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Earnings manipulation in transition to IFRS in the pharmaceutical and energy industries – the Hungarian case

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Abstract. Driven by the need to diversify financing channels and the incentives arising from globalization, the inevitable transition to international accounting systems may provide companies opportunities for accounting manipulation. The main objective of our study is to investigate whether the transition to IFRS significantly affects the reliability of financial statements of pharmaceutical and energy companies operating in Hungary. For this purpose, two econometric models were applied: firstly, a binary logistic regression-based analysis of the Beneish M-Score values, and secondly, a modified Jones model based on a linear regression estimation of discretionary accruals. The research findings showed no clear significant relationship for the Beneish M-score values. However, application of the Jones model to the financial statements that companies prepared for the same year according to different standards revealed a negative shift in the deviation of discretionary accruals from their normal value. This was observed in the energy sector among the companies transitioning to IFRS, which suggests a greater use

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of cost accounting opportunities by industry players. Nevertheless, these modelling results can only indirectly support the potential investor concerns about the change in accounting systems and they do not diminish the importance of the potential institutional incentives and benefits of the transition.

Keywords: earning manipulation, Beneish M-score, Jones model, IFRS

JEL Classification: M41

1. INTRODUCTION

In today's business environment, the accessibility of data, both in the context of accounting and other operational activities, has become of the utmost importance. Consequently, it is imperative to closely monitor the published data and improve the efficacy of audit systems. While experience to date suggests that various types of accounting fraud will never disappear entirely, fraud incidence is likely to be reduced by the improvements in audit processes and the continuous development of accounting reporting systems (Fazekas & Becsky-Nagy, 2021; Siminem et al., 2024). The theoretical significance of this research is that it examines the reliability of accounting systems and seeks to determine whether the use of Hungarian and international reporting systems affects the potential for corporate profit manipulation. The transition of companies to IFRS has been the subject of several studies conducted for a number of different countries. These primarily focused on whether such a transition facilitated a more realistic presentation of financial statements and whether it affected the extent of earnings manipulation and transparency in terms of the quality of financial reporting (Barth et al., 2008; Jeanjean & Stolowy, 2008; Aharony et al., 2009; Paananen & Lin, 2009; Chen et al., 2010; Jiang et al., 2010; Doukakis, 2014; Capkun et al., 2016; Vatis et al., 2023). One study also addressed their divergence from tax optimization practices (Kosi & Valentincic, 2017). The relationship between earnings manipulation techniques and IFRS transition in Central Europe has been investigated by several studies as well (Miková, 2014; Istrate et al., 2015; Kliestik et al., 2021).

Examining the possibility of manipulating results can provide practical information in a number of research areas (Nagy, 2004; Fazekas & Becsky-Nagy, 2018; Fenyves et al., 2024). It can be used to support managerial decision making in the conduct of corporate controlling activities, help decide whether it is worth partnering with certain companies, and can also be beneficial when analysing competitors. It can also be used for internal audit purposes to monitor the work of individual self-accounting units (Böcskei et al., 2017a). The study's practical relevance is further demonstrated by the fact that it assesses the reliability of companies' management, employees and the reports they prepare, so that the knowledge of this information, or even its concealment, can be critical in the context of investor decisions, which is a key issue when preparing IFRS-compliant financial statements. In the context of the ongoing harmonisation of accounting systems, it is important to be aware of the reliability of these systems. The acceleration of economic developments in recent years and changes on a global scale, such as the coronavirus pandemic, the energy crisis and the war in Europe, are among the events of the last few years and are all topical issues. Apart from bringing about major changes in the daily lives of individuals, they are also fundamentally changing the operational structures of many sectors. We are convinced that the changes brought about by this situation will require the accounting and auditing of the industries concerned to adapt to these rapidly changing circumstances and may make the examination of these sectors a priority.

