

https://dspace.org/

The Impact of IFRS 15 Adoption on the Financial Performance of JSE-Listed Companies in South Africa

Tchouaken Monkam, Marie Gisele

2022
University of the Witwatersrand, Johannesburg
https://hdl.handle.net/10539/39935
Tchouaken Monkam, Marie Gisele. (2022). The Impact of IFRS 15 Adoption on the Financial Performance of JSE-Listed Companies in South Africa [Master's dissertation, University of the Witwatersrand, Johannesburg]. WireDSpace. https://hdl.handle.net/10539/39935

Downloaded from a DSpace repository. https://dspace.org/

The Impact of IFRS 15 Adoption on the Financial Performance of JSE-Listed Companies in South Africa

Research submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree Master of Management in Finance and Investment

Student name	Student Number
Marie Gisele Tchouaken Monkam	**1243051**

Supervisor: Dr Sedjro Aaron Alovokpinhou

MMFI 2022

Abstract

This study investigates whether the adoption of the IFRS 15 standard has influenced the financial performance of firms listed on the Johannesburg Stock Exchange (JSE). The study analysed a sample of 188 firms from 2015 to 2020, using descriptive statistics, correlation and regression analysis to estimate the results. To establish the impact that the IFRS 15 standard has on real returns on equity and return on assets, while controlling other covariates, a Pooled OLS regression and a dynamic panel-GMM analysis were conducted. The IFRS 15 standard was measured as a dummy variable, while the financial performance was measured using accounting measures: Return on Assets (ROA) and Return on Equity (ROE). Endogeneity issues were addressed, and data analysis was performed on an unbalanced panel using the panel pooled OLS and two-step system GMM. The results revealed that the implementation of the IFRS 15 standard in 2018 had a significant impact, either negative or positive, on the financial performance of firms listed on JSE. This suggests that the introduction of new accounting standards impacts the financial performance (ROA, ROE) of companies listed on the JSE.

Keywords: Financial performance, IFRS15 adoption, DID model, macroeconomic factors, JSE.

JEL Classification E62, G30, B26

Acknowledgments

I dedicate this work to my Husband Aurelien Kanko, my beautiful kids Tifenne, Christopher, Michael, Daniel and my parents Mouka Tcheuffa and Mouka Rosette.

Ethical clearance

All ethical issues in this research were taken into consideration and observed. Permission to obtain the secondary data was obtained—the fundamental research adhered to all ethical requirements.

List of Tables and Figures

TABLES

TABLE 2.1 Previous standards and description

TABLE 2.2 IFRS 15 and Impact on Financial Statement Quality: The “Big-Four” Expectations.

TABLE 3.1 Model variable, explanation, measurements, and sources.

TABLE 4.1 Descriptive Statistics

TABLE 4.2.1 Pairwise correlations ROA

TABLE 4.2.2 Pairwise correlations ROE

TABLE 4.3.1.1 ROA Results before clustering (NC) and after clustering(C), without both clustering and macroeconomic variables (NC_M) and with both clustering and with macro variable (C_M)

TABLE 4.3.1.2 ROE Results before clustering (NC) and after clustering(C), without both clustering and macroeconomic variables (NC_M) and with both clustering and with macro variable (C_M)

TABLE 4.3.2.1 ROA Results before one and before two year of policy adoption, for both POLS and GMM

TABLE 4.3.2.2 ROA Results after one and after two year of policy adoption, for both POLS and GMM

TABLE 4.3.2.3 ROE Results before one and before two year of policy adoption, for both POLS and GMM

TABLE 4.3.2.4 ROE Results after one and after two year of policy adoption, for both POLS and GMM

List of Figures

Figure 1: The five steps revenue recognition model

Table of Contents

Abstract i

Acknowledgments i

Ethical clearance ii

List of Tables and Figures iii

List of Figures iii

1 Introduction 1

1.1 Background 1

1.2 Research gap 1

1.3 Objectives of the study 2

1.4 Research questions 2

1.5 Contribution of the study 2

1.6 Significance of the study 3

1.7 Structure of the report 4

2 Literature Review 5

2.1 Theoretical background 5

2.1.1 Development of IFR15 5

2.1.2 Potential effects of IFRS15 9

2.2 Empirical evidence 15

3 Research methodology and data 24

3.1.1 Methodology 24

3.2 Data 30

4 Results Estimation 32

4.1 Descriptive Statistics 32

4.2 Pairwise correlations 33

4.3 Regression estimates results 35

4.3.1 Estimated results using Pooled OLS before and after the policy adoption. 35

4.3.2 Estimated results using the Pooled OLS model and Dynamic panel system GMM 40

5 Results discussion 57

6 Conclusion 59

7 References 61

1 Introduction

1.1 Background

The latter part of the 20th century saw an unprecedented acceleration in globalisation, which was primarily driven by advancements in information technology. (Holban & Aldea, 2009; Tysiac, 2014). This phenomenon has extended to almost every aspect of human interaction and accounting (Ebaid, 2022). As a result, there has been an extended effort to harmonize accounting practices globally (Uwalomwa, 2020). The International Accounting Standard Board (IASB) has played a leading role in providing the accounting profession with several standards to support these endeavours, as highlighted by Umobong and Ibanichuka (2015). These standards, referred to as the International Financial Reporting Standards (IFRSs), are designed to promote the production of comparable financial reporting across different jurisdictions (KPMG, 2002). In 2002, the IASB and the Financial Accounting Standards Board (FASB) decided to collaborate on the convergence of their standards, leading to the creation of the Norwalk Agreement (Salah, 2020).

Since 2010, the new reporting standard, IFRS 15, has been developed in conjunction with the FASB under the Norwalk Agreement (PwC, 2014). Its primary objective is to align the income standards in these two benchmarks, allowing a better comparison of the financial information of companies around the world that report equally well under IFRS and US GAAP (Valentin &Adriana, 2018). The IFRS15 accounting standard aims to try to control the extent to which companies manipulate their accounting information, particularly revenue (Trabelsi, 2018). To help stakeholders, academics, and regulators understand the impact of the adoption of the IFRS 15 accounting standard, this paper provides theoretical and empirical evidence of its effects on the performance of Johannesburg Stock Exchange (JSE) listed companies.

1.2 Research gap

Several authors have studied the weaknesses of accounting standards, but there is still a knowledge gap regarding the adoption and performance of IFRS 15 in JSE-listed firms (Bohusova & Nerudova, 2015). De Sa Silva (2017) researched the impact of IFRS 15 adoption on JSE-listed

firms. However, the researcher only focused on the impact on internal operations of JSE-listed firms and not on the overall performance of companies before and after the adoption of IFRS 15. Most studies have been conducted on economies outside of Africa (Boujelben & Kobbi-Fakhfakh, 2020; Haggenmüller, 2019; Peters, 2016). In South Africa, most of the studies only explain the history and the implementation of IFRS 15, but neglect to analyse the overall impact of IFRS 15 on the financial health of JSE-listed companies. In addition, researchers have only explored the effects of IFRS 15 on one performance variable, neglecting the role of other variables in JSE-listed companies. This is a problem because companies listed on African stock exchanges, including the JSE, are also implementing IFRS 15 (Procházka, 2009, Da Silva, 2017). Therefore, this study seeks to cover this research gap with a specific focus on JSE-listed companies.

1.3 Objectives of the study

The main objective of this research is to analyse the performance of JSE-listed companies between 2015 and 2020, following the implementation of the new IFRS 15 accounting standard. The secondary objectives are as follows:

- To examine the impact that IFRS 15 adoption has on JSE-listed firms' returns on equity.
- To examine the impact that IFRS 15 adoption has on JSE-listed firms' returns on assets.

1.4 Research questions

This study attempts to answer the following questions:

- What is the impact of IFRS 15 adoption on JSE-listed firms' return on equity?
- What is the impact of IFRS 15 adoption on JSE-listed firm's return on assets?

1.5 Contribution of the study

This research contributes to the existing literature on how the adoption of IFRS 15 affects the real return on assets and real return on equity. Evidence is given on how companies have adopted this new standard and how it has affected their performance (Onie, Spiropoulos & Wells, 2022). This is done by combining and analysing studies from various research topics related to the implementation of IFRSs on financial performance. This study aims to provide policy stakeholders with an updated analysis of how the adoption of the new standard on the way revenues are

accounted for in the firm's balance sheet. This analysis provides updated information on how this affects both real returns on assets and return on equity respectively.

The study will be valuable to investors, financial analysts, accountants, and auditors in private and public parastatals (Rahmaningtyas, 2018) due to the importance of implementing IFRS in documenting accounting records, preparing financial records, reporting financial data, and making informed decisions. (Agyei Boapeah, 2018). policymakers will be able to use empirical data to make informed decisions about financial statement improvements or post-implementation reviews. This study will also be fascinating to academic and business researchers because it will promote more empirical research on IFRS adoption and implementation in South Africa and act as a repository of knowledge for those who are interested. Furthermore, the research demonstrates that the impact of IFRS 15 differs across industries, supporting the standard-setters' concerns with prior revenue recognition standards (IAS 18 and IAS 11) (Spiropoulas, 2020).

1.6 Significance of the study

The financial well-being of South African industries represented in the JSE is crucial to their contribution to the national and global economy. However, the period from 2015 to 2020 has presented many operational and financial challenges that have affected the financial stability of these industries. Examining the financial conditions of selected JSE-listed companies will help gauge the financial performance and sustainability of these industries. This study evaluates whether the implementation of IFRS 15 has resulted in higher or lower performance of JSE-listed companies by assessing their financial performance before and after the adoption of this standard. By doing so, this study will assist managers in ensuring consistent revenue.

Financial analysts will be able to use the study to predict future performance. The study is also significant to regulators who are concerned about the quality of the information and how well companies adhere to accounting standards. By analysing the firm performance before and after the adoption of the IFRS 15 standard, this research will help the standard makers to better evaluate the quality of the standard. This contribution is of significance in determining the potential impact of IFRS 15 on companies, not only in financial reporting but also in other aspects of the organization (PKF, 2017; Pw C, 2016).

1.7 Structure of the report

Chapter 1 provides an introduction to the research, including the background of the study, the study's contribution to the national economy, and challenges faced in financial reporting. The chapter also explains the research problem and outlines the study objectives. Chapter 2 covers the literature review, which is divided into two parts. The first part focuses on the theoretical background of the study, defining key theoretical concepts, including information asymmetry. The second part is the empirical literature review, which analyses recent scholarly work on the subject. Chapter 3 describes the methodology used to examine company performance, including data collection, and data analyses. Chapter 4 presents the results and data analysis; while Chapter 5 summarises the study and discusses the results. Chapter 6 provides the conclusion and recommendations of the study.

2 Literature Review

2.1 Theoretical background

2.1.1 Development of IFR15

Since 1973, there has been a global trend towards the harmonising of accounting standards (KPMG, 2016). South Africa has over the last few years, also recognised the need to harmonise accounting rules. IFRS 15 is a result of a long-awaited convergence project between the FASB and the IASB. The IASB's Conceptual Framework of 2010 outlines that the objective of financial reporting is to provide useful financial information about the reporting entity to existing and potential investors, lenders and other creditors to assist them in determining whether or not to provide resources to the entity (Ghiţă, Tăbîrcă, & Toplicianu, 2014). The IASB is responsible for developing IFRS and advocating their implementation, and the FASB for developing Generally Accepted Accounting Principles (USGAAP) in the public's best interest (Haga et al., 2021). The Accounting Practices Board (APB) was established in 1973 by the South African Institute of Chartered Accountants (SAICA) and other pertinent business organizations. One of its main responsibilities is creating Generally Accepted Accounting Principles and issuing Statements of Generally Accepted Accounting Practice (SA GAAP) (SA Profile, 2016). The (APB) objective is to create widely recognised accounting procedures and release Generally Accepted Accounting Statements Practice (SA Profile, 2016). In 1995, the APB decided to align SA GAAP with IFRS Standards, and since 2003, it has issued IFRSs as SA GAAP without modification following proper procedures. All South African businesses, including publicly traded, privately held, and unlisted businesses, began using SA GAAP in 2003. As of January 2005, listed companies are required by JSE Listings requirements to utilise IFRS Standards, instead of the harmonised SA GAAP.

In 2011, the South African government implemented new regulations under the Companies Act of 2008, to outline the reporting frameworks. To benefit from the global economy, South Africa joined the IFRS League of International Reporting. By using IFRS effectively, South Africa will increase Foreign Direct Investments (FDIs) and boost the confidence of financial experts, leading to increased investor confidence. IFRSs are a crucial component of the global market economy since they provide accurate and consistent financial data worldwide. In September 2010, the South

African government formally announced its decision to adopt IFRS and provided instructions for its application. This was seen as a success for South Africa as it became a member of the countries that have accepted IFRS. SAICA continued to serve as the technical advisor to the national standard-setter, the APB, until late 2011. However, due to changes in the Companies Act, the Financial Reporting Standards Council (FRSC), a newly established governmental body, took over as the Minister of Trade and Industry's advisor on financial reporting standards. South Africa's inclusion in the global economy is essential, as the world economy is more interconnected than ever before. South African businesses were required to comply with IFRS since January 2012, due to changes in accounting rules globally. As a result, SA GAAP was withdrawn from 01 December 2012.

Revenue recognition under USGAAP has been complex, resulting in different accounting practices for similar transactions within various industries. IFRSs have been criticised for being difficult to understand and for lacking guidelines on complex transactions. To address the inconsistencies and difficulties in comparing two companies using USGAAP or IFRS, the IASB and FASB jointly released a memorandum of Understanding Agreement called the Norwalk Agreement, through which the boards committed to the convergence of IFRS and USGAAP (Valentin & Adriana, 2018). The focus was the task of issuing a converged revenue recognition standard, hence the birth of the long-awaited as a result, IFRS15 standard was created to provide a more comprehensive and consistent framework for revenue recognition, and to improve the comparability of revenue recognition practices across countries and industries (Oncioiu & Tănase, 2016).

