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THE IMPACT OF IFRS ADOPTION ON COMPANIES' FINANCIAL RATIOS: EVIDENCE FROM LITHUANIA

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Abstract. According to previous research, a company's choice to adopt International Financial Reporting Standards (IFRS) may change accounting quality, comparability of financial statements, transparency, cost of capital, foreign investments, financial ratios and many other aspects. The main objective of this study was to evaluate the impact of the adoption of IFRS on financial ratios of Lithuanian state-owned companies. The study investigated financial ratios (profitability, liquidity and leverage) from the financial statements of 15 state-owned companies which adopted IFRS in the last decade. Data were manually collected from the companies' financial statements on websites, and statistical analysis was performed for the empirical study. The research results showed that IFRS adoption is related to decreased profitability (ROA, ROE, gross margin ratio, net profit margin) ratios, and liquidity ratios (current ratio and quick ratio), but none of these changes was significant. Leverage ratios (financial dependency ratio, debt ratio) varied differently: the financial leverage ratio had a statistically significant decrease, while the debt ratio had a significant increase. Comparing the obtained results with the results of other studies, it can be seen that similar results are obtained only with leverage ratios.

Keywords: IFRS adoption; financial ratios; impact; Lithuania

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1. Introduction

Each country in the world regulates its accounting system independently. The main idea of creating and issuing International Accounting Standards, later International Financial Reporting Standards (IFRS), was to harmonize accounting in the world, and to improve the comparability and transparency of financial statements so that users of financial statements can more easily compare companies in their investment process when making financial and economic decisions, although other economic consequences are also expected after this process. Now IFRS are mandatory, implemented in 87 percent of jurisdictions (Ball, 2016; International Financial Reporting Standards Foundation, 2017), mostly for listed companies. But other companies may choose an accounting regulation system between domestic accounting standards and IFRS. Therefore, companies may voluntarily use IFRS according to their accounting practice, characteristics, and needs of the users of accounting information.

As the main purpose of the International Accounting Standards Committee was to develop IFRS that bring transparency, accountability and efficiency to financial markets around the world (International Financial Reporting Standards Foundation, 2017), a very important issue is to explore what is the actual impact of IFRS adoption on a company's activity. With the transition to other accounting regulations, the numbers of the financial statements may be accounted for and measured differently, as a result of which the financial ratios derived from them and used for the financial analysis may also undergo certain changes. Therefore, the impact of IFRS adoption on accounting quality, comparability of financial statements, transparency, cost of capital, foreign investments and many other aspects has been examined in the context of the widespread implementation of IFRS worldwide. Opare et al. (2021) found that IFRS adoption has increased financial reporting comparability and market liquidity, and reduced the cost of equity. The impact on the financial performance of companies is not as widely examined in the literature as the impact on the quality of accounting or the comparability of financial statements, because IFRS adoption was not focused on changes in financial performance. But the impact on financial ratios is also an important economic change for a company, as they are the main indicators of the company's financial position, and are used by the company's managers and employees, investors, creditors and regulatory institutions. Therefore, it is necessary to examine the impact of IFRS adoption on the company's financial performance, as their changes affect the actions and decisions of users of external and internal financial statements.

Many studies on changes in the financial performance of European, African, Asian and North American companies that have adopted IFRS can be found in the literature. Changes may differ from country to country, depending on differences between national standards and IFRS. The impact of IFRS adoption in Europe on the numbers of financial statements and related aspects has been further explored since the European Union (EU) Regulation no. 1606/2002, when the mandatory application from 2005 of IFRS affected many listed companies in EU countries. Studies by Chan et al. (2015) and Utku & Kaya (2019) investigated the impact of IFRS adoption in more than 5 European countries, mostly in Western Europe. But if we consider that accounting systems in Western Europe and Eastern (post-Soviet) Europe differ, we may conclude that the impact of accounting change from domestic standards to IFRS should differ too. We found only a few investigations in Eastern European countries: Vellam (2012) researched the impact of IFRS adoption on financial ratios of Polish companies; Munteanu et al. (2014) and Neag (2014) in Romanian companies; and Jindřichovská & Kubíčková (2014) in Czech companies. Gastón et al. (2010) argue that the simultaneous adoption of new common accounting standards by different countries to obtain comparable financial information raises the question of how this change affects the financial statements issued by companies in each country. Therefore, the choice to research the impact of IFRS adoption in Lithuanian companies may be a good example of economic consequences of the change of accounting systems in the further evolution of knowledge in the Eastern European region which had the same features of accounting earlier, but now the accounting system is mixed.

In Lithuania, as an EU member state, the adoption of IFRS was mandatory for listed companies before 2005 or even earlier. Other companies have a choice to apply domestic Business Accounting standards (BAS) or IFRS

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according to the LR Law on Accounting (2011). State-owned enterprises (SOEs) have been recommended to start applying IFRS since 2010, but this recommendation has a mandatory aspect because there is the requirement to "apply or explain" – if the enterprise does not switch to IFRS it should present arguments to explain why. Then, we have one more "mandatory" recommended case for exploring the impact of IFRS adoption on financial ratios in the last decade – with quite new and publicly available data. Besides, SOEs are quite large companies which play an important role in the country's economy. This is why this topic is relevant today. Moreover, accounting standards are the same for private companies and SOEs, therefore, we may conclude that the impact of IFRS adoption should be the same.