2. LITERATURE REVIEW

2.1. The relationship between Hungarian and international accounting regulations

Hungarian accounting work is primarily regulated by Act C of 2000. It defines the reporting and accounting obligations of those subject to it, the principles to be applied in accounting, and the requirements for disclosure, publication and auditing (Szakács, 2019; Tamimi & Orbán, 2022). The scope of the Accounting Act - with the exceptions specified by the Act - covers all economic agents whose operations require information from the participants in the national economy (Act C of 2000). In the 1970s, the need for comparability of accounting reports and the development of an internationally uniform accounting system emerged. Accounting harmonisation is of primary importance for multinational companies and in the area of global investments, where the need for comparability of accounting work and reports prepared in different countries arises (Alfredson et al., 2007). The harmonisation of accounting and reporting systems can make the assessment of companies' statements more transparent, predictable and open (Mirza & Holt, 2011; Alexander & Nobes, 2013). In order to strengthen European accounting harmonisation, the European Commission has established the European Public Sector Accounting Standards (EPSAS). In doing so, the Commission aimed to increase transparency and reduce the costs of operating an accounting system, as well as to promote accounting harmonisation. However, some studies also point to the downsides of accounting harmonisation. A study (Frintrup et. al., 2020) shows a negative correlation between the population and market capitalisation of countries and the adoption of IFRS. The primary reason for this, according to the study, is that larger countries may already have a well-established accounting system that is more compatible with the local characteristics of the country.

There are three levels of accounting harmonisation: national, regional and international. In Hungary, the national level is regulated by the Accounting Act, which acts as a framework, while at the regional level, the European Union directives must be complied with. The most important international accounting systems are US GAAP (United States Generally Accepted Accounting Principles), IFRS (International Financial Reporting Standards) and, as a third accounting system, the European Union directives. From a domestic point of view, the latter two are particularly relevant, since the European Union has adopted the IASs (International Accounting Standards Committee), which are still in force, and the IFRSs (International Accounting Standards Board), which are the successor to the IASC (Mackenzi et al, 2014). All members of the IASC - 143 professional accountants from 104 different countries - voted to restructure the IASC in May 2000, thus creating the IASB (Zeff, 2012). Regulation (EC) No 1606/2002 of the European Parliament and of the Council, established by the European Community, states that from 2005, all listed companies within the Member States of the European Union are required to prepare consolidated accounts in accordance with IAS and IFRS, which has promoted accounting harmonisation. The exceptions are companies listed on US stock exchanges that prepare accounts in accordance with US GAAP and companies that trade only debt securities on the stock exchange (Böcskei et al, 2017b; Tamásné Orbán, 2019). In addition, EU Member States may allow or require companies not listed on a stock exchange to apply IAS and IFRS (Palea, 2013). EU Member States, including Hungary, are required to incorporate the adopted standards into national legislation (Finch, 2007; Bansal; 2023). In Hungary, this is achieved by the fact that the rules of the Accounting Act have been drafted in accordance with the European Community directives in this field of law and international accounting principles, which is in line with accounting harmonisation (Szakács, 2019).

2.2. Creative accounting and earning manipulation

Although the term "creative accounting" is often used, there is no universally accepted definition of the concept. There are basically two approaches to the subject: a broader American interpretation and a narrower British one. The American approach is that creative accounting is a way of circumventing the rules, essentially a fashionable term for accounting fraud. In contrast, in the British interpretation, creative accounting does not break any rules, does not include the concept of fraud, but merely takes advantage of the flexibility of the accounting system (Silva et al., 2023). Jones (2011) prefers the latter interpretation, thus separating creative accounting and fraud. He argues that if an accounting system is inflexible, it precludes the possibility of creative accounting, but also the possibility of a reliable and true picture. Lopez et al. (2022) argue that creative accounting refers specifically to beneficial traits: a practitioner who seeks imaginative, inventive solutions that are in line with the company's strategy, seek to optimise tax and are also legal. Some studies take a different view on creative accounting: a Slovak study suggests that creative accounting is a common tool of economic criminals (Durana et. al., 2022). In our opinion, an accounting system needs a certain degree of flexibility and framework-based regulation in certain areas. An excessively rigid set of rules does not allow economic agents to adequately present and detail the true picture, and thus without flexibility it is not possible to provide a complete picture of a company's assets, financial position, ability to generate income, operations and changes in its wealth. However, overly permissive legislation can lead to abuses such as manipulation of results for tax evasion purposes, which can not only damage the public purse but also deceive other participants in the market economy.

According to the Hungarian Criminal Code, a person commits fraud if he or she misleads or misleads another person in order to obtain unlawful gain and causes damage (Act C of 2012). Manipulation of results as fraud is a global phenomenon, which aims at restoring a company's financial statements using illegal methods. A company may find many reasons to cosmeticize its financial statements: some companies do so in order to maintain their financial position in the short term, to avoid the appearance of indebtedness, to maintain a competitive position in the market, to boost operations, or even to meet the expectations of shareholders (Durana et al, According to other literature, the most common reason for earnings manipulation is that the company tries to give the market, especially investors and equity analysts, a better impression of the company than the reality. However, this activity is unacceptable, considering that financial statements and accounting reports are a key tool used by governments to control companies and on which investors can base their decisions (Mohammed et al., 2021; Ebrahimi, 2022).