There are numerous standards and interpretation notes that cover different aspects of revenue recording. These include IAS18 for revenue; IAS11 for construction contracts; SIC31 for revenue barter transactions (including advertising services); IFRIC13 for customer loyalty programs; IFRIC15 for agreement for construction of real estate; and IFRIC18 for transfer of assets from customers. IFRS 15 consolidates previous standards and guides for reporting customer contract revenue. BC3 IFRS15 states that: "The objective of the new revenue recognition standard is to establish principles that an entity shall apply to report useful information to users of financial statements about the nature, amount, timing and uncertainty of revenue and cash flows arising from a contract with a customer. Certain aspects of the building industry are complex because of the

size and length of the projects and the dynamic nature of their projects (PwC SA, 2013). Some industry professionals and academics have expressed their concerns about the impact that IFRS15 has on companies (Lim, Devi, & Mahzan, 2015; Oncioiu & Tănase, 2016; Sammut Bickle, 2016).

Table 2.1: Previous Standards and Descriptions

Standard	Descriptions
IAS18 (Revenue)	Pertains to revenue recognition for the following transactions and events: sale of products; provision of services; and use of entity assets earning interest, royalties, and dividends by third parties (Zehri & Chouaibi, 2013).
IAS11(construction contracts)	Outlines the rules for allocating contract revenue and contract costs to accounting
	period during which construction work is conducted (Apostolov, 2015).
SIC31(Revenue barter transactions including advertising services)	Explains the conditions under which a seller can accurately estimate revenue at the fair market value of advertising services received or delivered in a barter arrangement (Bozkurt, Islamoğlu, & Öz, 2013).
IFRIC13 (customers loyalty programs)	Covers accounting by firms that issue loyalty award credits (like as 'points' or travel miles) to customers who purchase additional goods or services (Zehri & Chouaibi, 2013).
IFRIC15 (agreement for construction of real estates)	Relates to the timing of revenue recognition by real estate developers for unit sales, including apartments and houses (Wang & Brennan, 2014).
IFRIC 18(transfer of assets from customers)	Explains how a business should account for property, plant, and equipment obtained from a customer; that it must use to connect the customer to a network or provide the client with continued access to a supply of goods or services (such as a supply of electricity, gas or water) (Klein, Merfeld, Wilhelms, Falk, & Henkel, 2022).

The principle behind IFRS15 is to recognise revenue when the control over a product or service is transferred to the customer, (Piosik, 2021). Control is a broader concept than the previously used

criterion of risk and rewards that determine when the revenue should be recognised according to IAS 18. Research on IFRS15 is widely conducted by professional bodies and institutions. However, their research is mostly related to technical accounting and implementation questions (e.g., Deloitte, 2014, 2015; Ernst & Young, 2014, 2015, 2016; KPMG LLP, 2016; PWC, 2017). Academic research on the topic is scarce due to the standard's date of effect, which began on or after 1 January 2018. The European Union (EU) nations were among the early adopters of IFRS15, and most of the literature is from studies conducted in those countries. The following section provides an overview of the evolution of IFRS 15's related accounting standard (Haggenmuller, 2019).

2.1.2 Potential effects of IFRS15

The introduction of IFRS15, which is an international standard for revenue recognition, is expected to have a significant effect on certain industries, and the level of change will depend on the extent of changes required. The revenue recognition process will undergo significant alteration due to the implementation of a new standard (Gary, 2014). Every organization that generates revenue will be impacted, and industries, such as construction, telecommunications, entertainment, and media, are expected to experience significant accounting adjustments (Simon, 2014). Applying the new standard will affect all IFRS15 adopting companies and the principal element of their financial statements, which is revenues (Zehri & Chouaibi, 2013). The guidelines for specific sectors are utilised to understand whether the effects of this new standard will be the same in all industries. This is accessible on the websites of the Big Four. Table 2 outlines what has been analysed, especially the ideas given by the "BigFour" are consistent. The Telecommunications sector will be the most affected, while other segments will experience a normal impact.

Table 2.2. IFRS15 and Impact on Financial Statement Quality: The "Big-Four" Expectations.

	KPMG (a)	EY (b)	Deloitte (c)	PWC (d)
Insurance	Medium	Medium	N/A	N/A
Building and Construction	Medium	Medium	Medium	Medium
Retail and consumer goods	Medium	Medium	Medium	Medium
Licensors	Medium/High	N/A	Medium	Medium
Real estate	Medium	N/A	Medium	Medium
Technology	Medium	N/A	Medium/Low	High
Telecommunication	Medium	High	High	High
Energy(mining, oil and gas)	Medium	Medium	Low	Low
Transport	Medium	N/A	N/A	Low

Sources: (Marco & Giorgia, 2019)

a) (KPMG: 2016), "Revenue - Issues in depth", available at www.kpmg.com.

b) (Ernst and Young: 2016), "Revenue from contracts with customers, A summary of IFRS15 and its effects", available at www.ey.com.

c) In this case, the papers of each industry were analysed and the relative conclusion was taken from the analysis of each sector. The main element to arrive at the forementioned conclusion was the level of risk of error associated with the steps of the IFRS15 model.

d) (Price Waterhouse Coopers:2014), “IFRS15: implementation challenges”

According to IFRS15.BC3, the purpose of the new revenue recognition standard is to provide a more robust framework for addressing revenue recognition issues, and to improve comparability of revenue recognition practices across entities, industries, jurisdictions, and capital markets, while simplifying the preparation of financial statements through reduced guidance. (Bozkurt et al., 2013). The adoption of IFRS15 promotes globalization by providing higher quality, comparable and more complete financial data, which can attract foreign investment. It achieves this by limiting the information asymmetries to which shareholders are exposed (Peslak, 2013). To ensure transparency in decision-making, IFRS15 requires management to disclose all significant elements as part of the financial statements.

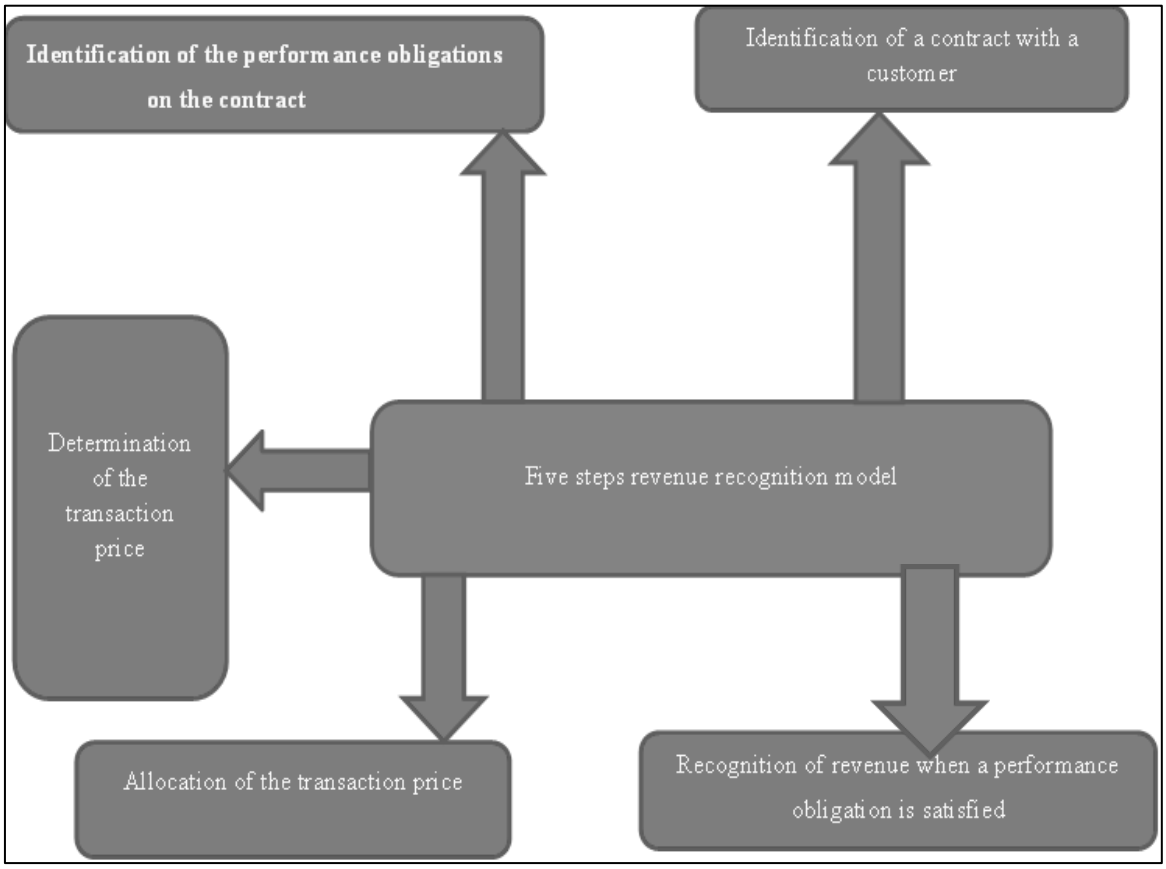
Reducing conflict of interest and increasing information asymmetry can lead to better economic performance and company valuation. The adoption of IFRS15 adoption by publicly traded companies in South Africa can improve corporate performance (Moser, 2014). Moreover, adopting a global revenue recognition standard reduces costs incurred by institutions when preparing financial statements for foreign investors, thereby achieving global capital market efficiency (Ahn, 2015). This can also improve company performance in the long run as it can be viewed through the lens of capital structure or other proxies (Kodongo, Maina &Mokoaleli-Mokoteli, 2014). The adoption of IFRS 15, will take macroeconomic aspects into account to enhance the performance of businesses operating in South Africa. However, since employee incentive plans are often tied to financial results, changes to revenue recognition may require organizations to rethink their compensation schemes. The use of IFRS can enhance the quality of macroeconomic parameters, which has a favourable impact on the company’s performance (Lowe, 1967).

Compared to IAS 18, IFRS 15 offers more comprehensive advice that may affect how the sale prices are allocated to various items and services within a contract, as well as the timing of revenue recognition. IFRS 15 provides a single, five-step methodology for contract revenue recognition, which aims to provide greater consistency and comparability across industries and business processes. The guideline outlines core principles to be followed when reporting information about the nature, amount, timing, and uncertainty of revenue and cash flows resulting from a customer contract (Onie, Ma, Spiropoulos and Wells, 2021). The impact of implementing IFRS15 will vary

depending on the specific customer contracts and how companies have reported revenue under present standards. The IASB consultation process made emphasis on companies having long-term or packaged contracts, such as the telecommunications and information technology industries (Onie et al., 2021). Inconsistent revenue recognition has been an issue in several industries, and the transition to IFRS15 is expected to bring significant changes in this area.

The new revenue model will apply to all customer contracts except for leases, insurance contracts, financial instruments, guarantees and some non-monetary exchanges (KPMG, 2016). The sale of non-monetary financial assets, such as property, plant and equipment, real estate or intangible assets will also be subject to some of the requirements of the new model (PWC, 2017). A contract with a customer may be partially within the scope of IFRS15 and partially within the scope of another standard. In this case, if the other standards outline how to separate and/or measure certain parts of the contract, then those guidelines should be followed first. The transaction price is then reduced by the amount initially measured under other standards. If other standards do not guide on how to separate and/ or measure certain aspects of the contract, then IFRS 15 should be applied. According to Peters (2016), specific elements in some contracts might fall within the scope of IFRS 15, while others might be excluded. In such cases, the other standard(s) should be applied first, followed by IFRS 15. A portfolio approach of similar contracts is possible as long as it does not lead to material differences compared to an individual treatment of all contracts. To recognise revenue, the following five steps outlined in Figure 1 below should be applied.

Figure 1: The five steps revenue recognition model



Source: Research construct (FASB,2014).

(i) It identifies the customer's contractual obligations (Hail, Leuz, and Wysocki, 2010). In some situations, the distinction between parties operating either as agents or as customers in a contract has changed. For instance, home-builders have had to create separate contracts for the sale of new homes, and for the sale of existing homes acquired through part-exchange. This has also affected the software, property management, and transportation industries. As a result, a commission expense may now be considered a discount, leading to a decrease in income, and vice versa (Aladwan, 2019). While some of these changes might have had a greater impact on the top-line revenue or the reported margins of various business lines, they have had a lesser effect on the bottom-line profit. However, in some organizations, the impact on both can be significant.

(ii) It identifies distinct contractual performance duties (Hail et al., 2010). As anticipated, this modification has had the greatest impact. The increased unbundling mandated by IFRS 15 has changed the timing of revenue recognition and profit, leading to a restatement of retained earnings. Separating the upfront sale of equipment and software from the supply of services, maintenance, and installation has, for example, accelerated revenue/profit recognition for mobile phone contracts while deferring and derecognising prior gains for others. For residential property developers, money must be allocated to the five-year warranties provided as part of the "package", rather than simply being set aside to cover the expected cost of claims (Umobong, 2015).

(iii) It determines the price of the deal (Hail et al., 2010). Companies often neglect to account for variable considerations such as volume discounts or bonuses for reaching milestones. However, the implementation of IFRS 15 has had a major impact on accounting practices, and on expenses related to customer contracts. This was not covered by prior standards, but now similar expenses should be amortized over time in proportion to revenue (Aladwan, 2019). In the past, some engineers, home builders, and mobile phone companies used to charge significant commissions to intermediaries as they were incurred.

(iv) It helps in allocating the price of the contract to the various performance responsibilities (Hail et al., 2010). When it is considerable in cases where a client makes a significant down payment, it is common to overlook financing if the period between receipt of cash and performance under the contract is less than 12 months. The requirement to establish individual selling prices for different performance obligations was challenging for many businesses and required some discretion.

(v) It enables to recognise money upon fulfillment of performance requirements (Hail et al., 2010). The primary condition for fulfillment under IFRS 15 is that control is transferred to the client, either immediately or gradually (Aladwan, 2019). It is difficult to distinguish the effects of this from the separate equipment delivery and service performance commitments.