In much research, the impact of IFRS adoption on a company's financial ratios is not clear. Some research results do not show any significant change in financial ratios after IFRS adoption (Abdul-Baki et al., 2014; Abdullahi et al., 2017; Blanchette et al., 2011; Dimitrios et al., 2013; Ibiamke & Ateboh–Briggs, 2014; Jindřichovská & Kubíčková, 2014; Munteanu et al., 2014; Paulinus et al., 2018; Shukla, 2015). Many studies show that IFRS adoption has undergone significant changes (Achalapathi & Bhanusireesha, 2015; Callao et al., 2007; Gastón et al., 2010; Istrate, 2013; Lantto & Sahlström, 2009; Lueg et al., 2014; Moura & Coelho, 2016; Stent et al., 2010; Utku & Kaya, 2019). Hence, we need further evidence from an Eastern European country to assess the latest implications of IFRS adoption on financial ratios in a globally harmonized accounting world.

The main objective of this study was to evaluate the impact of IFRS adoption on the financial ratios of Lithuanian state-owned companies (SOEs).

The methods of this study. The researchers used systematic and comparative analysis of scientific literature, synthesis, generalization, and induction method for the analysis of empirical research. Secondary data were manually collected from the SOEs' websites, and statistical analysis was performed for the empirical study. To evaluate the impact of IFRS adoption on financial ratios, researchers applied descriptive statistics measures (averages, medians), Gray's Comparability Index, Shapiro Wilk test, F-test, t-test and non-parametric Wilcoxon Signed Rank test of selected financial ratios computed under IFRS and BAS by using Statistical Package for Social Science (SPSS) software.

The remainder of the paper is organized as follows. Section 1 provides a literature review for the proposed research framework. This is followed by a detailed description of research methodology and research findings of consequences of the IFRS adoption in Lithuanian SOEs. Finally, the last section presents and discusses conclusions and research limitations.

2. Literature Review

External and internal users of a company's financial statements use not only the numbers from the financial statements, but also the calculated financial ratios, which more accurately describe the company's financial and economic performance. When a company changes its accounting policy from domestic accounting standards to IFRS, it has changes of values in financial statements and, therefore, changes in the company's financial ratios, which are the main means of financial analysis.

As the impact of the IFRS adoption on a company's financial ratios is not one of the main issues in recent research, most investigations were more focused on qualitative features (comparability, transparency, accounting quality). But the impact of IFRS adoption remains also an important object of the studies worldwide, and we can find many studies with this research object in different countries, though these are mostly single-country studies. Stent et al. (2010) investigated 56 listed New Zealand companies in 2005–2008 and found the median for each of four ratios (return on equity – ROE, return on assets – ROA, leverage and return on sales – ROS) increases and decreases for asset turnover. Blanchette et al. (2011) identified that the distribution of means and medians of financial ratios suggests that IFRS does not affect significantly the financial condition of 9 listed Canadian companies in 2007–2009.

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Ibiamke & Ateboh–Briggs (2014) found that IFRS adoption has caused a statistically insignificant negative impact on the financial ratios (profitability, liquidity, leverage, market) of 60 Nigerian listed firms in 2010–2012. Abdul-Baki et al. (2014) analyzed changes of financial ratios in 2004, 2010 of one company and did not find a significant difference between Nigerian GAAP and IFRS. The research results of Abdullahi et al. (2017) showed that IFRS adoption has no significant positive association with 8 Nigerian oil and gas companies' performance (profit margin, ROA and ROE ratios) in 2012–2013. Paulinus et al. (2018) revealed that IFRS adoption by 104 listed entities in Nigeria has effects on firm profitability. The results of the study in 2012–2017 also showed that, statistically, the differences between both standards are not significant.

Achalapathi & Bhanusireesha (2015) studied the financial ratios of 10 Indian companies in 2008–2014 and defined that IFRS adoption has led to a statistically significant increase in liquidity, profitability and valuation ratios. Shukla (2015) researched the financial ratios of 10 Indian listed companies in 2010–2011 and 2014–2015 and found there is no significant improvement in financial risk, investment activities, operating activities and debt covenant. Debt ratios after IFRS adoption by 78 Brazilian firms in 2008–2015 were investigated by Moura & Coelho (2016) and they found evidence of significant changes in the debt ratio towards both higher and lower debt with predominance of greater ratios.

Analyzing performed investigations in European countries, we may see the important impact of EU Regulation no. 1606/2002 on the IFRS adoption process. Much research has begun to examine IFRS adoption made after the mandatory application in EU listed companies from 2005. The financial statements of 26 listed companies in Spain were investigated by Callao et al. (2007). They found cash, solvency and indebtedness ratios, as well as the ROA and ROE, varied significantly as a result of the changes in the balance sheet and income statement. They concluded that the economic and financial positions of Spanish firms, reflected in accordance with IFRS, are significantly different from the picture presented by local accounting standards.

