0.000	.2004024	.221638
sigma_u	.9584147					
sigma_e	1.3924383					
rho	.32146178	(fraction of variance due to u_i)				

F test that all u i=0: F(14622, 87247) = 1.39 — Prob > F = 0.0000

Model 8: Effect on Dividends per share US

```
Fixed-effects (within) regression               Number of obs      =       125,522
Group variable: gvkey                           Number of groups   =        15,997

R-sq:                                           Obs per group:
     within  = 0.0348                                         min =             1
     between = 0.0038                                         avg =           7.8
     overall = 0.0001                                         max =            18

                                                F(3,109522)        =       1314.62
corr(u_i, Xb)  = -0.9226                        Prob > F           =        0.0000
```

epsfx	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
epsfx						
L1.	-.2326361	.0044221	-52.61	0.000	-.2413033	-.2239688
L2.	-.282337	.0045449	-62.12	0.000	-.291245	-.2734291
L3.	-.4420353	.0075281	-58.72	0.000	-.4567902	-.4272804
_cons	8.997595	3.735944	2.41	0.016	1.6752	16.31999
sigma_u	4064.6767					
sigma_e	1320.9788					
rho	.90447118	(fraction of variance due to u_i)				

```
F test that all u i=0: F(15996, 109522) = 3.96                     Prob > F = 0.0000
```

Model 9: Effect on EPS US GAAP

```
Random-effects GLS regression                   Number of obs     =     24,446
Group variable: gvkey                           Number of groups  =      7,193

R-sq:                                           Obs per group:
     within  = 0.0924                                         min =          1
     between = 0.0026                                         avg =        3.4
     overall = 0.0200                                         max =         22

                                                Wald chi2(7)      =    1614.89
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0000
```

epsexcon	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
act	.0003507	.0000214	16.41	0.000	.0003088	.0003926
am	.0048526	.0012275	3.95	0.000	.0024467	.0072585
at	-.0000915	7.00e-06	-13.07	0.000	-.0001053	-.0000778
gdwl	.0058339	.0002747	21.24	0.000	.0052956	.0063722
intan	-.0060689	.0003043	-19.94	0.000	-.0066653	-.0054724
LnNI	27.71325	9.717632	2.85	0.004	8.667046	46.75946
proxiRD	.0224677	.0012259	18.33	0.000	.0200649	.0248705
_cons	89.20412	80.31775	1.11	0.267	-68.21579	246.624
sigma_u	6132.3217					
sigma_e	1264.911					
rho	.95918927	(fraction of variance due to u_i)				

Model 10: regression on EPS for IFRS.

Fixed-effects (within) regression — Number of obs = 26,486
Group variable: gvkey — Number of groups = 6,354

R-sq:
within = 0.1180
between = 0.0161
overall = 0.0040

Obs per group:
min = 1
avg = 4.2
max = 19

F(9,20123) = 299.20
corr(u_i, Xb) = -0.6120 — Prob > F = 0.0000

epsexcon	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
epsexcon						
L1.	.3151792	.0091251	34.54	0.000	.2972932	.3330652
act	.0017541	.0001258	13.94	0.000	.0015075	.0020007
am	.0073854	.0024187	3.05	0.002	.0026445	.0121263
at	-.0009884	.000081	-12.20	0.000	-.0011472	-.0008296
gdwl	.0321413	.0011808	27.22	0.000	.0298269	.0344557
intan	-.0064814	.0008349	-7.76	0.000	-.0081178	-.0048451
proxiRD						
--.	.0609221	.009776	6.23	0.000	.0417603	.0800839
L1.	-.0915319	.0077665	-11.79	0.000	-.1067549	-.0763088
L2.	.0042393	.0014853	2.85	0.004	.001328	.0071506
_cons	74.47175	13.8805	5.37	0.000	47.26483	101.6787
sigma_u	3105.7452					
sigma_e	1999.81					
rho	.70690573	(fraction of variance due to u_i)				

F test that all u_i=0: F(6353, 20123) = 1.66 — Prob > F = 0.0000

Model 11: Regression on EPS in Combined dataset

10. Appendix C – Tests

Figure 2: Average reported value of intangibles

Test 1: Effect of the IAS, Crisis and PostCrisis on the value of intangibles

```
Fixed-effects (within) regression               Number of obs      =       366,850
Group variable: gvkey                           Number of groups   =        38,859

R-sq:                                           Obs per group:
     within  = 0.0033                                         min =             1
     between = 0.0001                                         avg =           9.4
     overall = 0.0006                                         max =            22

                                                F(3,327988)        =        367.30
corr(u_i, Xb)  = -0.0043                        Prob > F           =        0.0000
```