2.2 Empirical evidence

IFRS15 and Return on equity

There have been studies examining the relationship between IFRS and ROE, but not specifically the impact that the IFRS15 adoption has on these variables. Mattei & Paoloni (2018) conducted research on the impact of IFRS15 on telecommunication companies, using content analysis, focussing on Italian and Spanish market-listed firms. The literature review concluded that IFRS 15 is widely used by companies and that a direct correlation existed between the use of IFRS15 and the quality of information in annual reports (Mattei & Paoloni, 2018: 2). This shows that the use of IFRS15 is beneficial for the telecommunication firms in the Italian and Spanish market (Zehri & Chouaibi, 2013).In a related study, Aladwan (2019) investigated the effect of the early adoption of IFRS15 on Stock Prices and Revenue in Jordan. The variables used in the research were revenue, market value of stock price and stock price firm. Research findings showed that there is a statistically significant variation in the arithmetic means for both revenue and stock price before and after the adoption of the standard. Furthermore, the study demonstrated that IFRS 15 has a significant impact on the accountability and quality of information reported in financial statements for Jordanian mining, construction, and engineering firms. Descriptive statistics were found to be relevant in conducting evaluation research.

Kim, Goh, & Park (2020) carried out conducted research analysing the impact of IFRS 15 on the performance of firms listed on the Colombo Stock Exchange in Sri Lanka. The study used key variables such as size, financial leverage, and market-to-book. Fixed effects at ordinary lease squares were used in the methodology, and analysis of variance methods was used for descriptive statistics. Research output showed a positive impact on the firms' performance, following the adoption of IFRS15. Mattei & Paoloni, (2018) and Kim et al., (2020) share similar views on the importance of IFRS 15 in enhancing the performance of stock-listed companies. In addition, Umobong, (2015) examined the IFRS adoption and its impact on the performance of the food and beverage manufacturing firms in Nigeria. The study used key variables such as earnings per share, price-earnings ratio and dividend yield, and employed descriptive statistics for data analysis. The research output showed a weak correlation between the firm's performance and the adoption of

IFRS15. These research findings are in contrast to the research outcome of Mattei & Paoloni, (2018) and Kim et al., 2020).

Yeboah & Takacs (2018) conducted research on the effects of IFRS adoption on corporate performance in the South African manufacturing and mining firms. Proxies for depended variables used in the research were earnings per share, return on equity and market to book value ratio. . The Pooled ordinary least square regression was also used. Research findings showed a negative significant impact on ROE, and MKTBOOK, but revealed a positive effect on earnings per share. However, the research only covered the mining and manufacturing sector, leaving a significant research gap to be filled. Therefore, the current research seeks to address this gap by including a bigger sample of the JSE listed companies.

Relatedly, Opare, Houqe, & van Zijl, (2021) examined the impact of adoption of the IFRS on financial reporting comparability, market liquidity and cost of capital. The study used performance, size, leverage and market-to- book as control variables (Opare et al., 2021)., as well as liquidity, cost of equity and cost of debt as diverse measures to evaluate the effect of the adoption of IFRS . Research findings showed that the introduction of the International Financial Reporting Standards (IFRS) has improved financial reporting comparability, market liquidity, and reduced the cost of equity. Furthermore, it was discovered that voluntary adoption resulted in a decrease in debt cost (Opare et al., 2021).

Almaqtari et al (2021) conducted research to examine the impact of corporate governance mechanism on the adoption of IFRS. Dependent variables used in the research were Compliance with IFRS and Financial Reporting Quality, while independent factors used were the board of directors and audit effectiveness. The study also took into account control variables such as the firm's size and assets. The research findings showed that audit committee characteristics have a greater impact on IFRS compliance and financial reporting quality than other corporate governance methods. Furthermore, the findings found no evidence that the aggregate effect of corporate governance procedures has shifted from Saudi GAAP to IFRS to be more significant (Almaqtari et al., 2021).

A study by Mongrut & Winkelried (2019) examined the effects of IFRS adoption on earnings management, with a specific focus on Latin America. The research used variables such as IFRS adoption, audit quality, firm size, ownership concentration, and bid-ask spread. The study showed that the introduction of IFRS in Latin America lead to the replacement of high-quality audit practices, resulting in an unforeseen beneficial effect on the region's degree of opacity (Mongrut & Winkelried, 2019a). This supports previous studies conducted that demonstrate the usefulness and benefits of IFRS in the corporate world (Almaqtari et al., 2021; Păşcan, 2015; Isa, 2014). Relatedly, Isa (2014) also conducted research on the determinants of accounting choices for noncurrent assets in Nigerian firms, during the initial adoption of IFRS. The research used quantitative methods and examined variables such as total assets, ratio of non-executive board members, as well as equity. Research findings show that firm size and ownership concentration are significant determinants of non-current asset accounting decisions. Furthermore, companies with larger ownership concentration were more likely to adopt the fair value model rather than the income-growing strategy.

Prochaxka (2016), conducted a study on the e adoption of IFRS by private companies in Czech. The research was quantitative and used descriptive statistics variables such as perception, areas, frequency and size, were used (Procházka, 2016). The research findings showed that IFRS adopters were compelled to gradually integrate the IFRS principles into the management accounting subsystem (Procházka, 2016).

Ebaid (2022) investigated IFRS adoption and accounting-based performance measures: evidence from an emerging capital market. The purpose of the study was to investigate the financial effects of Saudi Arabia implementing International Financial Reporting Standards (IFRS). The study primarily looks at how the required implementation of IFRS has affected accounting-based performance measurements. The design, method, and strategy personally gathered information about research variables from the published financial statements of 67 companies that were listed on the Saudi Stock exchange between 2014 and 2019. The findings showed that there were no appreciable variations in the values of accounting-based performance metrics for the three performance categories (such as profitability, liquidity, efficiency and financial leverage) in the period following obligatory adoption (IFRS) versus the levels of these measurements in the time

before mandated adoption (Saudi accounting standards). The findings suggest that there is a correlation between IFRS adoption and the company's performance.

Păşcan (2015) also researched on the effects of IFRS adoption on accounting quality. The study outcome depicted that there was a decrease in managing earnings towards a target, a reduction in absolute discretionary accruals, and an improvement in greater accruals quality. However, there was an increase in earnings smoothing and substantial significant losses were recorded in a less timely manner (Păşcan, 2015).

IFRS15 and Return on Asset

Piosik, (2021) researched the role of implementing IFRS 15 with a specific focus on Poland. The research employed the following variables: size, financial leverage, market-to-book value and sales growth (Piosik, 2021). The results of the study proved that if reporting businesses miss the fourth-quarter revenue and net earnings consensus by a tiny amount, the introduction of IFRS 15 does not affect discretionary revenue (Piosik, 2021).

Another study by Nwaogwugwu (2020) investigated on effects of IFRS adoption on the financial performance and value of listed banks in Nigeria. The purpose of the study was to examine the impact of IFRS adoption on the financial health and market value of Nigeria's listed banks. The researcher used a sample of 5 banks (observed for eight years), which had adopted the IFRS from 2012 to 2015, and the pre-IFRS period from 2008 to 2011. Panel data analysis was used, including Return on Asset, profits per share (EPS), and IFRS dummy variable as independent variables in the model to achieve the study's primary goal.

The proper estimator for the data analysis in this research was the Fixed Effect Model. The coefficient of the regime period (RR) term that was calculated in the models was found to be statistically negligible and positive. The findings imply that Nigeria's adoption of IFRS did not lead to improved performance or higher value. It is recommended that speculators and financial professionals pay close attention to all profit ratios under the IFRS system. Overall, this article shows that there is no correlation between the firm's performance and its adoption of IFRS.

Salah (2020) explored the relationship between international financial reporting standards and the financial performance of an organisation. They analysed various accounting literature to examine the effects of IFRS on the organizations' financial performance. The review focused on three main areas: first, the justification and evidence behind differences in international accounting practice; second, theories supporting the transition from region-specific GAAP to IFRS; and third, the impact of accounting standards on the organisation's financial performance in three major groups: First is countries that follow common law, followed by those that follow civil law, and then by those in the Middle East and North Africa (MENA) region that are also subject to civil law.

According to the research, companies in regions with less emphasis on shareholder rights and those in the MENA region experienced improved financial performance measurements after transitioning from local GAAP to IFRS. This improvement is attributed to the IFRS fair value, which leads to more fluctuation in the financial performance and statement of financial position. It is recommended that managers should use this information to assess the financial accounts of other companies when considering potential mergers and acquisitions. Overall, this research shows that there is a direct correlation between IFRS adoption and firm performance.

Trabelisi (2018) researched IFRS 15 Early Adoption and Accounting Information with a specific focus on real estate companies in Dubai. Results show that REC's early adoption of IFRS 15 has a significant positive impact on the earnings and stockholder equity of all the companies analysed in the study. The new standard has two positive effects: contract costs are more likely to be capitalized than expensed, and revenue could be recognized over time rather than all at once, in almost all customer contracts.

Adeyanju (2020) investigated the impact of the adoption of IFRS on the performance of private sector enterprises in Nigeria. The study specifically focused on how the adoption of IFRS would affect the profitability, liquidity, and financial leverage of Nigerian private firms, between 2013 and 2018. Pertinent information was gleaned from the audited financial statements of chosen companies, including their financial indices. The study population consisted of 109 private-sector

companies listed on the Nigerian Stock Exchange as of 31 December 2018. By using purposeful sampling, the study's sample size was calculated to be half the size of the population.

The correlational and ex-post factor designs were used in the investigation, with the stakeholder theory as the pertinent theoretical framework. Regression and random effect correlation were used in the investigation, which found that the implementation of IFRS has no appreciable effect on the profitability, liquidity, or financial leverage of specific private firms in Nigeria. To support the sustainable implementation of IFRS, the call for adequate resources was recommended, including consultative groups to address user concerns and to provide ongoing training. Intensifying the necessary awareness among professional accountants, regulators, and other stakeholders was suggested to address the knowledge gap. Ultimately, this indicates that there is no correlation between the firm's performance and the adoption of IFRS.

Umobong and Ibanichuka (2015) also did a comparative analysis of IFRS adoption and its impact on the performance of food and beverage manufacturing firms in Nigeria. The study aimed to investigate the effects of IFRS on these companies' market performance. Data was gathered from the 2009 to 2013 financial statements of all 16 publicly traded food and beverage manufacturers in Nigeria, both before and after the adoption of the IFRS standard. The data was then subjected to comparative analysis and the T-test. Findings demonstrate that there is little association between the market performance of quoted food and beverage manufacturing firms on the Nigeria Stock Exchange and the implementation of IFRS, with no discernible differences in market performance between the Pre and Post IFRS eras. However, IFRS continues to evolve, future research will be required to assess any ongoing modification.

Yeboah and Takacs (2018) investigated the effect of IFRS adoption and corporate performance in South Africa. The study used various econometric techniques to estimate regression models and to gain a deeper understanding of the impact of IFRS adoption on company performance. Researchers presented evidence on the linkage between analyst following, managerial opportunism, and information asymmetry, as well as macroeconomic issues about business performance data. Breusch-Lagrange Multiplier tests and the test for over-identifying constraints were applied to a fixed effects panel dataset of 49 listed manufacturing and mining companies in

South Africa, between 2000 and 2015. The results of the regression analysis indicate that the introduction of IFRS had a negative impact on ROA and MKTBOOK, but a positive impact on earnings per share. Results indicated that the interplay between IFRS and analyst following has a beneficial effect on asset returns but a negative effect on earnings per share and market-to-book ratio. In addition, the relationship between IFRS and information asymmetries, IFRS, and managerial opportunism has a detrimental effect on market-to-book and returns on equity. Integrity, government borrowings, and insolvency have a beneficial effect on earnings per share. The study recommends that policymakers tasked with enhancing the reporting standards of mining and industrial enterprises in South Africa can benefit from the interaction of IFRS adoption and information asymmetry on performance. Overall, the study found that there is a positive relationship between IFRS adoption and the firm's performance.

Agyei-Boapeah, Machokoto, Amankwah-Amoah, Tunyi and Fosu (2020) investigated the influence of the adoption of International Financial Reporting Standards (IFRS) on the value of African publicly traded enterprises, between 2000 and 2015. They examined the average effect of IFRS adoption on company value by employing a difference-in-difference (DID) approach and regressing Tobin's q on Post, a dummy variable representing the post-IFRS adoption period. The findings indicated that the adoption of IFRS led to an increase in corporate value, particularly for organizations with a greater degree of financial limitations. Therefore, this study shows that there is a relationship between IFRS adoption and a firm's performance.

Rahmaningtyas and Mita (2017) did a study on IFRS adoption, earnings management and investor protection in several Asian countries. The purpose of the study was to determine whether the implementation of IFRS reduces earnings management in Asian enterprises. It also addressed the impact of investor protection at the national level, on the adoption of IFRS and its effect on earnings management. The study's sample consisted of non-financial and non-real estate companies in Indonesia, Malaysia, the Philippines, Taiwan, Korea, and Hong Kong, from 2008 to 2012. The list of companies and information was collected from the Worldscope Database. Earnings management is measured by calculating discretionary accruals using the approach developed by Kothari, Leone, and Wasley. Contrary to previous studies, the research suggests that earnings management increased after the adoption of IFRS. The principle-based approach of IFRS provides

managers with greater discretion. The study recommends that during the transition phase of IFRS implementation, management should prepare financial statements at its discretion. In conclusion, the study shows that the relationship between IFRS and earnings management is weaker in countries with robust investor protection.

Al-Khuzaie (2016) conducted a study on the effect of IFRS adoption and corporate governance (CG) practices on the financial performance of listed companies in Dubai. The return on assets was used as a performance metric, whereas IFRS adoption, board independence, board size, and audit quality were used to quantify CG. The study also included control factors such as firm size and leverage. The information was collected from annual reports and websites, and regression analysis was used to determine the impact of each independent variable on performance. The study found that the adoption of IFRS, board independence, board size, and audit quality have a substantial impact on the financial performance of companies listed on the Dubai stock-exchange. The study recommended that all companies should consider IFRS adoption to improve performance. Overall, the study shows that there is a positive relationship between IFRS adoption and the firm's performance.