The results of the Lantto & Sahlström (2009) study indicate that IFRS adoption changes the magnitudes of the 2002–2005 period key accounting ratios of 91 Finnish companies by considerably increasing the profitability ratios and gearing ratio moderately, and considerably decreasing debt and liquidity ratios.

The Gastón et al. (2010) study showed IFRS application for 74 Spanish and 100 UK first-time adopters in 2004 caused a higher value on assets and liabilities, lower equity and higher income in UK. A worse financial position referred to solvency and indebtedness in both countries, liquidity in Spain, but better profitability in the UK. The quantitative impact is significant in Spain and the UK and, against what was expected, it is higher in the UK. Lueg et al. (2014) investigated 101 UK companies from the FTSE 250 in 2005 and revealed that profitability and liquidity ratios increased significantly and were substantial in magnitude. Sovbetov (2015) studied 80 of the largest firms from the UK FTSE 100 in 2003–2006 and found that IFRS had affected profitability and capital structure ratios of the firms, but had not affected all efficiency and liquidity ratios. Therefore, Lueg et al. (2014) concluded that these differences in the UK have the same causes as in a creditor-oriented code law regime, i.e., an increase in operating income, net income, current liabilities and invested capital, as well as a decrease in shareholder equity.

No statistically significant difference between Greek GAS and IFRS was found in Greek companies in 2004–2010 (Dimitrios et al., 2013). Also, the changes in all examined indicators (firms' value, performance, and stability) of Czech firms did not prove to be statistically significant in 2004–2005 (Jindřichovská & Kubíčková, 2014).

Vellam (2012) analyzed IFRS adoption impact in 40 listed Polish companies in 2004–2005 and found that slightly more companies increased their profits and fewer decreased their profits, but the variation in the median of the earnings index was not significant for the large and small company sample. The findings for a sample of companies showed that equity increased significantly on the adoption of IFRS pointing to the significant difference between Polish accounting and IFRS. The impact of IFRS adoption on equity was considerably greater than on profits.

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Two research studies of the IFRS adoption impact on financial ratios of Romanian listed companies in 2011–2012 were found. The results of the Munteanu et al. (2014) study reveal that no statistically significant differences at median and mean level were observed, but when the variance was analysed, solvency ratios and ROE were found relevant. Neag (2014) defined that the net income and equity under IFRS were lower than provided under Romanian accounting regulations. Therefore, the application of IFRS had a small effect on net income and shareholders' equity in Romanian listed companies.

We found only a few studies which analyzed the impact of the IFRS adoption in more than one country. Istrate (2013) researched financial ratios of 593 companies listed on Euronext markets in 2005 and concluded that: 1) for equity, the IFRS numbers are a little greater than the ones in the former GAAP, except for the Netherlands; 2) for net income, the transition to IFRS determined its significant increase, on average; 3) the leverage ratio changes very little; 4) for the modifications of returns (ROE and ROA), a significant increase generated by transition to the IFRS. Also, after the analysis of 384 companies in 11 European countries in 1995–2014 Utku & Kaya (2019) concluded that profitability ratios showed a significant change in more countries in the short-term rather than in the long-term, and statistically significant differences of structure and operational ratios have occured in the long term.

Summarizing results of research studies on the impact of IFRS adoption on financial ratios, the following groups of financial ratios are commonly used by authors in their studies: first, profitability ratios mostly increased, especially ROE and ROA; second, liquidity ratios show a change, but both positive and negative, which does not allow one-sided conclusions to be drawn; third, leverage ratios almost always increase.

The studies also sometimes include solvency, operating, investment valuation and coverage indicators, but they were applied in only a few studies, which does not allow a common opinion on the impact on them after IFRS adoption. Several studies also show different conclusions that IFRS adoption does not have a significant impact on a company's financial ratios at all. Different research findings may be due to the fact that many other things can affect financial performance. Jindřichovská & Kubíčková (2014) concluded that transition of Czech statements to IFRS may cause changes in the values of financial indicators without relationship to the real change in the firms' value, performance, and stability. Gastón et al. (2010) expected the quantitative impact of IFRS to be significant due to differences between local and international standards, and that this impact would be higher in Spain because IFRS have always been considered close to the Anglo-Saxon accounting model and distant from the European continental accounting model. However, the results of their research revealed that the quantitative impact has been significant in both countries, though it has been higher in the UK. So, different national accounting standards and accounting practices in each country may cause the extent of changes after IFRS adoption, which may or may not affect changes in financial ratios. In summary, changes in financial ratios may be caused by economic events or company performance, but the change also is possible, according to the authors' research, from changed accounting standards, although not in all countries or companies.

3. Research Methodology

Choosing to investigate the impact of IFRS adoption on financial ratios we need to choose those ratios that best describe a company's financial performance and meet the needs of users, as it is important to consider the impact on such ratios, which are the most necessary for decision-making. The authors analyzed state that they choose to consider these financial ratios, because they are the most widely used in analyzing a company's performance and financial position, described as the main indicators (profitability, liquidity and leverage) of interest to investors, analysts, business leaders and creditors. Table 1 shows which financial ratios were chosen by the authors discussed.