ACFE's (Association of Certified Fraud Examiners) research for the year 2022, Occupational Fraud 2022: A Report to the Nations, examined the impact of more than 2,000 real cases on organisations in 133 countries and 23 industries. The academic programme provides valuable insights into the cost, perpetrators and methods of workplace and organisational fraud. The research revealed the incidence of fraud in each department of the organisations studied and the median dollar amount of damage caused by fraud. The research revealed that cases perpetrated by management were much more costly to the organizations studied compared to other departments, with at least half of the fraud costs estimated at more than $500,000, and also relatively common for senior management, accounting for one-tenth of the total number of cases. Fraud in accounting departments is high risk in terms of both frequency and value. Accounting and bookkeeping fraud accounted for roughly 12% of all frauds, and the median value of the damage they caused was close to $150,000. Divisions such as research and development, human resource management, inventory management and production and maintenance are considered low risk for fraud, with a distribution ratio of less than 5% and lower median associated costs. According to the study, the value of accounting fraud caused an average of $847,000 in damages to the companies involved (ACFE, 2022).

According to Lukács (2020), the most common purpose of fraud in Hungary is to show higher or even lower results than the real ones, so profit manipulation. A company may show higher than real revenues and lower expenses in its books, for example to attract investors or to appear to be in a stronger position. Other organisations may hide some of their revenues, or account for the costs and expenses of transactions that do not exist and reduce their profits in order to avoid taxes. They issue invoices for fictitious transactions that have not taken place, false fees, dividends. In many cases, companies subsequently modify the terms of contracts already concluded, perhaps by translating them incorrectly or by deliberately misinterpreting them. A common method of manipulating results is to present private consumption as if it were an expense incurred for the benefit of the business. This includes disguising electronic goods purchased for personal use as business purchases or, for example, using a company car for private purposes and then claiming it as a business trip.

According to a study by the AICPA (American Institute of Certified Public Accountants), a number of illegal methods are widespread for manipulating or misrepresenting inventory levels. According to Lukács (2020), these are as prevalent in Hungary as they are internationally. Examples of methods of manipulating the level of inventories recorded in accounting records include diluting inventories - thereby increasing quantity at the expense of quality - overvaluing inventories, showing inventories in the company's books that have been sold but not yet delivered, or even falsifying inventory prices of warehouses that have not been searched by the auditor. International experience shows that fraud can be reduced by tightening up regulations, by introducing checkpoints and by raising the moral standards and general well-being of society. Overall, therefore, earnings manipulation and other accounting frauds pose a high risk to governments, investors and companies, and can also cause significant damage to many stakeholders in the economy..

3. METHODOLOGY

3.1. Analysis

The study analysed the financial reporting data of all pharmaceutical and energy companies operating in Hungary that had switched from local accounting rules to IFRS at the time of writing, and compared them with industry data for the years of transition. Since the majority of the transitioned companies started to use IFRS in 2016, while the other part of the companies in 2017, the database (n = 38) used exclusively for testing the first hypothesis included the 2016 and 2017 values of non-transitioned industry companies randomly selected 30 companies from the full sample (see Table 1) as well as only the post-transition values of all transitioned companies in both sector (but not the values of the latter before the transition: all transitioned company had only one value on the database). To account for the potential effects of differing transition years, so time effects independent of the transition itself, a separate variable was incorporated into the model to capture these differences. The industry data used for the comparison were extracted from the EMIS (Emerging Markets Information Service) database.

Table 1

Number of all (transitioned and non-transitioned) companies in each year of the transition in the two industries surveyed, retrieved from the EMIS database.

Year	Pharmaceutical sector	Energy sector
2016	n = 488 (transitioned: 4)	n = 413 (transitioned: 6)
2017	n = 518 (transitioned: 4)	n = 416 (transitioned: 2)

Source: Authors' calculations

The choice of sectors was inspired by the population used by the Beneish M-Score model, which included manufacturing, production and private business service providers, as mentioned in the literature review. The choice of these sectors was also motivated by the potential for manipulation of the results in these sectors. For the former sectors, manipulation of results may be important mainly because of the formation of provisions, research and development activities, the treatment of indirect services, the accounting of administrative expenses and the classification of assets other than tangible assets. However, among the abuses committed by pharmaceutical companies, the sale of counterfeits, misbranding of products, and various accounting abuses such as embezzlement, bribery, insider trading, money laundering or manipulation of results are more common (Timofeyev et al., 2022).