Nwufo and Chima (2021) investigated the effect of IFRS Adoption on the corporate performance of listed firms in Nigeria. The aim is to conduct an empirical analysis of the impact of IFRS adoption on the financial performance of listed enterprises in Nigeria, using data from all 21 banks listed on the Nigerian Stock Exchange, from 31 December 2016. A multiple regression model was employed to evaluate the premise of this study using two robust performance metrics – profitability and growth. The study also compared the growth of listed banks in Nigeria before and after the implementation of IFRS to determine whether there was a substantial difference. The analysis demonstrates that the adoption of IFRS has no meaningful influence on the performance of listed banks in Nigeria in terms of profitability and growth. This study also demonstrates that the adoption of IFRS has no meaningful impact on the Pre- and Post-growth of listed Nigerian banks. The researchers recommended that the Financial Reporting Council of Nigeria should fund ongoing studies on the implementation of IFRS in Nigeria. Based on the above, it can be concluded that there is no relationship between IFRS adoption and the firm's performance.

Hoshino (2017) also did a study on the effect of IFRS adoption on corporate performance measurement in Japanese manufacturing companies. The study investigated how the implementation of IFRS affected management accounting. Specifically, how the relative importance of strategy objectives, and financial and nonfinancial variables has changed since the adoption of IFRS. The survey questionnaire was distributed to 813 Japanese manufacturing firms listed on the Tokyo Stock-Exchange and regarded as innovators and market leaders in their respective industries. The results of the survey revealed that management accounting procedures and approaches had a significant influence on Japanese manufacturing firms before and after the implementation of IFRS. There appear to be substantial variations in the importance of strategic goals and financial and nonfinancial measurements before and after IFRS implementation. The study recommended that the adoption of IFRS will greatly change the evaluation and measurement rule of corporate performance. This shows that there is a relationship between IFRS adoption and the firms' performance.

Kehelwalatenna and Thilini (2020) did a study on the impact of IFRS adoption on Firm Performance in Sri Lanka. The study aimed to investigate whether there have been any significant changes in the financial and market performance of companies listed on the Colombo Stock Exchange, Sri Lanka. Audited financial statements were mined for information regarding the financial performance of all publicly traded companies from 2009 to 2016, including data from the pre-IFRS adoption period (2010-2011) and the post-IFRS adoption period (2012-2016). The performance of chosen companies on the stock market was computed using data from the CSE data source. The present study's hypothesis was refuted using descriptive statistics and analysis of variance to acquire statistical data. According to the study's findings, there was a considerable change in the performance of Sri Lankan-listed companies, after the introduction of IFRS. It was recommended that more companies should adopt IFRS as it has a positive impact on performance, indicating a strong relationship between IFRS adoption and the firms' performance.

3 Research methodology and data

3.1.1 Methodology

In this research, to test the effects of IFRS 15 on the performance of JSE-listed companies, the performance variables that will be used include profitability where profitability is measured by Return on Assets (ROA) and Return on Equity (ROE). Replete literature on how to design a DID model is given in (Angrist & Imbens, 1994; Agrawal, A, 2009; Angrist & Pischke, 2009 and Becker and Stromberg 2010).

This paper makes use of the difference in difference estimators to determine the impact of policy adoption of IFRS 15 on both returns on assets and returns on equity respectively. The DID estimators are designed for panel data of firms collected from various industry in South Africa. The main idea is to estimate a DID estimator from panel data and system GMM, choosing randomly chosen samples from the same population over time (Angrist & Krueger, 1999). DID exploit a quasi-experimental research design to reduce concerns about omitted variables bias. By dividing our population of interest into a treatment group (firms that adopted the new standard of reporting) and a control group (firms, which did not adopt the new standard of reporting). The assumption is that we can observe these groups before some unexpected event occurs (i.e., adoption of a new standard of reporting), of which this event only affects the treatment group. The control group is not affected. Another assumption made here is that it is not possible to observe the same firms over time; instead, what we have is one random sample from the treatment group in the control before the event occurs and a separate random sample from the group in the control after the even have occurred. The objective is to take these two random samples, pool them and estimate ordinary least square regression and system GMM.

Assume that there are two-panel data sample draws before and after a new standard of reporting is introduced. The event only affects the treatment group (T).

- Let $post_{it} = 1$ if t is the post treatment period
- Let $T_{it} = 1$ if i belongs to the treatment group

The Difference in Difference Estimator take the following form:

$$y_{it} = \alpha_0 + \alpha_1 post_{it} + \alpha_2 T_{it} + \gamma post_{it} T_{it} + \alpha_3 X_{it1} + \cdots + \alpha_k X_{itk} + u_{it}$$

$post_{it}$ is the dummy variable that is equal to one if and only if t happens in the post treatment period, after treatment. Moreover, we let T_{it} is a dummy variable equal to one if observation i belongs to the treatment group. Where $\alpha_1$the intercept shifter for the post treatment group is, α_2 is the intercept shifter for the treatment group, γ is the intercept shifter for the interaction between the post treatment period and the treatment group (i.e., it captures the average treatment effect). In addition, α_3 to α_k, are parameters of the control variables designed to control and observe differences within and between each of the groups. The assumption here is that not all of these control variables may control all the differences between the treatment group and the control group. We might have some difference between groups that are hard to establish directly. So α_2 is designed to absorb the effect of all of unobserved time constant differences between the treatment group and the control group. Similarly, α_1 is designed to absorb all of the unobserved changes that affect the treatment group and the control group equally between the pre-treatment period and post treatment period. Lastly, γ captures the effect of the treatment on the average outcome for the dependent variable. i.e., it captures the effects of the treatment on the treatment group in the post treatment period (the difference between a series of differences in the intercept).

In this case, the difference emanates as follow:

	After	Before	**After-Before**
Treatment	$\alpha_0 + \alpha_1 + \alpha_2 + \gamma$	$\alpha_0 + \alpha_2$	$\alpha_1 + \gamma$
Control	$\alpha_0 + \alpha_1$	α_0	α_1
Treatment-Control	$\alpha_2 + \gamma$	α_2	γ

As such, Takacs (2018) who investigated the impact of IFRS adoption and corporate performance measures and used Breusch-Lagrange Multiplier tests and the test of over-identifying restrictions used the difference in difference (DID) methodology. Therefore, this study uses the DID methodology to investigate the influence of the adoption of the IFRS15 standard on firm's performance in terms of real ROA and ROE. The control group for this method, which is frequently

used in the literature (Agyei-Boapeah, 2015; Fauver et al., 2017), implicitly includes all JSE-listed companies from all industries that have embraced IFRS 15.

This study employs the following performance proxies (dependent variables), return on asset (ROA) and return on equity (ROE). Such measurements of company financial performance are supported by various researchers that used the difference in difference research methods such as (Ebaid, 2022; Nwaogwugwu, 2020; Hoshino 2017, Yeboah and Takacs, 2018; Agyei-Boapeah et al, 2020; Kehelwalatenna and Thilini, 2020). These dependent variables are consistent and comparable and show confidence and trust among shareholders. The researcher employs IFRS with moderating factors such as information asymmetry (IA), growth of market capitalisation (glmc) and liquidity (LIQ) to obtain more reliable results, regarding the extent to which the adoption of IFRS15 explains the firm performance of JSE listed companies. The researcher incorporates the following macroeconomic variables in the estimation model since they have an impact on business performance generally: real interest rate and the growth of real gross domestic product (rgdpgrowth). According to Yeboah, & Takacs, 2018), control variables prevent skewed results when used to measure performance, hence their inclusion in this study too. Table 3 below defines and provides a brief explanation of the wide range of performance measurements that are employed in this investigation and their sources.

To assess the influence of IFRS 15 adoption on the financial performance of South African quoted firms, the performance regression model is used. The model follows specifications used by (Yeboah & Takacs 2018) to evaluate the impact of IFRS15 adoption on company performance. The pooled ordinary least square regression (POLS) is estimated without clustering for time and with time clustering first, and then the results are estimated again without macroeconomic variables and with macroeconomic variables included. This is done for robustness purposes. Moreover, because the sample size is unbalanced (N>T) and we are likely to face heteroscedasticity issues and the common challenge of indigeneity, the results computed make use of system GMM. (see Kumar and Wood, 2010; Checherita et.al, 2010) argue that in the event of the unbalanced sample (N>T), two-step GMM is a suitable model for estimation. On instrument selection, the researcher follows Presbitero (2012) and uses the lag of returns on assets and returns on equity as instrument variables.

Equations (1) and (2) represent the empirical estimated to get the results, where 2018, the adoption year, is excluded from the pooled data for the pooled period of 2009–2020. In addition, the period before is the year 2017, while the two years before is the years 2016 and 2017. One period after is the year 2019, while the two years after are years 2019 and 2020.

$$\mathbf{ROA}_{it} = \alpha + \alpha_0 + \alpha_1 d_t + \alpha_2 d_{it} + \alpha_3 d_t d_{it} + \alpha_4 glmc_{it} + \alpha_5 LIQ_{it} + \alpha_6 IA_{it} + \alpha_7 gdpgrowth_{it} + \alpha_8 real_rate_{it} + \alpha_9 inflation_{it} + \varepsilon_{it} \quad (1)$$

$$\mathbf{ROE}_{it} = \alpha + \alpha_0 + \alpha_1 d_t + \alpha_2 d_{it} + \alpha_3 d_t d_{it} + \alpha_4 glmc_{it} + \alpha_5 LIQ_{it} + \alpha_6 IA_{it} + \alpha_7 gdpgrowth_{it} + \alpha_8 real_rate_{it} + \alpha_9 inflation_{it} + \varepsilon_{it} \quad (2)$$

Table 3.1. Model variable, explanation, measurement and sources.

Variables	Measurement and explanation	Sources
DEPENDENT VARIABLES		
Return On Equity (ROE_{it})	Net profit after tax divided by shareholders equity in natural logarithm.	Parrot (2017) Blanchette et al., 2011) Baker and Martin (2011)
Return On Asset ($\mathbf{ROA_{it}}$)	Ratio of net profit after tax divided by total asset.	Baker and Martin (2011) Gitman and Zutter (2012) Blanchette et al., (2011)
INDEPENDENT VARIABLES		
d_{it}	d is the dummy variable for IFRS 15, it takes the value one for treatment and zero for control. Generated by author	Author design
Information Asymmetry (IA_{it})	Assets size calculated as the natural logarithm of total assets as at the end of the accounting year (i.e., book value under IFRS)	Corwin and Schultz (2010) Foster (2003) Jlao et al. (2012)

	Control variables	
Liquidity (LIQ)	Ratio of current asset to current liability	Baker and Martin (2011) Zeller(2019)
Market capitalization $glmc_{it}$)	($glmc_{it}$) Market capitalization is calculated by multiplying the firm's current market price per share with the total number of shares.	Bragg(2017)
$\boldsymbol{d_t}$	is the dummy variable that is equal to one if and only if t (time) happens in the post treatment period, after treatment. T- Simply captures a difference time window. This dummy variable is used to capture period before and after treatment. Is generated from the sample. e.g. if the period is before, $\boldsymbol{d_t} = 1$, otherwise, equal zero. The same apply for after period.	Generated
inter($\boldsymbol{d_t d_{it}}$)	interaction between the post treatment period and the treatment group. It is also computed from the sample.	Reserve bank indicators
$real_rate_{it}$	Is the short-term real interest rates in percentage form	Reserve bank indicators
rgdpgrowth	Is South Africa economic growth for the period	Reserve bank indicators
$inflation_{it}$	$inflation_{it}$ is the annual inflation rate for South Africa.	Reserve Bank indicators

Source: (Takacs, 2018)

Where i stands for a specific firm, t stands for the year. Where $\boldsymbol{\alpha_1}$ to α_k represent slope coefficients for each respective explanatory variable. There is an explanation and expectation of the relationship between the dependent variables and independent variables. This measure shows a company's capacity to pay short-term commitments as they become due (Focardi, 2010). If it is less expensive to swiftly turn a company's assets into cash, liquidity is increased. Adopting IFRS15 improves business performance, particularly because it restricts managerial accounting manipulations while still allowing for the maintenance of cash flow to meet immediate obligations (Gitman, 2006).

According to the literature, IFRS15 was introduced on 28 May 2014, and the mandatory year of adoption for JSE-listed companies is 2018. Therefore, the following pre and post-sample periods are considered: First, equations (1) and (2) were estimated by considering 2017 as the pre-event window and 2019 as the post-event window. The two-year pre-event window includes the year 2016 and 2017, while the post-event window includes the year 2019 and 2020. Therefore, the pre-event window is defined as 2015, 2016, and 2017 and the post event window is defined as 2019, 2020.

3.2 Data

The data used in this study comprise the JSE listed companies from eight industries. The study used data from annual financial reports issued by JSE-listed companies spanning the period of 2015 to 2020. A Pooled OLS regression and a dynamic panel-GMM analysis are done to establish the impact that the IFRS15 standard has on returns on equity and return on assets while controlling other covariates.

A full initial sample size was drawn from 300 companies of all the JSE listed firms' annual reports for the period 2009 to 2021. The data is collected from DataStream [1], which is a database that compiles data from reports of collected companies based on their annual financial reports. All JSE listed companies were mandatory to adopt IFRS15 in 2018 and early adoption of the IFRS15 standard was permitted. The actual date of adoption is obtained from the company's annual financial reports and disclosures relating to accounting policies. I identified manually the year in which each firm adopted IFRS15 and almost 95% of the firms adopted the IFRS15 standard in 2018. Some restrictions are applied to reduce the size of the initial sample like the consistency of annual reports for the period 2015 to 2020, and positive total asset; firms should be in an industry

where at least ten companies meet the above criteria. By collecting the dataset this way, we hope to ensure that robust research findings are produced, which will give efficient and consistent estimates that can be used to make inferences about the research question identified above.

After cleaning the data, there are 188 companies left; financial data are collected for 4 years prior to transition (i.e.; 2015 and 2018 for firms with 30 June financial year end) and 2 years subsequent to transition (generally financial year 2020). The disruption to markets and firms arising from COVID-19 preludes an extension to 2020. Some firms are deleted from the dataset due to missing data. The study employs a sample of 188 distinct firms to assess the impact of the IFRS 15 standard on company performance. A straightforward regression analysis is employed to investigate the relationship between performance and the implementation of the IFRS 15 standard. The following section presents the descriptive statistics, correlation coefficients and the regression results for this paper. The discussion on those results is provided below each table of results respectively.

4 Results Estimation

4.1 Descriptive Statistics

The table below shows the descriptive statistic for all 188 companies.