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Table 1. Financial ratios analyzed in other research

Authors, year	Financial ratios
Callao et al. (2007)	CR, QR, Cash ratio, solvency, D/E, ROA, ROE
Lantto & Sahlström (2009)	CR, QR, E, GR, OPM, P/E, ROE, ROIC
Gastón et al. (2010)	CR, solvency, D/E, ROA, ROE
Stent et al. (2010)	ROE, ROA, D/E, asset turnover, ROS
Blanchette et al. (2011)	CR, QR, D, E/A, IC, cash flow coverage, operating cash flow, ROA, GPR, EBITDA, asset turnover
Vellam (2012)	Equity, ROE
Istrate (2013)	Equity, D, income, ROE, ROA
Dimitrios et al. (2013)	CR, QR, D, E, E/D, ROA, ROE, ROIC, EBITDA, GPR, ROS, turnovers (equity, assets, fixed assets)
(Ibiamke & Ateboh–Briggs, 2014)	EPS, ROA, ROE, CR, NCFO, D/E, D, P/E
Lueg et al. (2014)	OPM, ROE, ROIC, CR, P/E
Munteanu et al. (2014)	CR, solvency, D/E, ROA, ROE, ROS, autonomy
Neag (2014)	Net income, equity
Abdul-Baki et al. (2014)	GPR, ROS, ROIC, CR, QR, CRA, D, GR, Cash Flow ratio, EPS, DPS, dividend payout
Jindřichovská & Kubíčková (2014)	ROE, ROA, ROS, ROCE, CR, QR, Cash ratio, D, E, D/E, IC, turnovers (assets, inventory, receivables, liabilities)
Chan et al. (2015)	IC, ROA, COD, IC
Sovbetov (2015)	ROE, ROCE, ROA, PM, CR, QR, GR, book-to-market value, turnovers (net assets, stock)
Achalapathi & Bhanusireesha (2015)	D/E, D, E, IC, Cap ratio; CR, QR, CF/NA, CF/NW, CF/CL, CF/TL, GPR, NPR, OPR, ROA, ROAE, ROACE; EPS, B/M, M/C, P/E
Shukla (2015)	QR, ROE, D/E; ROA, fixed asset turnover, debt to total capital, debt to EBITDA, IC
Moura & Coelho (2016)	D/E, D
Abdullahi et al. (2017)	ROS, ROA, ROE
Paulinus et al. (2018)	EPS, ROA
Utku & Kaya (2019)	CR, QR, Cash ratio, financial leverage; ROA, ROE; turnovers (net fixed assets, asset, inventory, accounts receivable)

CR – current ratio, QR – quick ratio, CF/NA – cash returns to net assets, CF/NW – cash returns to net worth, CF/TL – cash returns to total liabilities, CF/CL – cash returns to current liabilities, GPR – gross profit ratio, OPR – operating profit ratio, ROAE – return on average equity, ROACE – return on average capital empoyed, OPM – operating profit margin, ROIC – return on invested capital, NCFO – net cash flow from operation to current liabilities, P/E – price-to-earnings ratio, IC – interest coverage ratio, GR – gearing ratio, ROS – return on sales, ROCE – return on capital employed, Cap ratio – capitalization ratio, B/M – book-to-market ratio, M/C – market-to-cash ratio, BVPS – book value per share, EPS – earnings per share before extraordinary items, D/E – leverage, D – debt ratio, E – equity ratio, COD – interest expense divided by interest bearing debt.

Source: compiled by authors according to the listed in the table sources.

Profitability ratios show how effectively a company is able to earn revenue and use it to make a profit. The authors mostly examined these ratios: ROE, ROA, return on invested capital (ROIC), gross and net profit margin and return on sales (ROS). Results of research by Abdul-Baki et al. (2014), Abdullahi et al. (2017) and Paulinus et al. (2018) stated that profitability ratios did not change significantly after the IFRS adoption. Research results of Callao et al. (2007), Jindřichovská & Kubíčková (2014), Neag (2014), Ibiamke & Ateboh–Briggs (2014) stated that profitability ratios decreased after the IFRS adoption, but most studies show different results. Results reported by Callao et al. (2007), Stent et al. (2010), Achalapathi & Bhanusireesha (2015), Istrate (2013) and Gastón et al. (2010) (except results in UK) found that profitability ratios increased after IFRS adoption; findings by Sovbetov (2015), Munteanu et al. (2014), Blanchette et al. (2011) and Utku & Kaya (2019) showed significant change of profitability ratios. Hence, the following hypothesis was formulated for further analysis:

H1: IFRS adoption significantly increases profitability ratios of Lithuanian companies.