Our first hypothesis tested in this study is that the transition to IFRS alone causes a significant difference in the Beneish Z-Score converted to nominal values, which best reflects the manipulation of corporate earnings. To do this, we used binary logistic regression, whereby we ran a model with the following variables, due to the low number of elements in all the companies that had already migrated, alongside the data of companies that had not migrated by random selection from the industry data:

$$log\left(\frac{P(M=1)}{P(M=0)}\right) = \beta_0 + \beta_1 * X + \beta_2 * t \quad (1)$$

where

- M is a dummy variable that takes a value of 1 if the Beneish M-score is greater than -1.78 and 0 if it is less than -1.78
- a P(M=1) is the probability that the dependent dummy variable is 1
- β_1 the coefficient showing the impact of IFRS transition, which changes the chance of manipulating the financial report if the company has transitioned to IFRS
- β_2 coefficient measuring the impact of years
- t is a binary control variable representing the year of the transition, which takes the value 0 if the data were for 2016 and 1 if for 2017

On this basis, the probability value of the odds is expressed by the equation (2):

$$P(M=1) = \frac{e^{\beta_0+\beta_1*X+\beta_2*t}}{1+e^{\beta_0+\beta_1*X+\beta_2*t}} \quad (2)$$

During the verification of the models, data quality checks and pseudo-R-squared analysis were performed to test the goodness of fit of the data. The score value, which is the dependent variable of the logistic regression model, is the output of a model that measures the financial and accounting reports of companies by analysing (Field, 2013; Bilder & Loughin, 2015; Witte & Witte, 2017), investigating potential manipulation of earnings and predicting and detecting accounting fraud. The US SEC (United States Securities and Exchange Commission) found that the Beneish M-Score model detected earnings manipulation in 76% of the companies examined in the US SEC's accounting enforcement activity. In addition, 71% of the most prominent financial and accounting reporting frauds committed in the US were predicted using the model (Mohamad et. al., 2016). The model aims to detect distortions in companies' reporting using the variables it includes. According to Beneish, these can arise from manipulation or circumstances that may encourage a company to manipulate or commit fraud. The results of the model suggest that there is a systematic relationship between the possibility of manipulation and certain financial accounting ratios in financial statements (Beneish, 1999). The model uses ratios derived from financial statements as variables to explore earnings manipulation behaviour based on revenues, income, and costs

and expenses. The model uses 8 variables, which are tested for two time periods: the financial year in which the fraud was detected and the year before with the coefficients detailed in equation (3):

$$M = -4{,}84 + 0{,}92 \times DSRI + 0{,}528 \times GMI + 0{,}404 \times AQI + 0{,}892 \times SGI + 0{,}115 \times DEPI - 0{,}172 \times SGAI - 0{,}327 \times LVGI + 4{,}679 \times TATA \quad (3)$$

where DSRI: Days' Sales in Receivables, GMI: Gross Margin Index, AQI: Assets Quality Index, SGI: Sales Growth Index, DEPI: Depriciation Index, SGAI: Sales, General and Administrative Expense Index, LVGI: Leverage Index, TATA: Total Accruals to Total Assets Index (Sakib, 2019).

However, the results of the logistic regression model alone are not sufficient for a statistically reliable evaluation of the proposed research questions. Therefore, independent of the previous logistic model, we deemed it necessary to apply a separate regression model (see Equation 4) commonly also used in the literature, specifically for the transitioned companies. The second hypothesis of the study is that the value of accruals normalised by total assets estimated from industry data using linear regression is significantly different from the actual accruals ratios among industry companies that have switched to IFRS. In the regression estimation, the modified Jones model (Dechow et al., 1995) developed to measure non-discretionary (not firm-dependent) accruals was applied as follows:

$$ND_t = \alpha_1 \left(\frac{1}{A_{t-1}}\right) + \alpha_2 \left(\frac{\Delta REV_t - \Delta Rec_t}{A_{t-1}}\right) + \alpha_3 \left(\frac{PPE_t}{A_{t-1}}\right) + \varepsilon_t \quad (4)$$

where

- ND_t non-discretionary (not firm-dependent), estimated accruals in year t
- A_{t-1} total assets of the previous year
- ΔREV_t change in net sales revenue in year t
- ΔRec_t change in trade receivables in year t
- PPE_t value of property, plant and equipments in year t