Table 4.1 Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	p1	p99	Skew.	Kurt.
Year	1118	2017.512	1.702	2015	2020	2015	2020	-.008	1.74
IA	1118	6.601	.887	4.346	8.812	4.561	8.473	-.207	2.474
LIQ	1118	2.56	8.542	.153	185.674	.409	12.762	15.843	288.18
c id	1118	94.429	54.368	1	188	2	187	.002	1.799
d_{it}	1118	.874	.332	0	1	0	1	-2.252	6.073
real interest rate	1118	.066	.01	.045	.073	.045	.073	-1.221	2.912
inflation	1118	.046	.01	.032	.064	.032	.064	.531	2.575
Rgdp-growth	1118	.829	.535	.05	1.509	.05	1.509	-.181	1.485
ROA	1118	4.867	14.21	-269.84	123.196	-36.024	29.256	-6.451	134.73
ROE	1118	5.571	68.319	-2091.1	297.216	-91.042	55.599	-25.94	795.648
glmc	929	-.13	.505	-3.777	3.536	-1.548	1.23	-.138	11.568
real rate	1118	.02	.009	-.005	.041	.001	.04	-.239	2.232

Note: ROA is the real return on assets, ROE is real returns on equity, glmc is the growth of log of market capitalization (MCAP) in real terms, LIQ is liquidity and IA is information asymmetry, d_{it} is the dummy variation for IFRS15 adoption. It captures firms that adopted the new standards of way of organising the revenue; it takes the value of one if adopted. Real rate is the short-term real interest rates. rgdpgrowth-is the South African economic growth, and inflation –is the annual inflation rate in South Africa.

The estimates in table 4.1 are used to describe the characteristics of the data as argued by (Kenton, 2020) and can be categorized in the following two basic categories:

Measures of Central tendency

The measure of central tendency is primarily concerned with describing the central data, and it consists of the following:

- Mean: average value
- Median: middle value
- Mode: most observed value

Measures of dispersion

The measures of dispersion are primarily concerned with describing the dispersion of the data, and it consists of the following:

- Range: the difference between the highest and lowest value
- Variance: how widely observations vary
- Standard deviation: how far observations are from the sample average.
- Kurtosis: a measure of the sharpness of the peak skewness, a measure of the degree of asymmetry of the series.
-

Concerning the data in table 4.1, it's observed that over the period examined (which means 2015-2020) 4.87, 5.571, -0.13, 6.601, 2.56, 0.874, 0.02 and 0.829 and 0.046 percent average real returns were recorded for variables ROA, ROE, glmc, IA, LIQ, d_{it}, real interest rate, real GDP growth and inflation respectively. With real ROA, real ROE and LIQ recording the highest standard deviations from their average returns respectively. This could be because the returns on equity and real returns on assets tend to vary a lot across sectors and firms.

Further examination of the standard deviations shows that they are all high for liquidity (LIQ) compared to its mean, indicating potential high volatility in liquidity across firms in the dataset (Mensah & Alagidede, 2017). Glmc deviated the most from its average and d_{it} deviated the least and could therefore be classified respectively as the riskiest and least risky. Results obtained from the skewness statistics indicate that the ROA, ROE, IA, glmc, real interest rate and rgdpgrowth variables had a negative skewness and consequently had a long-left tail (which means skewed to the left). The remaining variables all displayed positive skewness and consequently had a long - right tail.

Results obtained from the kurtosis statistic showed that ROE, ROA, glmc, LIQ, d_{it} and rgdpgrowth variables were leptokurtic as they each had kurtosis values greater than three (3). The remaining variables all displayed a kurtosis value lesser than three.

4.2 Pairwise correlations

The table below shows the pairwise correlation between variables.

Table 4.2 Pairwise correlations between ROA and other covariates.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ROA	1.000							
(2) glmc	0.106*	1.000						
(3) LIQ	-0.035	-0.021	1.000					
(4) IA	0.153*	0.019	-0.132*	1.000				
(5) d_{it}	0.056	-0.052	0.032	0.105*	1.000			
(6) rgdpgrowth	0.083*	0.059	-0.021	-0.006	0.005	1.000		
(7) real_rate	-0.005	-0.006	-0.010	0.005	-0.003	0.264*	1.000	
(8) inflation	0.066	0.127*	-0.043	-0.012	-0.002	0.273*	-0.425*	1.000

Note: ROA is the return on assets, glmc is growth of market capitalization in log form, LIQ is liquidity and IA is information asymmetry, $d_{it}$is the dummy variable, real rate-is real interest rates and inflation is annual inflation rate, dit is the adopted standards that captures the way of organising the revenues; it takes the value one if adopted and zero otherwise. **** p<0.01, ** p<0.05, * p<0.1*

As evidenced from the results in table 4.2.1, there is a significantly strong correlation between the growth of the log of the market capitalization and real return on assets (significant at 10% level of significance); information asymmetry and the growth of output (rgdpgrowth) are positively correlated with real return on assets. At the same time, the growth of the log of the market capitalization variable is positively correlated with inflation. d_{it}, which is a dummy IFRS15 adoption, and has a positive correlation with the information asymmetric variable.

Table 4.3. Pairwise correlations ROE and covariates

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ROE	1.000							
(2) glmc	0.037	1.000						
(3) LIQ	-0.003	-0.021	1.000					
(4) IA	0.124*	0.019	-0.132*	1.000				
(5) d_{it}	0.033	-0.052	0.032	0.105*	1.000			
(6) rgdpgrowth	0.071	0.059	-0.021	-0.006	0.005	1.000		
(7) real_rate	-0.017	-0.006	-0.010	0.005	-0.003	0.264*	1.000	
(8) inflation	0.045	0.127*	-0.043	-0.012	-0.002	0.273*	-0.425*	1.000

Note: ROA is the return on assets glmc is growth of market capitalization in log form, LIQ is liquidity and IA is information asymmetryd_{it} is the dummy variable which captures the firms' way of organising the revenues; it takes value of one if adopted and zero otherwise. **** p<0.01, ** p<0.05, * p<0.1*

The real return on equity is positively correlated with information asymmetry (r=0.124), and all other variables show no correlation with the dependent variable (real ROE). The growth of the log of market capitalization is positively correlated with information asymmetry. Information asymmetry is also negatively correlated with liquidity (LIQ).

4.3 Regression estimates results

4.3.1 Estimated results using Pooled OLS before and after the policy adoption.

Table 4.3.1.1 below, presents the estimated results obtained using the Pooled OLS model before and after the policy adoption. Currently, information regarding the time period is being disregarded. The results are obtained for the real ROA model with only financial covariate and IFRS15 dummy (dit) without clustering across time (POLS_NC), then the results are again estimated without macroeconomic covariate, but with time clustered. The results show that only the growth of market capitalization and information asymmetry are positive and significant in explaining real return on assets. The IFRS15 dummy (dit) variable which takes the value of one, if the firm has adopted the new standard of accounting reporting and zero otherwise, is positive but not significant. This means that firms that adopted the new way of reporting, are associated with an increase in real returns on assets of about 0.472 %. Nevertheless, this variable is not significant for all model specifications considered here. The lack of significance observed here could be associated with other factors associated with the return on assets, which will be explored further in this paper.

Holding all else constant, a one percent increase in growth market capitalization (glmc), results in a 4.02 % increase in real returns on assets. The lag of real return on assets is positive and significant in explaining the current real return on assets. Every one percent increase in previous returns on assets, results in current returns increase by 0.39 %. Similarly, for every one percent change in information asymmetry, real returns on assets increase by 1.79 %. The variable of interest (dit) is positive but not significant. Liquidity is also negative but not significant in explaining real returns on assets. In the following case (POLS_C), clustering across time does not seem to improve results in any meaningful way. The results are also clustered across firms and results did not change materially.

Inclusion of macroeconomic covariates; growth of output and real interest rates, and estimating without clustering, produce the same results as those obtained with clustering across time observed earlier. In this case, growth of output, growth of market capitalization and information asymmetry are all positive and significant in explaining the real return on assets (ROA). For every one percent increase in the previous year's real returns, growth of market capitalization (glmc), information asymmetry (IA) and output (rgdpgrowth) returns on assets will increase by 0.389, 3.929, 1.87, and 2.300 % respectively. The R-square coefficient, which highlights how goods are independent variables in the model, in explaining the dependent variable is 0.178. Meaning that the variables in the model only explain 18 % of the variation found in real return on assets. The possible cause of weak explanatory powers of these covariates can be attributed to model misspecification. The next set of regression is estimated using a different dependent variable (real return on equity) following the same procedure as done under ROA. The lag of real return on assets is positive and significant in explaining the current real return on assets. For every one percent increase in previous return on assets, results in current returns increase by 0.39 %. Clustering results across time does not change the results completely. Notably clustering results across firms make most of the variables insignificant.

Table 4.3.1.1 ROA Results before clustering (NC) and after clustering(C), without both clustering and macroeconomic variables (NC_M) and with both clustering and with macro variable (C_M)

	1	2	3	4
VARIABLES	POLS_NC	POLS_C	POLS_NC_M	POLS_C_M
L.ROA	0.390***	0.390***	0.389***	0.389***
	(0.031)	(0.061)	(0.031)	(0.059)
glmc	4.020***	4.020**	3.929***	3.929**
	(0.889)	(1.092)	(0.898)	(1.181)
LIQ	-0.010	-0.010	-0.006	-0.006

	(0.056)	(0.023)	(0.056)	(0.022)
IA	1.791***	1.791*	1.816***	1.816*
	(0.515)	(0.789)	(0.514)	(0.758)
d_{it}	0.472	0.472	0.473	0.473
	(1.359)	(1.212)	(1.357)	(1.233)
rgdpgrowth			2.300**	2.300***
			(1.032)	(0.411)
Real interest rate			-85.476	-85.476**
			(63.705)	(23.194)
inflation			-25.848	-25.848
			(57.021)	(45.010)
Constant	-9.101***	-9.101	-8.154*	-8.154
	(3.517)	(4.837)	(4.754)	(5.364)
Observations	929	929	929	929
R-squared	0.179	0.179	0.185	0.185
e(F)	40.353	e(F)	26.055	e(F)

Note: ROA is the return on assets, ROE, is return on Equity, glmc is log of market capitalization, LIQ is liquidity, IA is information asymmetry and t is the dummy variable which captures the firms that adopted the new standards of way of organising the revenues; it takes the value of one if adopted and zero otherwise. *** p<0.01, ** p<0.05, * p<0.10

Table 4.3.1.2 below, presents the estimated results obtained using the Pooled OLS model. The results are obtained for the ROE model with strict financial covariate and the IFR15 dummy (d_{it}) without clustering across time (POLS_NC) and then the results are again estimated without macroeconomic covariates, but with time-clustering them across time. The IFRS15 dummy (d_{it}) variable, that takes the value of one if the firm has adopted the new IFRS15 standard and zero otherwise, is positive but not significant. This means that firms that have adopted the IFRS15 new ways of reporting are associated with an increase in real returns on equity of about 0.703 %. Nevertheless, this is not significant for all model specifications considered here. The other results show that only information asymmetry is positive and significant in explaining real returns on equity. Hold all else constant, a one percent increase in information asymmetry results in a 9.201 % increase in real returns on equity. Other variables, such as liquidity, and growth of capitalization, are positive but insignificant in explaining real returns on equity. In the case of (POLS_C), which is regression results, clustering across time. Neither control variables (LIQ, IA, glmc) are significant in explaining real returns on equity. Only the lag of real returns on equity is positive

and significant. Every one percent increase in the last year's real return on equity will result in a 1.41 % increase in current real returns on equity.

Inclusion of macroeconomic covariates, growth of output (rgdgpgrowth) and real interest rates, estimated without clustering, produce different results to those obtained with clustering across time. In this case, the lag of real return on equity, growth of output and information asymmetry are all positive and significant in explaining the real return on equity (ROE). For every one percent increase in the previous year the real return on equity, information asymmetry (IA) and output (rgdpgrowth), the real return on equity will increase by 0.390, 9.37 and 11.04 %, respectively. The IFRS15 dummy (d_{it}) is positive, but not significant. The R-square, which highlights how good the independent variable in the model is 0.04 and is in explaining the dependent variable. Meaning, the variables in the model only explain 4 % of the variation found in real return on equity. The cause of weak explanatory powers of these covariates can be attributed to either model misspecification or variable omission. The next set of regression is estimated with possible specification problems.

Table 4.3.1.2 ROE Results before clustering (NC) and after clustering(C), without both clustering and macroeconomic variables (NC_M) and with both clustering and with macro variable (C_M)

	1	2	3	4
VARIABLES	POLS_NC	POLS_C	POLS_NC_ M	POLS_C_M
L.ROE	0.141***	0.141**	0.139***	0.139**
	(0.033)	(0.039)	(0.033)	(0.038)
glmc	6.664	6.664	6.031	6.031
	(4.748)	(4.106)	(4.791)	(4.618)
LIQ	0.129	0.129	0.149	0.149
	(0.300)	(0.195)	(0.300)	(0.192)
IA	9.201***	9.201	9.366***	9.366
	(2.738)	(6.096)	(2.736)	(6.032)
d_{it}	0.703	0.703	0.661	0.661
	(7.250)	(5.507)	(7.241)	(5.525)
Rgdp-growth			11.041**	11.041*
			(5.510)	(4.696)
Real interest rate			-459.067	-459.067
			(340.097)	(275.707)
inflation			-59.163	-59.163
			(304.216)	(193.608)
Constant	-56.957***	-56.957	-54.664**	-54.664
	(18.782)	(39.152)	(25.358)	(30.518)
Observations	929	929	929	929
R-squared	0.037	0.037	0.043	0.043
e(F)	7.097	e(F)	5.161	e(F)

Note: ROA is the return on assets, ROE, is return on Equity, glmc is log of market capitalization, LIQ is liquidity, IA is information asymmetry and d_{it} is the dummy variable that captures the firms that adopted the new standards of way of organising the revenues; it takes the value of one if adopted and zero otherwise. *** p<0.01, ** p<0.05, * p<0.10

4.3.2 Estimated results using the Pooled OLS model and Dynamic panel system GMM

Table 4.3.2.1 presents the estimated results obtained using the Pooled OLS model and Dynamic panel –System GMM. The results are obtained for the ROA model with the IFRS15 dummy (d_{it}), dmtbefore1 which is (is a dummy variable equal to one if observation i belongs to the treatment group and zero otherwise). Inter1 variable, which is (an interaction between the post-treatment period and the treatment group). Moreover, growth of market capitalisation (glmc), liquidity (LIQ), information asymmetry (IA) and output growth (rgdpgrowth) and short-term real interest rate (real interest rate) are included as a control in the model.