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Liquidity ratios show whether a company has sufficient highly liquid assets and liabilities that could be used to meet the company's activities and liabilities in the short term. The authors mostly examined the indicators current ratio (CR) and quick ratio (QR). Liquidity ratios varied in the results of previous studies in different countries. Results of research by Callao et al. (2007), Istrate (2013) and Achalapathi & Bhanusireesha (2015) revealed that liquidity ratios increased after IFRS adoption, but Gastón et al. (2010), Ibiamke & Ateboh–Briggs (2014), and Jindřichovská & Kubíčková (2014) found a decrease of liquidity ratios. For Blanchette et al. (2011) the results of their study showed increased volatility of indicators, Utku & Kaya (2019) found a significant change of these ratios, and for Dimitrios et al. (2013), Abdul-Baki et al. (2014) and Sovbetov (2015) the results of their research did not show any change in liquidity ratios after IFRS adoption. Hence, the following hypothesis was formulated for analysis:

H2: IFRS adoption significantly decreases liquidity ratios of Lithuanian companies.

Leverage ratios are used to evaluate a company's debt levels. The authors mostly examined the indicators leverage coeficient (D/E) and debt ratio (D). Leverage rates in previous studies tended to increase. The results of the study by Moura & Coelho (2016) showed inconsistent results (both significant and insignificant change for different leverage ratios). Abdul-Baki et al. (2014) found no significant change in the leverage ratios after IFRS adoption, but Callao et al. (2007), Stent et al. (2010), Gastón et al. (2010), Istrate (2013), Ibiamke & Ateboh–Briggs (2014) revealed that leverage ratios increased after IFRS adoption. Sovbetov (2015) determined the significant changes in leverage ratios, and Blanchette et al. (2011) concluded increased changes in leverage ratios after IFRS adoption. Hence, the following hypothesis was formulated for analysis:

H3: IFRS adoption significantly increase leverage ratios of Lithuanian companies.

Table 2 shows the profitability, liquidity and leverage ratios which were selected for the research. The choice to analyze the relevant financial ratios in Lithuanian companies is based on financial ratios used in previous research and the frequency of their usage in practice.

Table 2. The financial ratios and their formulas

Financial ratio	Formula
Return on assets (ROA)	Net profit/assets
Return on equity (ROE)	Net profit/equity
Gross margin ratio (ROS)	Gross profit/Revenue (net sales)
Net profit margin (NPM)	Net profit/Revenue (net sales)
Current ratio (CR)	Current assets/Current liabilities
Quick ratio (Acid test) (QR)	(Current assets-inventories)/Current liabilities
Debt-to-equity ratio (D/E) (leverage ratio)	Debt/Equity
Debt ratio (D)	Debt/Assets
Equity ratio (E)	Equity/Assets

Source: compiled by authors.

Further research will be conducted in the following stages based on the research methods in previous research. Two-year financial ratios (before and after IFRS adoption) are calculated and descriptive statistics, which include averages, medians and their changes, are analyzed. Data are measured using the Gray Comparability Index to estimate the relative change of financial ratios after the IFRS adoption. Vellam (2012), Istrate (2013), Ibiamke & Ateboh–Briggs (2014), Achalapathi & Bhanusireesha (2015), Paulinus et al. (2018) used Gray's Comparability Index in their research, or sometimes referred to relative impact, which was used by Gastón et al. (2010). The index measures the extent to which the financial results reported under different accounting practices would provide a ratio about the measurement behaviour (Ali et al., 2016). The Gray Comparability Index is calculated using a formula (Istrate, 2013):

$$\text{Gray's Comparability Index (CI)} = 1 - \frac{previous\ numbers - IFRS\ numbers}{previous\ numbers} \quad (1)$$

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According to Achalapathi & Bhanusireesha (2015), consistent with previous studies, an index value larger than 1 suggests that the financial ratio under IFRS is higher than the financial ratio under domestic accounting standards; a value lower than 1 suggests that the financial ratio under IFRS is lower than the financial ratio under domestic accounting standards, and an index value of +1.0 is neutral, suggesting no change.

The advantage of this index is that it prevents any problems related to financial statements drafted in difference currencies (Gray et al., 2009). But the big weakness of the index is that it shows only the relative change; it does not show whether or not the difference if any is significant (Achalapathi & Bhanusireesha, 2015; Ibiamke & Ateboh–Briggs, 2014). This may be calculated with descriptive statistics.

Furthermore, we need to analyze whether the financial ratios are distributed normally. To determine the distribution of the means of financial ratios, Stent et al. (2010), Blanchette et al. (2011), Dimitrios et al. (2013), Munteanu et al. (2014) relied on asymmetry and excess coefficients and the Jarque-Bera test; Callao et al. (2007), Gastón et al. (2010), Abdul-Baki et al. (2014), Achalapathi & Bhanusireesha (2015) relied on Kolmogorov-Smirnov and Shapiro-Wilk tests; Sovbetov (2015) relied on Shapiro-Wilk and Lilliefors tests. Razali & Wah (2011), Saculinggan & Balase (2013) agreed that the Shapiro-Wilk test is more suitable for the analysis of various data distributions and data amounts compared to the Lilliefors, Kolmogorov-Smirnov tests.

The Shapiro-Wilk test is used to verify normality in subsequent statistical analysis. If the resulting p-value is less than the significance level (1% or 5% levels are used in the studies), the hypothesis that the data are distributed normally is confirmed, and vice versa.