Discretionary (dependent on company-specific circumstances) accruals, which are the difference between the total accruals and the accruals estimated from industry data, were determined for the IFRS transition years as follows:

$$DA_t = TA_t - ND_t \quad (5)$$

where

- TA_t total accruals as the difference between profit after tax and operating cash flow
- DA_t the discretionary part of total accruals

As the companies that have converted to IFRS had available in the year of transition the accounting statements prepared under local GAAP (HAS) and IFRS, the significance of the difference in the discretionary accruals calculated with the Hungarian and IFRS current period data is tested using Wilcoxon's rank sum test (Wilcoxon, 1992; Wooldridge, 2002). Based on the significance value of this test, we decide on our hypothesis whether the shift could have directly contributed to the manipulation of the results in the industries under investigation. While the coefficients of the relationships established in the Jones model (see Equation 4) were estimated using regressions run on the full sample (see Table 1) for each industry and year separately, the comparison of the estimated and the actual accruals using the Wilcoxon rank-sum test was

conducted exclusively for the data of the transitioned companies. For the companies that transitioned in 2016, we applied the Jones model estimated from the 2016 industry sample, while for the companies that transitioned in 2017, we applied the Jones model estimated from the 2017 industry sample in each industry. The necessary statistical calculations and illustrative graphs were carried out using Microsoft Excel and the statistical software STATA.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1. Impact of the transition to IFRS on profit manipulation

In order to answer the question whether the transition to IFRS has a significant impact on the Beneish M-Score values reflecting earnings manipulation, data from companies that were already reporting under international accounting standards were queried, in addition to data from companies that were still reporting under Hungarian accounting standards in the year of transition, both in the pharmaceutical and energy sectors. In the descriptive statistical analysis of the M-Score values, outlier data exceeding three times the interquartile range were filtered out.

Table 2

Descriptive statistical analysis of the combined M-Score data of migrated and non-migrated companies in the two industries in the years of transition

	Pharmaceutical sector	Energy sector
Mean	0,295	-1,510
Standard error	1,533	0,600
Median	-2,346	-2,279
Standard Deviation	9,452	5,127
Kurtosis	19,849	13,133
Skewness	4,311	2,999
Minimum	-4,034	-12,570
Maximum	48,544	23,320
First Quartile (Q1)	-2,672	-2,973
Third Quartile (Q3)	-1,582	-1,317

Source: Authors' calculations

The average M-Score of pharmaceutical companies fell into positive territory during the transition years, a clear warning sign that more companies in this industry were likely to have manipulated their financial statements, if the -1.78 threshold is accepted as the lower bound for this category. This is a significant departure from the energy sector, where the average M-Score (-1.510), although still indicative of the dominance of the former category, shows a negative shift compared to the pharmaceutical sector, suggesting a better quality of accounting reporting by energy companies. This is somewhat tempered, however, by the much higher standard error of the pharmaceutical sample population (1.533), indicating that the estimate of the average M-Score is less accurate. This suggests that the data are more widely dispersed and that there is more uncertainty about how representative the mean value is. In the energy sector, on the other hand, the standard error was found to be lower (0.600), which allowed a more accurate estimate of the expected value. In the pharmaceutical sector, there are much larger differences between the M-Score values of individual companies, suggesting that some industry players have manipulated their results even more than the detectable average. In the energy sector, the variance was found to be slightly lower (5.127), but still more than three times the absolute value of the average, indicating wide variations between firms. The different distribution of the data also points to a higher degree of manipulation in the

reporting of pharmaceuticals: the distribution of the M-Score in the pharmaceutical sector is very "peaked", so most of the data are concentrated around the average, but some companies have very high values, and the overall distribution of the data is skewed to the right, so there are more positive M-Scores (suggesting manipulation) and there is also a significant proportion of outliers with high indicator values.

In the years of transition, companies in the top-quartile in both industries are far from the threshold and also far from the suspicion that there may still be a possibility of cosmetic financial reporting in their quarters. In comparison, even the values for the third quartile are around the threshold for manipulation, in the negative range: so even within the top 25% of companies with the most suspicious indicator values, there are companies that could be said with less confidence that their reported financial results are fully reliable. In the pharmaceuticals segment, however, both the top and bottom quartile of the sample data recorded values closer to the threshold, while the interquartile range of indicator values for energy players proved to be much more extensive. Although there can be large differences in the degree of bias between firms with manipulative indicator values, the maximum values suggest that the values in the top 25% are already extremely high and almost certainly indicate problems with the credibility of financial data. There is also a gradual transition between firms not suspected of manipulation based on quartiles, but there is already a strong suspicion of manipulation in the top quartile.