For the Pooled OLS (Where the post-treatment is one year before); the d_{it} values of (-1.372) mean that firms that have adopted the IFRS15 standards are associated with a 1.372 % decrease in real return on assets. The post-treatment dummy in this case; dmtbefore1 variable has a value of (-4.424 %), meaning that the post-treatment period is associated with a 4.42 % decrease in the real return on assets. The average treatment effect (inter1) for firms in a before period treatments is associated with an increase of 4.701 % on average, which is statistically significant.

In the case of the control covariates controlling for period effect. A one percent increase in the log of growth of market capitalisation for firms, in one year before as a treatment group, resulting in an increase of 2.36 % in real returns on assets. Furthermore, a one percent increase in growth of output for firms one year before as a treatment group, leads to same increase in percent of real returns on assets, which is the same for firms in two years before as a treatment group as well. The lagged real return is positive in explaining current real returns. Every one percent increase in the last real return on real assets is associated with a 0.388 % increase in the current real return on assets. This means that there is persistence in real return on assets.

For the Pooled OLS (Where the post-treatment is two years before); the d_{it} values of (-1.372) means that firms that adopted the IFRS15 standards are associated with a 1.372 % decrease in real return on assets. Considering the post-treatment dummy in this case, dmtbefore2 has a value of (-4.424 %), meaning that the post-treatment period is associated with a 4.42 % decrease in the real returns on assets, which is significant at a 5 % level. The average treatment effect (inter2) for firms in a before period-treatments are associated with an increase of 4.701 % per average. This implies

that the treatments have a positive and significant impact on real return on assets, which is significant at a 1 percent level of significance.

In the case of control variables controlling for the time period effect, one percent increase in growth of market capitalisation for firms, in one year before as a treatment group, real return on assets increased by 3.991 %. Furthermore, a one percent increase in growth of output for firms one year before as a treatment group, and real return on assets increased by 2.36 %, which is the same for firms two years before as a treatment group. Additionally, holding all else constant, a one percent increase in information asymmetry (IA), the real return on asset increases by 1.821 %, which is statistically significant at 10 %.

For the system GMM estimation technique (Where the post-treatment is one year before), the d_{it} values of (-1.372 %) mean that firms that adopted the IFRS15 standards are associated with a 1.37 % decrease in the real return on assets. Considering the post-treatment dummy, the dmtbefore1 variable has a value of -5.186 %, meaning that the post-treatment period is associated with a 5.186 % decrease and the real return on asset, which is significant at the 1 % level. The average treatment effect (inter1) for firms before the period of treatment is associated with an increase of 4.71 % in the real return on assets on average. Again, the adoption of IFRS15 effect on the real return on assets is observed one year post-adoption.

The coefficients of the lag of real returns on assets, the growth of market capitalization and the short-term interest rates are also statistically significant, in explaining real returns on assets. Holding all else constant, a one percent increase in growth of market capitalization will result in a 2.55 % increase in the real return on assets. In addition, a one percent increase in information asymmetry will result in a 1.82 % increase in the real return on asset. Lastly, one percent increase in the previous year, the real return on assets will result in an increase of 0.23 % in the current real return on assets. These indicators play a vital role in explaining the return on real assets, which is also observed in previous literature.

For the system GMM (Where the post-treatment is two years before), the d_{it} values of (-1.372 %) mean that firms which have adopted the IFRS15 standards experience a 1.372 % decrease in the real returns on assets under this consideration. The post-treatment dummy in this case; dmtbefore2

factor has a value of -5.186 % which is statistically significant), meaning that post- treatment periods are associated with a 5.186 % decrease of the real returns on assets. The average treatment effect (inter2) for firms before period-treatment is associated with an increase of 4.71 % returns on real assets on average.

The other variables such as the lag of real return on assets, growth of market capitalisation, and information asymmetry are also significant in explaining the real return on assets under this consideration as well. Holding all else constant, a one percent increase in the growth of market capitalisation will result in a 2.550 % increase of the real returns on assets. Additionally, a one percent increase in the information asymmetry will result in a 1.821 % increase in the real return on assets. Lastly, a one percent increase in the lagged real return on assets will result in an increase of 0.229 % in current real return on assets. The p-values of the Sargan test which is the test of over-identification restrictions, has the value of 14.831, which is greater than 5 %, which implies that all instruments are valid.

Table 4.3.2.1 ROA Results before one year and before two years of policy adoption, for both POLS and GMM

	1	2	3	4
VARIABLES	POLS_BF1	POLS_BF2	GMM_BF1	GMM_BF2
L.ROA	0.388***	0.388***	0.229***	0.229***
	(0.059)	(0.059)	(0.043)	(0.043)
glmc	3.991**	3.991**	2.550***	2.550***
	(1.140)	(1.140)	(0.982)	(0.982)
LIQ	-0.005	-0.005	0.097	0.097
	(0.023)	(0.023)	(0.148)	(0.148)
IA	1.821*	1.821*	4.863*	4.863*
	(0.758)	(0.758)	(2.950)	(2.950)
d_{it}	-1.372	-1.372	8.388	8.388
	(0.723)	(0.723)	(33.344)	(33.344)
dmtbefore1	-4.424**		-5.186***	
	(1.472)		(1.929)	
inter1	4.701***		4.714**	
	(0.674)		(1.963)	
rgdpgrowth	2.355***	2.355***	0.348	0.348
	(0.408)	(0.408)	(0.591)	(0.591)
Real interest rate	-86.293**	-86.293**	47.717	47.717
	(23.481)	(23.481)	(36.809)	(36.809)
inflation	-18.331	-18.331	148.633***	148.633***
	(80.069)	(80.069)	(46.156)	(46.156)
dmtbefore2		-4.424**		-5.186***
		(1.472)		(1.929)
inter2		4.701***		4.714**
		(0.674)		(1.963)
Constant	-6.808	-6.808	-42.864	-42.864
	(5.521)	(5.521)	(34.214)	(34.214)
Observations	929	929	929	929
R-squared	0.187	0.187		

Number of c_id	188	188
Sargan p-value	14.831	14.831
No. of Instruments	23.000	23.000
Wald-Chi2(9)	211.543	211.543

Note: ROA is the return on assets, glmc is growth of market capitalization in log form, LIQ is liquidity and IA is information asymmetry, $d_{it}$is the dummy variable, real rate-is real interest rates and inflation is annual inflation rate, dit is the adopted standards that captures the way of organising the revenues; it takes the value one if adopted and zero otherwise. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4.3.2.2, presents the estimated results obtained using the Pooled OLS model and Dynamic panel System GMM estimation methods. The results are obtained for the ROA model with the IFRS15 dummy (d_{it}), dmtafter1 (which is (is a dummy variable equal to one if observation 1 belongs to the treatment group and zero otherwise). Inter2, which is (an interaction between the post-treatment period and the treatment group). Moreover, the growth of market capitalisation (glmc), liquidity (LIQ), information asymmetry (IA) and output growth (rgdpgrowth) and short-term real interest rate (real interest rate) are included as controls in the model.

For the Pooled OLS estimation method (*Where the post treatment is one year after*); the d_{it} values of (1.024 percent) means that firms that adopted the IFRS15 standards one year after being associated with a 1.024 percent increase in the real returns on assets. Nevertheless, it is not significant. The post-treatment dummy in this case; dmtafter1 has a value of (0.801 percent), meaning that the post- treatment period is associated with a 0.801 percent increase in the real returns on assets. However, this variable is insignificant. The average treatment effect (inter3) for firms in a before period treatments are associated with a decrease of (2.73) percent per average and this is statistically significant.

In the case of control covariates controlling for time period effect and exogenous effects besides the policy change, a one percent increase in the growth of market capitalisation for firms, in one year after as a treatment group, real returns on assets increased by 3.92 percent, which is significant at a 5 percent level of significance. Furthermore, a one percent increase in the growth of output for

firms a one year after as a treatment group, real returns on assets increased by 1.54 percent. In the case of information asymmetry (IA), the real returns on assets increases by 1.81 percent. The lag of real returns on assets is positive and significant. For every one-unit increase in the previous year real returns on assets will result in the current returns on assets increasing by 0.387 percent, holding all else constant.

For the Pooled OLS (*Where the post treatment is two years after*); the d_{it}values of (1.514) means that firms that adopted the IFRS15 standards will experience a 1.514 percent increase in the real returns on assets. The post-treatment dummy in this case; dmtafter2 has a value of (1.40 percent), meaning that the post-treatment period is associated with 1.40 percent real returns on assets, but it is not significant. The average treatment effect (inter4) for firms in a before period treatments is associated with a decrease of (-2.57) percent on average.

Additionally, the covariates intended to control for time period effects and other sources of variations. A one percent increase in growth of market capitalisation for firms, in a two years after the adoption of the new accounting standard as a treatment group, real returns on assets increased by 3.92 percent. Furthermore, a one percent increase in growth of output for firms in one year before as a treatment group real return on assets increased by 1.98 percent, which is the same for firms in two year before as a treatment group. Additionally, holding all else constant, a one percent increase in information asymmetry, real returns on assets increase by 1.825 percent. The real interest rate is negative and significant in explaining real returns on assets. For every one percent increase in the real interest rates, the returns on assets will decrease by 89.3 percent.

For the system GMM (*Where the post-treatment is one year after*), the d_{it} values of (22.46 percent) mean that firms that adopted the IFRS15 standard observe a 22.46 percent increase in the real returns on assets; however, it is not significant. The post-treatment dummy in this case; dmtafter1 has a value of -1.19 percent) but it is not significant, meaning that the post-treatment period is associated with a 1.19 percent decrease in the real returns on assets. The average treatment effect (inter3) for firms in a before period treatments is associated with an increase of 0.72 percent per average. However, this is not significant.

Considering other indicators in the model, the lag of real returns on assets, the growth of market capitalisation and short-term interest rates are also significant at 1, 5 and 10 percent level, in

explaining real return on assets. Holding all else constant, a one percent increase in market capitalisation will result in a 2.72 percent increase in real returns on assets. In addition, a one percent increase in information asymmetry will result in a 5.82 percent increase in the real return on assets. Lastly, a one percent increase in previous year real returns on assets will result in an increase of 0.23 percent increase in current real returns on assets. For the system GMM (*Where the post treatment is two years after*), the d_{it} values of (21.31 percent) mean that firms that have adopted the IFRS-15 standards are associated with a 21.31 percent increase in real returns on assets, which is significant at 1 percent level. The post-treatment dummy in our case; dmtbefore2 has a value of -1.52 percent), meaning that the post-treatment period is associated with 1.79 percent decrease in real return on asset. The average treatment effect (inter4) for firms in before period treatment is associated with an increase of 0.768 percent on average. However, it is insignificant.

The covariate, lag of real returns on assets, growth of market capitalization and short-term interest rates are also significant, in explaining real returns on assets. Holding all else constant, a one percent increase in market capitalization will result in a 2.51 percent increase in real returns on assets. In addition, a one percent increase in information asymmetry will result in a 6.51 percent increase in real return on assets. Lastly, a one percent increase in the previous year's real returns on assets will result in an increase of 0.23 percent increase in the current real returns on assets, holding all else constant.

Table 4.3.2.2 ROA Results after one and after two year of policy adoption, for both POLS and GMM

	1 POLS_AF1	2 POLS_AF2	3 GMM_AF1	4 GMM_AF2
L.ROA	0.389***	0.387***	0.226***	0.224***
	(0.058)	(0.059)	(0.042)	(0.041)
glmc	3.915**	3.912**	2.721***	2.508***
	(1.188)	(1.128)	(0.929)	(0.893)
LIQ	-0.008	-0.006	0.099	0.096
	(0.023)	(0.023)	(0.146)	(0.149)
IA	1.808*	1.825*	5.822*	6.512**
	(0.765)	(0.761)	(3.076)	(3.108)
d_{it}	1.024	1.514	22.463	21.306
	(1.262)	(1.689)	(32.555)	(32.522)
dmtafter1	0.801		-1.193	
	(1.462)		(1.086)	
inter3	-2.729*		0.715	
	(1.199)		(1.285)	
rgdpgrowth	1.536**	1.979**	0.087	0.105
	(0.466)	(0.468)	(0.596)	(0.512)
Real interest rate	-52.114	-89.298***	64.917	47.654
	(37.429)	(15.775)	(42.334)	(36.346)
inflation	-14.156	-47.427	125.108***	97.071*
	(34.605)	(69.618)	(38.749)	(53.001)
dmtafter2		1.399		-1.515
		(1.910)		(1.206)
inter4		-2.570		0.768
		(1.568)		(1.425)
Constant	-8.877	-7.457	-61.149*	-62.820*
	(4.879)	(5.625)	(34.784)	(34.526)
Observations	929	929	929	929
R-squared	0.187	0.186		
Number of c_id			188	188
Sargan p-value			15.281	15.624

No. of Instruments	23.000	23.000
Wald-Chi2(9)	150.538	161.472

Note: ROA is the return on assets, glmc is growth of market capitalization in log form, LIQ is liquidity and IA is information asymmetry, $d_{it}$is the dummy variable, real rate-is real interest rates and inflation is annual inflation rate, dit is the adopted standards that captures the way of organising the revenues; it takes the value one if adopted and zero otherwise. **** p<0.01, ** p<0.05, * p<0.1*

Table 4.3.2.3 presents the estimated results obtained using the Pooled OLS model and Dynamic panel –System GMM techniques. The results are obtained for the ROE variable with the IFRS15 dummy (d_{it}), dmtbefore1 which is (is a dummy variable equal to one if observation i belongs to the treatment group and zero otherwise). Inter1, which is (an interaction between the post-treatment period and the treatment group). Moreover, the growth of market capitalisation (glmc), liquidity (LIQ), information asymmetry (IA), output growth (rgdpgrowth) and short-term real interest rate are included as controls in the model.