The next step of the authors of previous studies was to determine whether the change in financial ratios after the IFRS adoption is statistically significant. The methods that help to determine statistical significance can be divided into two groups: 1) if it is a normal distribution, parametric tests are used; 2) if it is not the normal distribution, non-parametric tests are used.

A parametric t-test was used by Callao et al. (2007), Blanchette et al. (2011), Dimitrios et al. (2013), Jindřichovská & Kubíčková (2014), Ibiamke & Ateboh–Briggs (2014), Munteanu et al. (2014), Shukla (2015), Sovbetov (2015), Achalapathi & Bhanusireesha (2015), Paulinus et al. (2018) and Utku & Kaya (2019). A non-parametric Wilcoxon test was used by Callao et al. (2007), Stent et al. (2010), Gastón et al. (2010), Blanchette et al. (2011), Dimitrios et al. (2013), Munteanu et al. (2014), Sovbetov (2015) and Achalapathi & Bhanusireesha (2015). We may conclude that the basic parametric test of the normal distribution is the t-test**,** and the basic non-parametric test is the Wilcoxon test, which uses the median to calculate statistical significance.

The t-test and Wilcoxon test analyze the hypotheses, comparing the selected financial ratios (average and median respectively) before and after IFRS adoption:

- H0 – the averages (medians) of the two samples do not differ;
- H1 – the averages (medians) of the two samples differ significantly.

The t-test and Wilcoxon test evaluate by p-value. If the value is higher than the chosen significance level, hypothesis H0 can be rejected and it can be stated that the differences in financial ratios before and after IFRS adoption exist and are significant. The obtained results of changes in financial ratios and statistical analysis will show the rrectness of the statements of hypotheses H1, H2, H3, which can be accepted or rejected.

4. Research Results

Companies listed on the NASDAQ OMX Vilnius Stock Exchange adopted IFRS before 2005. Therefore, Lithuanian SOEs that have adopted IFRS during the last decade were selected for this research. SOEs are such companies in which the Republic of Lithuania holds a majority or all of the shares. Most of these companies are not listed on a regulated market and were therefore not required to adopt mandatory IFRS in 2005. SOEs,

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according to the Government of the Republic of Lithuania 2010 July 14 Resolution no. 1052 "On the Approval of the Description of the Guidelines for Ensuring the Transparency of the Activities of State-Owned Enterprises and the Designation of the Coordinating Authority" (LRV2010, 2010), had to keep their accounts in accordance with IFRS. However, as these guidelines are only indicative, companies could choose not to apply IFRS in accordance with the "comply or explain" principle, based on the Government of the Republic of Lithuania Resolution no. 1052, "Derogations from or non-compliance with the Transparency Guidelines are only possible if the reasons for this are necessary (appropriate)." As a result, enterprises that ignore the application of IFRS must justify the non-application of the standards for an important reason, and may proceed before those standards at a later date when their application would be appropriate for the entity. Thus, from 2010, SOEs have been switching to the application of IFRS.

At the beginning of 2021, 20 out of 49 SOEs applied IFRS. As the study requires financial ratios before and after IFRS adoption, those enterprises are selected that have previously applied BAS and whose financial statements prepared in accordance with BAS are publicly available. Of the 20 companies, 5 are non-compliant companies that do not have publicly available reports prior to IFRS adoption, or have applied IFRS only in their accounts. As a result, the sample of the research includes 15 Lithuanian SOEs that adopted IFRS in the 2011–2018 period. Most of these enterprises operate in the transport, financial, service and television services sectors, and there are several manufacturing companies. Since at the beginning of 2015 there was a change of operating currency in the Lithuanian market, when all companies changed their accounting numbers from Litas to Euros, and some (3) enterprises from the research sample present their financial statements in Litas and Euros. However, this will not distort the research results, as the financial ratios, as relative numbers, from financial statements prepared in Litas are calculated with the data from financial statements in the same currency.

We calculated the financial ratios for the 15 enterprises from their annual financial statements before IFRS adoption based on domestic accounting standards and the first year of IFRS implementation. The data of descriptive statistics are presented in table 3.

Table 3. Descriptive statistics of financial ratios changes after IFRS adoption

Ratio	Minimum		Maximum		Change of average	Change of median	Gray's index
	BAS	IFRS	BAS	IFRS			
ROA	-4.65%	-7.48%	13.64%	15.54%	-24,19%	-70.46%	0,76
ROE	-9.05%	-20.81%	15.21%	16.67%	-50.32%	-78.30%	0,50
ROS	15.97%	4.21%	109.59%	124.14%	-0.78%	-0.01%	0,99
NPM	-5.87%	-34.69%	98.74%	98.53%	-30.45%	-85.15%	0,70
CR	0.52	0.63	20.73	13.76	-8.44%	-48.8%	0,92
QR	0.47	0.56	19.10	12.81	-12.97%	-59.19%	0,87
D/E	0.03	0.05	9.86	3.62	-21.26%	159.76%	0,79
D	0.03	0.05	0.91	0.78	47.20%	169.02%	1,47
E	0.09	0.22	0.95	0.95	0.09%	4.05%	1,001

Source: Own calculations based on conducted research.