Examining the impact of the transition to IFRS on the results of the Beneish model using binary logistic regression, the results summarised in Tables 3 and 4 are for the two industries.

Table 3

Logistic regression results of the impact of IFRS transition on M-Score in the pharmaceutical sector

Title	Coef.	St.Err.	t-value	p-value	Odds-ratio	95% CI (bottom)	95% CI (top)
Transition (dummy)	3.046	1.177	2.59	0.010***	21.031	0.739	5.353
Year	-0.947	1.256	-0.75	0.451	0.388	-3.409	1.515
Constant	-1.418	0.460	-3.08	0.002***	0.242	-2.320	-0.515

Source: Authors' results. * indicates significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level.

Based on the results presented in Table 3, explaining the Beneish M-Score transformed into nominal values by the dummy variables of the transition to IFRS and the years of transition resulted in a statistically significant model overall: this is confirmed by the significance test for the chi-square test of the latter being significantly lower than 5% ($\chi^2 = 9.930$, $p = 0.007$). However, the former picture is nuanced by the fact that the model explains only about 20% of the variance of the dependent variable (pseudo $R^2 = 0.200$), which may justify the inclusion of additional explanatory variables in the model if the aim of the study is to fully understand the assignment of firms to the manipulated category and not only to examine the explanatory power of a single variable. The model fit was also assessed using the Akaike information criterion (AIC = 45.642) and the Bayesian information criterion (BIC = 50.783), which supported a more moderate model fit. The positive coefficient of the transition suggests that switching from Hungarian to international standards classification increased the likelihood 21-fold in the years of transition that a pharmaceutical company took advantage of the associated greater accounting latitude in the reporting of its accounting results to present a more favourable overall picture of itself. By itself, the control variable for the two years of transition concerned did not have a significant effect on the indicator, so there were no time-varying circumstances between the two years of transition that could significantly explain the differences between the categories according to the score scores.

Table 4

Logistic regression results of the impact of IFRS transition on M-Score in the energy sector

Title	Coef.	St.Err.	t-value	p-value	Odds-ratio	95% CI (bottom)	95% CI (top)
Transition (dummy)	1.934	0.874	2.21	0.027**	6.917	0.222	3.646
Year	-0.012	0.893	-0.01	0.989	0.988	-1.762	1.738
Constant	-0.832	0.276	-3.01	0.003***	0.435	-1.373	-0.291

Source: Authors' results. * indicates significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level.

Based on the results presented in Table 4, the previously presented model for the energy sector produced a less robust model with relatively low explanatory power: the chi-square value with a significance level of 5% indicates that the model as a whole was only just significant at the 95% confidence level (χ^2 = 5.978, p = 0.050). However, this is further evidenced by the finding that the variables with 20% explanatory power in the pharmaceutical industry can explain only slightly more than 6% of the variance of the manipulation categories' dummy variables in the energy sector (pseudo R^2 = 0.062). However, even within this model, the change of the accounting system proved to be highly significant: according to this model result, the change itself increased the probability that the financial statements prepared by companies are already classified as manipulated according to the Beneish model by a factor of almost 7. As in the pharmaceutical sector, there was insufficient statistical evidence to support the explanatory power of the years included as a control variable, so that in this sector there could not be a time-varying circumstance that would have significantly affected the variance of the dependent variable, independent of the transition.

4.2. Application of the Jones Model to demonstrate the impact of transitioning to IFRS

The research question was to what extent the quality of accounting statements changes in the transition process for the migrated companies only. For this purpose, we have conducted a Wilcoxon signed rank sum test of the differences between the normal accruals and the actual values calculated by regression estimation from an industry sample population for the sample of firms concerned only.