For the Pooled OLS (*Where the post-treatment is one year before*); the d_{it} values of (-4.01) means that firms that adopted the IFRS15 standards are associated with a 4.01 percent decrease in the real return on asset, holding all else constant. However, it is not significant. The post treatment categorical variable in this case; dmtbefore1 has a value of (-6.45 percent), meaning that the change in the post-treatment period is associated with 6.45 percent decrease in real returns on equity. The average treatment effect (inter1) for firms in a before period treatments is associated with an increase of 11.93 percent per average, holding all else constant. The interactive variable has a positive influence on returns on the real equity.

In the case of the control covariate controlling for time period effect was done previously. The results show that, a one percent increase in growth of output for firms in a one year before as a treatment group real returns on the real equity increased by 10.60 percent. The lag of real returns on equity is positive and significant in explaining current real returns on equity. Every one percent increase past year's real returns on assets, results in a 0.14 percent increase in current real returns on equity. The persistent effect of the real returns on equity is statistically significant at 5 and 1 percent levels across the two estimation techniques.

For the Pooled OLS (*Where the post-treatment is two years before*); the d_{it} values of (30.32) mean that firms that adopted the IFRS15 standard are associated with a 30.32 percent decrease in real

returns on equity, holding all else constant. However, the coefficient is insignificant. The post-treatment dummy in our case; dmtbefore2 has a value of (-6.45 percent), meaning that the post-treatment period is associated with a 6.45 percent increase in the real returns on equity, holding all else constant. The average treatment effect (inter2) for firms in a before period treatments is associated with an increase of 11.93 percent per average, which is statistically significant at a 5 percent level.

In the case of control other covariates intended to control for time period effect and other effects. Holding all else constant, one percent increase in growth of output for the firms; in one year before as the treatment group, the real returns on assets increased by 10.60 percent. The lag of real returns on equity is positive and significant in explaining current real returns on equity which is consistent with results observed for the real returns on real equity in previous studies. Every one percent increase past year's real returns on assets, results in a 0.14 percent increase in current real returns on equity.

For the system GMM estimation method, (*Where the post-treatment is one year before*), the d_{it} values of (30.32 percent) mean that, those firms that adopted the IFRS-15 standards are associated with a 32.30 percent increase in real returns on equity, holding all else constant. The post-treatment dummy in this case; dmtbefore1 has a value of -12.21 percent), meaning that the post-treatment period is associated with a 12.21 percent decrease in the real returns on equity. The average treatment effect (inter1) for firms in before period treatment is associated with an increase of 9.93 percent per average. However, it is not significant.

Moreover, when considering the role of other covariates, the lag of real returns on assets and short-term interest rates are also significant, in explaining real returns on equity. Holding all else constant, a one percent increase in short-term interest rate will result in a 2.32 percent increase in the real returns on equity. Lastly, a one percent increase in previous year real returns on equity will increase of 0.11 percent in the current real returns on equity, the results are consistent with those observed under the real returns on assets previously.

For the system GMM estimation technique (*Where the post treatment is two years before*), the d_{it} values of (30.32 percent) means that firms that adopted the IFRS15 standard are associated with a

32.30 percent increase in real returns on equity, however, it is insignificant. The post-treatment dummy in this case; dmtbefore2 has a value of -12.21 percent), implying that the post-treatment period is associated with 12.21 percent decrease in the real returns on equity. The average treatment effect (inter2) for firms in a before period treatments is associated with an increase of 9.93 percent on average, which is significant at a 5 percent level.

The other covariates included in the model show that the lag of real returns on assets is positive and significant, in explaining the real returns on equity. Holding all else constant, a one percent increase in the previous year real returns on assets will increase of 0.103 percent increase in current real returns on equity. The persistent nature of the real return on equity is positive and significant. The goodness of fit under Pooled OLS is extremely small (0.04), implying that the model fit under OLS is inappropriate. However, the Sargan tests of exogenous instruments is not rejected, therefore the instrument restrictions are valid.

Table 4.3.2.3: ROE Results before one and before two year of policy adoption, for both POLS and GMM

VARIABLES	(1) POLS_BF1	(2) POLS_BF2	(3) GMM_BF1	(4) GMM_BF2
L.ROE	0.138**	0.138**	0.103***	0.103***
	(0.038)	(0.038)	(0.006)	(0.006)
glmc	5.967	5.967	4.778	4.778
	(4.628)	(4.628)	(3.214)	(3.214)
LIQ	0.152	0.152	0.607	0.607
	(0.194)	(0.194)	(1.112)	(1.112)
IA	9.382	9.382	1.907	1.907
	(6.048)	(6.048)	(5.487)	(5.487)
d_{it}	-4.005	-4.005	30.320	30.320
	(5.668)	(5.668)	(23.425)	(23.425)
dmtbefore1	-6.452		-12.205**	
	(4.964)		(5.188)	
inter1	11.929**		9.930*	
	(4.013)		(5.096)	
rgdpgrowth	10.585**	10.585**	1.352	1.352
	(3.561)	(3.561)	(1.812)	(1.812)
Real interest rate	-451.166	-451.166	81.467	81.467
	(260.610)	(260.610)	(108.179)	(108.179)
inflation	-183.750	-183.750	403.173***	403.173***
	(308.592)	(308.592)	(99.556)	(99.556)
dmtbefore2		-6.452		-12.205**
		(4.964)		(5.188)
inter2		11.929**		9.930*
		(4.013)		(5.096)
Constant	-46.383	-46.383	-52.061	-52.061
	(28.048)	(28.048)	(38.986)	(38.986)
Observations	929	929	929	929
R-squared	0.044	0.044		
Number of c_id			188	188
Sargan p-value			15.690	15.690
No. of Instruments			23.000	23.000

Note: ROA is the return on assets, glmc is growth of market capitalization in log form, LIQ is liquidity and IA is information asymmetry, $d_{it}$is the dummy variable, real rate-is real interest rates and inflation is annual inflation rate, dit is the adopted standards that captures the way of organising the revenues; it takes the value one if adopted and zero otherwise. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4.3.2.4 presents the estimated results obtained using the Pooled OLS model and Dynamic panel –System GMM techniques. The results are obtained for the ROE as a dependent variable with the IFRS15 dummy (d_{it}), dmtafter1 (dummy variable equal to one if observation i belongs to the treatment group and zero otherwise). The inter2, which is (an interaction between the post-treatment period and the treatment group). Moreover, the growth of market capitalisation (glmc), liquidity (LIQ), information asymmetry (IA), output growth (rgdpgrowth) and short-term real interest rate are included as a control in the model.

For the Pooled OLS method (*Where the post-treatment is one year after*); the d_{it} values of (3.83) means that firms that adopted the IFRS15 standard one year after, are associated with a 3.85 percent decrease in the real returns on equity. Nevertheless, it is not significant. The post-treatment dummy in this case; dmtafter1 has a value of (3.85 percent), meaning that the post-treatment period is associated with 3.85 percent real returns on equity (not significant). The average treatment effect (inter3) for firms in a before period treatments is associated with a decrease of 15.80 percent per average which is statistically significant.

In the case of control covariates; controlling for time period effect. Only one of the covariates is statistically significant in this case. The lag of the return on equity is positive and significant in explaining the current real returns on equity.

For the Pooled OLS (*Where the post-treatment is two years after)*; the d_{it} values of (4.46 percent) mean that firms that adopted the IFRS15 standards are associated with a 4.46 percent increase in real returns on equity, holding all constant. The post-treatment dummy in this case; dmtafter2 has a value of (-1.970 percent), meaning that the post-treatment period is associated with a 1.970 percent real return on equity, but it is not significant. The average treatment effect (inter4) for firms in a before period treatment is associated with a decrease of (-9.340) percent per average. None of these variables are significant. This implies that the results are sensitive to model specifications.

In case various other indicators are used for controlling the time period effect and other exogenous influences, the results are as follows. Few of the control variables included are significant in this instance. The lag of the real returns on equity, the real GDP growth and the real interest rate are all significant, in explaining returns on the real return on equity. For every one percent change in these variables results in 0.138, 7.35 and (-5018) percent increase (decrease) in the return on real equity, holding all else constant.

For the system GMM (*Where the post-treatment is one year after*), the d_{it} values of (31.27 percent) mean that firms that have adopted the IFRS15 standards are associated with a 31.27 percent increase in the real returns on equity, but it is insignificant. The post-treatment dummy in our case; dmtafter1 has a value of -1.43 percent) but it is also not significant, meaning that the post-treatment period is associated with 1.43 percent decrease in the real returns on equity. The average treatment effect (inter3) for firms in a before period treatment are associated with an increase of 6.64 percent per average. However, this is also not significant.

Accounting for other covariates, the lag of real returns on equity, the growth of market capitalisation and inflation rates are also significant, in explaining the real returns on assets. Holding all else constant, a one percent increase in the previous year's return on equity, will result in a 0.10 percent increase in the real return on equity, which is significant at a one percent level. In addition, a one percent increase in the inflation rate will result in a 348 percent increase in real return on equity, which is also significant but extremely abnormal raising the concern of a multicollinearity problem. For the system GMM (*Where the post-treatment is two years after*), the d_{it} values of (20.62 percent) mean that firms that adopted the IFRS15 standard are associated with a 20.62 percent increase in the real returns on equity. The post-treatment dummy in this case; dmtbefore2 has a value of (-5.72 percent) although it is not significant, meaning that the post-treatment period is associated with a 5.72 percent decrease in real returns on equity. The average treatment effect (inter4) for the firms in a before period treatments is associated with an increase of 4.504 percent per average. However, it is not significant.

In the case of other explanatory variables, the lag of real returns on equity and inflation are significant, in explaining the real returns on assets. Lastly, a one percent increase in the previous year's real returns on assets will result in an increase of 0.10 percent increase in current real returns on equity, which is significant at a 5 percent level. In addition, a one percent increase in the

inflation rate will result in a 309 percent increase in real returns on equity, which is also significant. The price stability seems to have substantially larger impacts on return on the real returns on equity under system GMM estimation techniques. The goodness of fit under OLS is extremely weak, signalling the need for caution when using the results obtained under such specification for policy-making.

Table 4.3.2.4 ROE Results after one and after two year of policy adoption, for both POLS and GMM

	1	2	3	4
VARIABLES	POLS_AF1	POLS_AF2	GMM_AF1	GMM_AF2
L.ROE	0.140**	0.138**	0.100***	0.099***
	(0.038)	(0.037)	(0.007)	(0.006)
glmc	5.962	5.617	4.384	4.001
	(4.609)	(4.564)	(3.195)	(3.058)
LIQ	0.138	0.148	0.231	0.337
	(0.185)	(0.194)	(1.108)	(1.073)
IA	9.300	9.388	3.300	4.277
	(6.031)	(6.085)	(6.823)	(6.040)
d_{it}	3.834	4.459	31.268	20.621
	(3.186)	(3.925)	(22.665)	(22.487)
dmtafter1	3.848		-1.429	
	(4.270)		(3.565)	
inter3	-15.771***		0.642	
	(2.346)		(3.773)	
rgdpgrowth	6.250	7.350*	0.807	0.569
	(3.600)	(3.226)	(1.697)	(1.498)
Real interest rate	-251.406	-517.595**	133.789	109.874
	(271.785)	(161.315)	(111.225)	(104.680)
inflation	12.826	-315.813	347.759***	308.956***
	(154.132)	(214.038)	(81.627)	(113.277)
dmtafter2		-1.970		-5.720
		(4.276)		(3.540)
inter4		-9.340		4.504
		(5.525)		(4.038)
Constant	-58.776	-38.335	-60.860	-55.201
	(30.117)	(30.192)	(47.287)	(43.531)
Observations	929	929	929	929
R-squared	0.046	0.045		
Number of c_id			188	188
Sargan p-value			10.799	12.074

No. of Instruments	23.000	23.000

Note: ROA is the return on assets, glmc is growth of market capitalization in log form, LIQ is liquidity and IA is information asymmetry, $d_{it}$is the dummy variable, real rate-is real interest rates and inflation is annual inflation rate, dit is the adopted standards that captures the way of organising the revenues; it takes the value one if adopted and zero otherwise. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

5 Results discussion

Based on the analyses, it appears that the adoption of IFRS15 has impacted the real return on assets and real return on equity for the companies studied. However, we cannot attribute the increase in returns solely to the policy change due to potential identification issues that are hard to control. For instance, there may have been other events that occurred, around the same time as the introduction of the new accounting standard, which may have impacted the ROA and ROE. Nonetheless, noticeable changes were observed in both returns on assets and equity across all estimation methods used.

Many factors affect the company's real returns on assets (ROA, including its market capitalisation. A higher market capitalisation usually indicates efficient cost management and increased revenue generation, which translates into a higher real returns on assets. Management also plays a crucial role in the company's ability to generate high real returns on asset (Damodaran, A; 2007). Companies with high quality management are likely to perform better compared to those without. In addition, a credible regulatory framework in place such as regulations on reporting and taxation, allows the firms to operate efficiently and minimise costs, resulting in higher revenues and thus higher ROA.

Results regarding regulatory changes and the new reporting standards are a bit mixed. According to the FE model, the interaction between the time dummy and change dummy is significant, indicating that both the duration and policy change have an impact on real returns on assets. However, the same could not be said for the real return on equity. When using the dynamic GMM technique, the adoption of new reporting standards did not have a significant influence on real return on assets and real return on equity. This could be due to a lack of accurate modeling or difficulty in selecting appropriate instruments for GMM method. (Roodman, 2009). Additionally, certain variables that could affect equity return such as tax burden, interest burden, operation margins and assets turnovers, and financial leverage, could not be included due to a lack of data, (Davit et al, 2017). -. The pooled panel model provides more reliable estimates in this analysis than the dynamic GMM technique for certain variables.

Based on the observation, the use of financial leverage to fund a company's operations can result in higher real return on assets, but it also comes with increased financial risks. Other industry related factors, which are not discussed here, can also influence the real returns on asset. Some industries are more capital-intensive than others, which affects returns on asset. In addition, the return on assets will depend on the macroeconomic conditions of the economy under which the firms are operating. While this paper did not include macroeconomic variables, future research can explore this approach further. It will also be beneficial to explore various methodologies to improve the results.