The values of all profitability ratios decreased after IFRS adoption: the largest change in the average is in the ROE (-50.32%), and the largest change in the median is in the ratio of NPM (-85.15%). The smallest change in the average and median is in the ROS. The value of the Gray CI shows that the profitability ratios of Lithuanian SOEs decreased after IFRS adoption, as the values of all indicators are lower than 1. The largest change in return is shown in ROE (0.5). The smallest change is seen in the ROS, whose value (0.99) is very close to 1 and shows that it has hardly changed.

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Liquidity ratios decreased slightly after the IFRS adoption: the average of QR decreased the most (-12.97%), and the median of quick liquidity also decreased the most (-59.19%). The same result is shown by the values of Gray's CI which are lower than 1 for all ratios. The largest change is seen in the CR, as its value deviates the most from 1.

Leverage ratios changed in various ways after IFRS adoption: the average of D/E ratio decreased (-21.26%), the D ratio increased (47.20%) and the E ratio remained almost unchanged (0.09%), the median of all leverage ratios increased with IFRS adoption, but this change of D/E and D ratios was the largest (159.76% and 169.02% respectively). The D/E ratio is the only one with a value of Gray's CI of less than 1, and it shows a decrease after IFRS adoption. The value of the E ratio is almost equal to 1, which means that it has hardly changed. The D ratio shows the highest value of all calculated selected financial ratios of the company – 1.47. This shows that after IFRS adoption, this ratio had the largest change – it had increased.

Table 4 shows the p-values obtained from the Shapiro-Wilk test with the chosen level of significance and the compliance with the hypothesis in selected financial ratios of companies before and after IFRS adoption.

Table 4. The results of Shapiro-Wilk test

Ratio	p-value		Hypothesis test
	BAS	IFRS	
ROA	0.151	0.288	H0
ROE	0.460	0.500	H0
ROS	**0.002***	**0.020****	H1
NPM	**<0.0001***	**0.007***	H1
CR	**0.000***	**0.002***	H1
QR	**0.000***	**0.001***	H1
D/E	**<0.0001***	**0.000***	H1
D	**0.001***	0.249	H0 IFRS, H1 BAS
E	0.119	0.244	H0

* p < 1%; ** p < 5%.
Source: Own calculations based on conducted research.

The numbers in bold in the table indicate that the calculated p-value is less than the selected significance level, which means that the data are not normally distributed. From the results of the tests, it can be stated that the ROA and ROE are normally distributed, while return on sales ROS and NPM are not normally distributed. All liquidity ratio data for both the years before and after IFRS adoption are not normally distributed. The p-values obtained are less than both significance levels. The distribution of leverage data is different. The values of the leverage ratio p-value indicates that the data are not normally distributed. D ratio data for BAS are not normally distributed, but for IFRS are normally distributed. E ratio data are distributed normally.

Furthermore, appropriate tests are used to determine the significance of the changes. Table 5 shows financial ratios' averages and medians before and after IFRS adoption and t-test and Wilcoxon test p-values.

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TABLE 5. The results of t-test and Wilcoxon test

Ratio	Results of t-test			Results of Wilcoxon test		
	Average		p-value of t-test	Median		p-value of Wilcoxon test
	BAS	IFRS		BAS	IFRS	
ROA	0.04	0.03	0.36	0.019	0.005	0.524
ROE	0.053	0.026	0.24	0.058	0.012	0.330
ROS	0.42	0.417	0.872	0.273	0.273	0.975
NPM	0.148	0.103	0.174	0.070	0.010	0.277
CR	4.532	4.149	0.572	3.192	1.634	0.421
QR	4.114	3.581	0.407	3.043	1.242	0.252
D/E	0.897	0.706	0.677	0.12	0.32	**0.083*** **
D	0.211	0.311	**0.057*** **	0.09	0.24	**0.048** **
E	0.687	0.687	0.959	0.73	0.76	0.978

** p < 5%, ***p < 10%.
Source: Own calculations based on conducted research.

The results show that the p-values for all profitability, liquidity and leverage ratios, except for the D ratio, are higher than the significance levels. Therefore, hypothesis H0, which states that the ratios of the two compared samples do not differ, cannot be rejected. The results of the t-test show that all profitability, liquidity and debt ratios, with the exception of one D ratio, did not change significantly after IFRS adoption. For the D ratio, hypothesis H0 is rejected and alternative hypothesis H1 is accepted. However, as the values of this ratio are not distributed normally for BAS and distributed normally to IFRS, based on data normality tests, additionally non-parametric tests should be applied to determine the significance of average differences, i.e., Wilcoxon test.

The analysis of Wilcoxon test shows that the p-values of all profitability and liquidity ratios are higher than the significance levels. This means that profitability and liquidity ratios did not change significantly after the IFRS adoption. Analysing leverage ratios, the p-value of the financial leverage ratio is less than the 10% significance level and the D ratio p-value is less than the 5% significance level. For these ratios, hypothesis H0 is rejected and the alternative hypothesis H1 is accepted, what means that the medians of the two samples differ significantly. As a result, IFRS adoption has led to a significant increase in the leverage ratio and the D ratio. The p-value of the E ratio is higher than the significance levels, therefore, hypothesis H0 cannot be rejected, and we may conclude that this ratio did not change significantly after the IFRS adoption.