LnIntan	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
postcrisis	-.0550776	.0122307	-4.50	0.000	-.0790495	-.0311057
crisis	-.0782204	.0123609	-6.33	0.000	-.1024475	-.0539933
IAS	-.4473822	.0136325	-32.82	0.000	-.4741016	-.4206629
_cons	3.133179	.0030189	1037.87	0.000	3.127263	3.139096
sigma_u	3.114164					
sigma_e	1.6690775					
rho	.77684589	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(38858, 327988) = 28.42                 Prob > F = 0.0000
```

Test 2: Hausman Test for Hypothesis 1

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
break	.0196543	.0185021	.0011522	.
fyear	.0714189	.0634189	.0080001	.0003011
act	8.50e-08	2.12e-09	8.29e-08	4.49e-09
at	-1.78e-08	1.98e-09	-1.97e-08	1.05e-09
xrd	-1.69e-07	2.53e-07	-4.21e-07	4.30e-08
nicon	-2.85e-08	5.14e-09	-3.36e-08	2.60e-09

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 773.97
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Test 3: Hausman Test for Hypothesis 2

	Coefficients (b) fixed1	(B) random1	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
LnNI				
L1.	.2541121	.5129363	-.2588242	.0068215
L2.	.0260643	.1595212	-.1334569	.0048955
L3.	.040992	.1384923	-.0975004	.0048928
L4.	.0205573	.0859004	-.0653431	.0043057
L5.	.0114163	.0620934	-.0506771	.0049
IAS	.0406167	.1937296	-.1531129	.012692
crisis	-.189846	-.1621605	-.0276855	.007988
act	1.37e-08	-1.49e-09	1.52e-08	2.67e-08
at	-3.69e-09	1.63e-09	-5.32e-09	8.56e-09
intan	1.37e-07	1.38e-07	-8.33e-10	1.18e-07
gdwl	-6.29e-08	-1.33e-07	6.99e-08	1.21e-07
xrd	-1.48e-07	1.14e-08	-1.59e-07	2.52e-07

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 1506.70
Prob>chi2 = 0.0000

Test 4: Hausman Test for Hypothesis 3 US GAAP

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
LnNI				
L1.	.2896385	.50799	-.2183516	.0043141
L2.	.0581294	.1798714	-.1217419	.0023225
L3.	.0716631	.1662751	-.094612	.0027651
am	-.0000668	-.0000264	-.0000404	.0000198
at	1.17e-06	1.64e-06	-4.69e-07	6.56e-07
gdwl	3.54e-06	2.90e-06	6.46e-07	3.33e-06
intan	3.04e-06	1.22e-06	1.82e-06	1.93e-06
xrd	.0000587	.0000342	.0000244	.0000139
proportionRD	-.0000637	.000079	-.0001427	.0004195

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 2324.62
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Test 5: Hausman Test for Hypothesis 3 IFRS

	Coefficients (b) fixed3	(B) random3	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
LnNI				
L1.	.3122573	.6016475	-.2893902	.0063149
L2.	.0347471	.168149	-.1334019	.0044082
L3.	.0613531	.159135	-.0977819	.0045409
am	-4.09e-06	-3.25e-07	-3.77e-06	6.15e-07
at	6.38e-08	8.86e-09	5.49e-08	4.48e-09
gdwl	-1.53e-07	-2.97e-08	-1.23e-07	1.97e-08
proxiRD	-2.61e-06	-1.76e-07	-2.43e-06	5.31e-07

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 2137.08
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Test 6: Hausman Test for Hypothesis 3 Combined Dataset

	Coefficients			
	(b) fixed4	(B) random4	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
LnNI				
L1.	.3273477	.5675349	-.2401873	.0036923
L2.	.0563634	.1783324	-.1219689	.0025246
L3.	.0780683	.1566879	-.0786196	.0025607
am	-6.28e-06	-1.79e-06	-4.49e-06	4.31e-07
at	6.27e-08	1.83e-08	4.44e-08	3.90e-09
proxiRD	-1.62e-06	-2.23e-07	-1.39e-06	4.35e-07

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 4272.91
Prob>chi2 = 0.0000

Test 7: Hausman Test for Hypothesis 4

	Coefficients			
	(b) fixed5	(B) random5	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
epsexcon				
L1.	.2597178	.1537187	.1059991	.0065129
act	.000448	.0001272	.0003208	.0000217
am	.015975	.0054289	.0105461	.00147
at	-.0001141	-.0000317	-.0000824	5.15e-06
gdwl	.0151536	.001575	.0135786	.0005657
intan	-.0158039	-.0019301	-.0138738	.0005961
proxiRD	.0356847	.0124087	.0232759	.0019479

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 1143.46
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)