Table 5

Results of linear regression estimation of non-discretionary accruals on modified Jones model variables

Sector	Pharmaceutical sector		Energy sector	
Year	2016	2017	2016	2017
Sample size	n = 488	n = 518	n = 413	n = 416
R value (F value sign.)	0.3515 (<0.001)***	0.3884 (<0.001)***	0.3659 (<0.001)***	0.2567 (<0.001)***
R-square	0.1235	0.1508	0.1338	0.0659
Intercept (p-value)	0.1474 (<0.001)***	0.0676 (0.002)**	0.0938 (<0.001)***	-0.0135 (0.539)
1/ $Assets_0$ (p-value)	-304.9310 (0.767)	-3589.8891 (<0.001)***	-1664.0780 (0.088)	5008.4779 (0.002)**
$(Rev-Rec)/Assets_0$ (p- value)	-0.2456 (<0.001)***	-0.1493 (<0.001)***	-0.1723 (<0.001)***	-0.1139 (<0.001)***
$PPE/Assets_0$ (p-value)	0.0287 (<0.001)***	0.0366 (<0.001)***	0.0039 (0.748)	0.0115 (0.015)*

Source: Authors' results. * indicates significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level.

The results show that the correlation is significant in both sectors ($p < 0.001$), indicating that the model explains the observed data well. The R-values indicate a similar moderately strong correlation (0.35-0.38) in the pharmaceutical and energy sectors, although this resulted in a weaker value for the energy sector in 2017 ($R = 0.2567$). Although the R-squared values suggest that the dependent variable of accruals is better explained by the values of tangible assets and changes in turnover of pharmaceutical companies than in the energy sector, overall the Jones model correlations did not prove to be statistically strong enough in terms of explanatory power. In 2016, the previous year's asset stock, considered as the first explanatory variable in the theoretical model, did not yet have a significant impact on the value of accruals as a share of assets in any industry, but this changed the following year: while in the pharmaceutical sector, larger companies also report higher accruals as a share of assets, in the energy sector this relationship is now inverted and more sensitive. However, the significant effect of the current year's tangible fixed assets is no longer observed over time, but rather across industries: in the pharmaceutical segment, there is a more general correlation that the increase in tangible fixed assets has a noticeable positive impact on the normalised difference between profit after tax and operating cash flow, which was less expressed in 2017 and not at all in the previous year for operators in the energy business. In contrast, the asset ratio of the change in turnover less the change in accounts receivable already had a negative impact on the asset ratio of the accruals considered as a profit and loss variable in both sectors under review and in both years under review, with 95% confidence.

After the implementation of the coefficients of the regression models with the variables of the modified Jones model on the data of the migrating firms, it was possible to estimate the differences between the normal and the actual (asset normalised) accruals for all the industry participants, which were compared between the two industries using the Wilcoxon signed rank sum test in Table 6.

Table 6

Results of the Wilcoxon signed-rank test applied to current-year HAS and IFRS data

Szektor	Sample size (n)	Median (HAS)	Median (IFRS)	Rank statistic	Z-statistic	p-value
Pharmaceutical sector	8	-0.0859	-0.0024	36	-0.8400	0.4008
Energy sector	8	0.0746	0.0427	36	2.5210	0.0117

Source: Authors' results. * indicates significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level.

In the pharmaceutical industry, the results of the Wilcoxon signed-rank test summarized in Table 5 indicate no statistically significant difference in discretionary accruals calculated based on identical Hungarian Accounting Standards (HAS) values but varying subject values under HAS and IFRS standards. This lack of significant difference may partially be due to both positive and negative deviations as well as changes in sign observed among the industry players within the sector. Consequently, we cannot reject the null hypothesis, which posits that the differences in values calculated under Hungarian and IFRS standards are equivalent. In contrast, in the energy sector, the Wilcoxon signed-rank test reveals a statistically significant difference in discretionary accruals ($z = 2.521$, $p = 0.0117$). Furthermore, the discretionary accruals calculated under IFRS values were significantly lower than those based on Hungarian standards, suggesting that international standards provide a statistically more reliable representation of the financial performance of companies in the sector. Such a clear association, however, cannot be identified in the pharmaceutical sector.

Figure 1 illustrates the detectable change in normalized discretionary accruals with the transition to IFRS, shown separately for each industry. Based on this, pharmaceutical companies exhibited discretionary

accruals that varied considerably in both positive and negative directions when the same year's Hungarian accounting data was restructured according to international standards. In contrast, this variation was observed to be narrower and with less dispersion in the energy sector. Although the smaller sample size of transitioning companies limits the reliability, more homogeneous outcomes may be anticipated within the energy sector, where discretionary accruals uniformly decreased, albeit minimally. Conversely, in the pharmaceutical segment, over half of the transitioning companies – consistent with models explaining M-score values – presented greater distortions in reported accounting data when using the international reporting standards rather than local ones.