Summarizing the results of statistical analysis of characteristics of the change in the values of financial ratios led to the **H1 hypothesis** (IFRS adoption significantly increase profitability ratios of Lithuanian companies) being **rejected**, as profitability ratios, although statistically insignificant, decreased. This is consistent with the results of Callao et al. (2007), Jindřichovská & Kubíčková (2014), and Ibiamke & Ateboh–Briggs (2014) who found that IFRS adoption has led to a decrease in profitability, but it was not significant.

The **H2 hypothesis** (IFRS adoption significantly decrease liquidity ratios of Lithuanian companies) **is rejected**, as liquidity ratios decreased statistically insignificantly after IFRS adoption. From their research, Gastón et al. (2010), Ibiamke & Ateboh–Briggs (2014), and Jindřichovská & Kubíčková (2014) found the same results, but other studies found no change in liquidity ratios after IFRS adoption (Dimitrios et al., 2013; Sovbetov, 2015), or the increase of liquidity ratios (Achalapathi & Bhanusireesha, 2015; Callao et al., 2007; Istrate, 2013).

The **H3 hypothesis (**IFRS adoption significantly increases leverage ratios of Lithuanian companies) **is accepted for the debt ratio (D)**. The E ratio had an insignificant very small increase. Also, the hypothesis H3 should be rejected for the leverage ratio because this ratio decreased significantly after IFRS adoption. In other similar studies, these ratios mostly showed an increase (Callao et al., 2007; Gastón et al., 2010; Ibiamke & Ateboh–Briggs, 2014; Istrate, 2013; Stent et al., 2010).

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Conclusions

Lithuania, as an EU Member State, adopted accounting regulation after the issue of EU Regulation No 1606/2002, which required accounting to be kept under IFRS in publicly listed companies. Other companies could voluntarily choose accounting standards between national or international. However, in 2010 the Lithuanian Government issued the recommendation for SOEs to implement IFRS in their accounting; if a company does not implement IFRS in accordance with this recommendation, it should explain why. Therefore, authors have chosen the sample of SOEs for this research because of their IFRS adoption in last decade and publicly available data from their financial statements.

After the analysis of research which investigated the impact of mandatory and voluntary IFRS adoption on companies' financial ratios in the world in recent decades, we may conclude that researchers mostly found significant impact of IFRS adoption on profitability, liquidity and leverage ratios. But there are investigations where this significant impact was not found. And we have no clear conclusions about this situation in one country or country group. Therefore, we need more evidence about the practice in the IFRS adoption implications on a company's financial performance.

The performed research in Lithuanian SOEs analyzed the impact of the IFRS adoption on three groups of financial ratios: profitability, liquidity and leverage. The research results showed that IFRS adoption is related to decreased averages and medians of profitability ratios, but some changes of ratios were stronger, some were very weak. But the change in profitability ratios after IFRS adoption was not significant. Liquidity ratios also decreased after IFRS adoption, but the change also was not statistically significant. Averages and medians of leverage ratios increased after IFRS adoption, except for the leverage ratio, which had a negative strong change of average. The results of the statistical analysis showed that the leverage ratio and the debt ratio had a statistically significant change: the debt ratio increased significantly, and the leverage ratio decreased significantly based on the change in the average and the Gray Comparability Index. The equity ratio had a very small insignificant increase.

Comparing the obtained results with the results of other studies, it can be seen that similar results are obtained only with leverage ratios. Profitability ratios in most previous studies increased, but there were some cases of decrease: the same result was obtained in this study. The decrease in liquidity ratios coincides with a third of the research of other authors discussed, but other authors also discussed the increase in ratios and the absence of change. Our results show a statistically significant increase in debt ratio, but the other two leverage ratios do not concur with the results of similar research.

The performed research has some limitations. First, it analyzed the IFRS adoption only of SOEs because their financial statements are available publicly. Moreover, they changed their accounting policy in the last decade, so this research was timely. But the population of SOEs is quite limited, because the number of such companies is not big. A larger population should include the population of private companies, but the data about the number of companies which voluntarily changed accounting policy from BAS to IFRS in last decade are not available. Only financial statements of listed companies are available, but they adopted IFRS before 2005. Therefore, the analysis of the impact of IFRS adoption on their financial ratios would be not timely and actual. Of course, accounting standards are the same for private companies and SOEs, therefore, we may conclude that the impact of IFRS transition should be the same, but it would be better to test financial ratios of private companies separately.

Second, we analyzed the impact of the IFRS change on financial ratios in two years – one year before and one year after – making the assumption that all economic circumstances were equal. Therefore, the change of financial ratios may be caused by factors other than IFRS adoption. Based on this fact, the users of financial statements should determine the causes of the numbers in companies' financial statements, because if a company changed

accounting policy from national accounting standards to IFRS it will have an impact on the company's financial performance, but this could be the consequence of other economic circumstances.

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