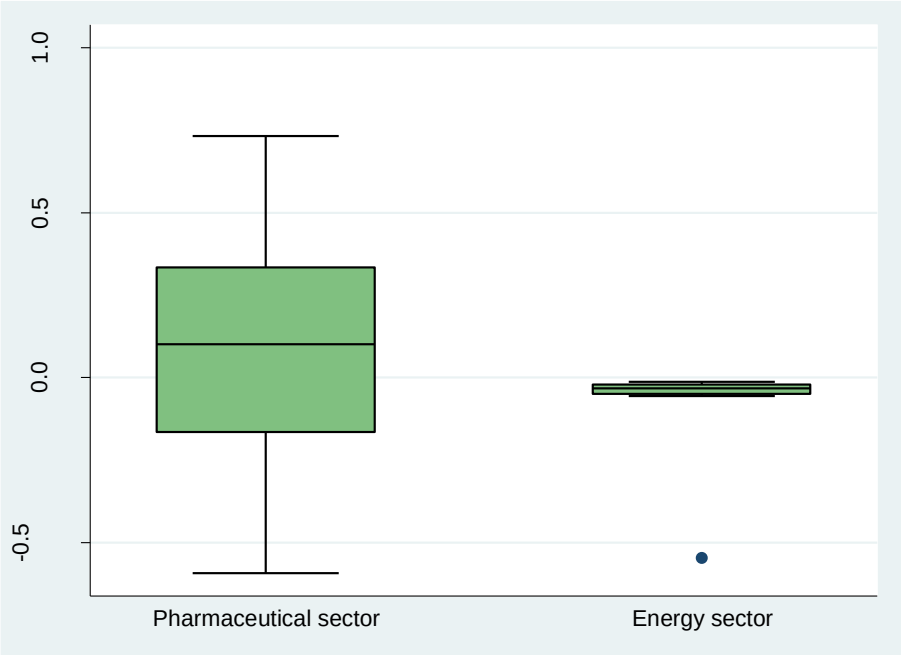

Figure 1. Change of discretionary accruals in transition to IFRS in the parmaceutical and energy sector

Source: Authors' edition with using Stata program

5. CONCLUSION

In summary, the results indicate that the impact of IFRS adoption on earnings manipulation differs primarily across the industries examined, as shown by statistical tests. Due to the low reliability and the consequently more challenging interpretability of the results from the logistic regression model, it became necessary to apply the modified Jones model based on a linear regression relationship to the accounting data of Hungarian pharmaceutical and energy companies collected for the transition years. In the energy sector, narrower variance and more homogeneous results suggest that, while half of the transitioning companies may have used cost accounting techniques that could distort earnings—primarily due to an additional decline in already negative differences—this effect was limited in scope. Conversely, the other half of the sample exhibited changes in the opposite direction: although to a minor extent, the transition to IFRS appeared to enhance the reliability of their reports. In the pharmaceutical sector, however, due to higher heterogeneity in the data, no clear trend was observed. The larger deviations pointed to a greater exploitation of opportunities for earnings manipulation, resulting in more significant distortion of financial reports, consistent with Kliestik's (2021) findings for the region. Among the transitioning companies, normalized discretionary accruals increased for more than half, with only one instance explained by a reduction in

negative deviation, resulting in more reliable results. For the remaining cases, the increases could be attributed to either a rise in preexisting deviation or a reversal of the distortion's sign, leading to a more favorable profitability profile from an investor's perspective. This lack of a straightforward relationship further reinforces Miková's (2014) findings that IFRS alone may not prevent earnings manipulation, as local regulatory and audit environments play a crucial role.

The findings of this study also hold relevance for external auditing, providing government and regulatory bodies with insights to evaluate taxpayers and their financial reports, and to identify high-fraud-risk companies and sectors from an audit and oversight perspective. Although relatively few companies in Hungary—the focus of this study—have transitioned to international financial reporting standards compared to the overall number of companies, it is still possible to conclude that industry-specific characteristics could heighten the use of earnings manipulation techniques during a change in reporting structure. This is a consideration that institutional policymakers, as well as investors who rely on financial reports in part for decision-making, should prepare for. While the study's limited sample size offers only constrained support for investor concerns over quality changes in reports related to shifts in accounting systems, further analyses will be needed as the number of transitioning companies increases and models are expanded to include new variables. Nonetheless, as evidenced by the less significant yet statistically relevant variations in the energy sector, the results also highlight the potential benefits of IFRS adoption from an institutional incentive perspective.

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