According to the literature, real returns on equity is determined by market capitalisation. The higher the market capitalisation of the firm, the higher the real returns on equity. At the same time, financial leverage can also impact real return on equity as it often comes with higher financial risks. Another factor that influences real returns on the equity is quality of management, this was however not researched due to a lack of data or suitable proxies for each industry. Interestingly, a covariate that explains real returns on assets, performed poorly when used to estimate the real return on equity. Moreover, previous literature highlights other factors such as earning growth, share buybacks and dividend yields have also been cited as covariates, which explains the real returns on equity. Future studies could explore the validity of these variables across industries in South Africa.

6 Conclusion

The main objective of this study is to investigate how the adoption of the IFRS15 standard impacts the financial performance of JSE-listed companies across all industries, especially in terms of return on assets and real return on equity. From the results obtained above, it was found that the adoption of IFR15 had either positively or negatively affected the performance of firms during different periods For example, the real return on equity was negatively impacted one year after the adoption compared to the pre-adoption period. The same pattern was observed for real return on assets after one year of adoption.

When examining firm's performance one year before the policy adoption, it was observed that the interaction variable ($inter_i$) for $i = 1\ or\ 2$, had a positive and significant coefficient. This suggests that there was a notable difference in the performance of the firm before and after the period of adoption. Moreover, this result highlights the importance of considering policy change when analysing real return on assets and real return on equity. Policymakers should take this into account when formulating policies that affect the real returns on assets and equity.

It has been observed that return on real assets provides a better measure of a company's performance compared to returns on real equity. David Kharatyan et al (2017), argue that relying solely on ROE is not sufficient for determining future performance, and it is therefore an inappropriate summary measure for financial statement analysis. However, holding all else constant, the following outcomes are observed across different regression results in terms of the control variable, it has been found:

- Market capitalization and liquidity have a positive impact on Return on Equity. An increase in any of these variables leads to an increase in return on equity. However, the adoption before the dummy and the interaction effect do not have a dynamic effect on ROE and information asymmetry. These findings are consistent with those of Saleem & Rehman(2011), who found that, the liquidity ratio has a positive and significant impact on returns on assets, in the oil and gas industry in Pakistan.
- Market capitalization, liquidity, and lag of ROE all have a positive impact on return on equity. Similarly, one unit increase in any of these variables leads to an increase in return on equity.

- Further, market capitalization, liquidity, and lag of ROA have a positive impact on return on asset, and increasing any of these variables will lead to an increase in return on asset. The adoption dummy and the interaction effect do not have a dynamic effect on ROA.

- Market capitalization, liquidity, and lag of ROA have a positive impact on Return on Asset. Similarly, any increase by one unit in any of these variables leads to an increase in return on assets. The early adoption dummy in 2019 and the interaction effect do not have a dynamic effect on ROA. In addition, Market Capitalization, Liquidity, Information Asymmetry and IFRS Adoption before 2018, as well as the interaction dummy do not have a significant impact on return on equity even when allowing for intragroup correlation among companies.

- Market capitalization, liquidity, information asymmetry and IFRS Adoption in 2019 had no significant impact on return on equity even after allowing for intragroup correlation among companies. However, the adoption interaction dummy in 2019 had a negative impact on return on equity when taking intragroup correlation among companies into account.
- On the other hand, Market capitalization, liquidity, information asymmetry and return on equity are positively affected by market capitalization and negatively affected by information asymmetry and liquidity. However, the impact of liquidity and information asymmetry on return on equity was insignificant. There is no impact whatsoever from the early adoption of IFRS15 in 2019.

  In conclusion, the findings of this paper provide valuable insight into real return on assets and real return on equity, which can give financial planners the ability to effectively conduct strategic and financial planning during policy changes of IFR15.

  Future research can be expanded to include other macroeconomic covariates such as inflation, consumer confidence, interest rates and economic growth. Furthermore, variables like dividend yields, profit margins and, a proxy for quality of management can be used to analyse the factors influencing real returns on assets and real returns on equity, in light of policy changes.

7 References

Adeyanju, D. (2020). Impact of the Adoption of IFRS on Performance of Private Sector Enterprises in Nigeria. *International Journal of Economics, Commerce and Management, Vol.VII, Issue 11 November 2020.*

Agrawal, A. (2009). The impact of investor protection law on corporate policy: Evidence fr*om the Blue Sky Laws. Working Paper, New York, NY: New York University Stern School of Business.*

Agyei-Boapeah, H., Michael, M., Joseph, A., Abongeh, T. & Samuel, F. (2020). IFRS adoption and firm value: African evidence.

Allen, B., Shao, K., Hobbie, K., Mendez, W., Lee, J. S., Cote, I., … Davis, J. A. (2020). Bayesian hierarchical dose-response meta-analysis of epidemiological studies: Modeling and target population prediction methods. *Environment International*, *145*(December 2019), 106111. https://doi.org/10.1016/j.envint.2020.106111

Aladwan, M., (2018). Fluctuations of Stock Price and Revenue after the Early Adoption of IFRS 15,Revenue from Contracts with Customers. *Italian Journal of pure and applied mathematics*.https://www.researchgate.net/publication/329718762_Fluctuations_of_Stock_Price_and_Revenue_after_the_Early_Adoption_of_IFRS_15_Revenue_from_Contracts_with_Customers

Angrist, J., & Imbens, G. (1994). Identification and estimation of local average treatment effects. Econometrica, 62, 467–476.

Angrist, J., & Pischke, J.-S. (2009). Mostly harmless econometrics: An empiricist's companion. Princeton, NJ: Princeton University Press.

Aune-Lundberg, L., & Strand, G. H. (2014). Comparison of variance estimation methods for use with two-dimensional systematic sampling of land use/land cover data. *Environmental Modelling and Software*, *61*, 87–97. https://doi.org/10.1016/j.envsoft.2014.07.001

Bastiaansen, J. A., Kunkels, Y. K., Blaauw, F. J., Boker, S. M., Ceulemans, E., Chen, M., … Bringmann, L. F. (2020). Time to get personal? The impact of researchers choices on the selection of treatment targets using the experience sampling methodology. *Journal of Psychosomatic Research*, *137*(July), 110211. https://doi.org/10.1016/j.jpsychores.2020.110211

Bauer, G. R., & Scheim, A. I. (2019). Methods for analytic intercategorical intersectionality in quantitative research: Discrimination as a mediator of health inequalities. *Social Science and Medicine*, *226*(December 2018), 236–245. https://doi.org/10.1016/j.socscimed.2018.12.015

Becker, B., & Stromberg, P. (2010). Equity-debtholder conflicts and capital structure. Working paper, Harvard Business School.

Cusher, T., McCleary, K., & Grossman, C. (2018). How Patient Organizations are Using Patient-Reported Outcomes: Survey Results from a Non-Probability Sample of Patients Count Network Members. *Value in Health*, *21*, S114. https://doi.org/10.1016/j.jval.2018.04.776

Danaher, J. (2021). Axiological futurism: The systematic study of the future of values. *Futures*, *132*(April), 102780. https://doi.org/10.1016/j.futures.2021.102780

Danescu, T., & Chira, A. (2014). Professional Judgment and Reticence to Apply Sampling Techniques. *Procedia Economics and Finance*, *15*(14), 1253–1258. https://doi.org/10.1016/s2212-5671(14)00585-1

Daske, H., Hail, L., Leuz, C. and Verdi, R., 2008. Mandatory IFRS reporting around the world: Early evidence on the economic consequences. *Journal of accounting research, 46(5), pp. 1085-1142*.

Damodaran, A. (2007). Return on Capital (ROC), Return on Invested Capital (ROIC) and Return on Equity (ROE): Measurement and Implications. Working Paper.

Davazdahemami, B., Zolbanin, H. M., & Delen, D. (2022). An explanatory analytics framework for early detection of chronic risk factors in pandemics. *Healthcare Analytics*, *2*(December 2021), 100020. https://doi.org/10.1016/j.health.2022.100020

Driver, F. (2013). Research in historical geography and in the history and philosophy of geography in the UK, 2001-2011: An overview. *Journal of Historical Geography*, *42*, 203–211. https://doi.org/10.1016/j.jhg.2013.07.011

Ebaid, I. (2022). IFRS Adoption and Accounting-based Performance Measures: Evidence from an Emerging Capital Market. *Department of Accounting, Faculty of Commerce, Tanta University, Tanta Egypt.*

Fatma,Z, & Jamel, C,. (2013). Adoption determinants of the International Accounting Standards IAS/IFRS by the developing countries. *Journal of Economics Finance and Administrative Science 18(35):56–62*. https://www.researchgate.net/publication/259169559_Adoption_determinants_of_the_International_Accounting_Standards_IASIFRS_by_the_developing_countries

Galligani, E., Ruggiero, V., & Zanni, L. (1996). Splitting methods for constrained quadratic programs in data analysis. *Computers and Mathematics with Applications*, *32*(5), 1–9. https://doi.org/10.1016/08981221(96)00131-9

Geels, F. W. (2022). Causality and explanation in socio-technical transitions research: Mobilising epistemological insights from the wider social sciences. *Research Policy*, *51*(6), 104537. https://doi.org/10.1016/j.respol.2022.104537

Gellar, L., Druker, S., Osganian, S. K., Gapinski, M. A., LaPelle, N., & Pbert, L. (2012). Exploratory research to design a school nurse-delivered intervention to treat adolescent overweight and obesity. *Journal of Nutrition Education and Behavior*, *44*(1), 46–54. https://doi.org/10.1016/j.jneb.2011.02.009

Gitman, Principles of Managerial Finance, 4th ed., Pearson Addison Wesley, Boston, 2006.

Guia, J., & Jamal, T. (2020). A (Deleuzian) posthumanist paradigm for tourism research. *Annals of Tourism Research*, *84*(October 2019), 102982. https://doi.org/10.1016/j.annals.2020.102982

Hamzeh, J., Pluye, P., Bush, P. L., Ruchon, C., Vedel, I., & Hudon, C. (2019). Towards an assessment for organizational participatory research health partnerships: A systematic mixed studies review with framework synthesis. *Evaluation and Program Planning*, *73*(June 2018), 116–128. https://doi.org/10.1016/j.evalprogplan.2018.12.003

Heller, A., Webb, N. P., Bestelmeyer, B. T., Brungard, C. W., & Davidson, Z. M. (2022). Rangeland Ecology & Management An Inductive Approach to Developing Ecological Site Concepts with Existing Monitoring Data ☆. *Rangeland Ecology & Management*, *83*, 133–148. https://doi.org/10.1016/j.rama.2022.03.009

Isidori, E., Migliorati, M., Maulini, C., & Echazarreta, R. R. (2015). Educational Paradigms and Philosophy of Football Coaching: A Theoretical and Practical Perspective. *Procedia - Social and Behavioral Sciences*, *197*(February), 614–621. https://doi.org/10.1016/j.sbspro.2015.07.203

Kumar, M. and Woo, J., 2010. Public debt and growth. IMF Working Papers, no. 10/174, pp.1-47. Washington: International Monetary Fund

Kharatyan, Davit; Lopes, José; Nunes, Alcina (2017). Determinants of return of equity: evidence from NASDAQ 100. In XXXVII Jornadas Hispano-Lusas de Géstion Científica. Alicante, Spain

Mattei1 & Niccolò Paoloni. (2019). Understanding the Potential Impact of IFRS 15 on the Telecommunication Listed Companies, by the Disclosures' Study. *Business Studies Department, Roma Tre University, Italy ; Engineering Department, Roma Tre University, Italy*.

Nyhan, T., & Howlin, F. (2021). From registered nurse to nursing student - Exploring registered nurses' transition to nursing student during a post-registration children's nurse programme: A qualitative descriptive research study. *Nurse Education Today*, *105*(April), 105046. https://doi.org/10.1016/j.nedt.2021.105046.

Nwaogwugwu, C. (2020). Effects of IFRS Adoption on the Financial Performance and Value of Listed Banks in Nigeria. *Journal of Finance and Accounting, 2020, 8(4): 172-181.*

Nwufo, C.& Chima, M. (2021). The Effect of IFRS Adoption on Corporate Performance of Listed Firms in Nigeria. *International Journal of Academic in Accounting, Finance and Management Sciences, 11(3), 1-18*. http://dx.doi.org/10.6007/IJARAFMS/v11-i3/10575 DOI:10.6007/IJARAFMS /v11-i3/10575.

Olivares-Alarcos, A., Foix, S., Borgo, S., & Guillem Alenyà. (2022). OCRA – An ontology for collaborative robotics and adaptation. *Computers in Industry*, *138*, 103627. https://doi.org/10.1016/j.compind.2022.103627

Östlund, U., Kidd, L., Wengström, Y., & Rowa-Dewar, N. (2011). Combining qualitative and quantitative research within mixed method research designs: A methodological review. *International Journal of Nursing Studies*, *48*(3), 369–383. https://doi.org/10.1016/j.ijnurstu.2010.10.005

Petersen, M. W., Ørnbøl, E., Dantoft, T. M., & Fink, P. (2021). Assessment of functional somatic disorders in epidemiological research: Self-report questionnaires versus diagnostic interviews. *Journal of Psychosomatic Research*, *146*. https://doi.org/10.1016/j.jpsychores.2021.110491

Pucken, V. B., Bodmer, M., Lovis, B., Pont, J., Savioli, G., Sousa, F. M., & Schüpbach-Regula, G. (2021). Antimicrobial consumption: Comparison of three different data collection methods. *Preventive Veterinary Medicine*, *186*. https://doi.org/10.1016/j.prevetmed.2020.105221

Presbitero AF (2012) Total public debt and growth in developing countries. Eur J Dev Res 24(4):606–626

Rahmaningtyas, F. & Mita, A. (2017). IFRS Adoption, Earnings Management and Investor ¨Protection in Several Asian Countries. *Advances in Economics, Business and Management Research (AEBMR), volume 55, 6th International Accounting Conference (IAC 2017).*

Roodman, D. (2009). How to do Xtabond2: An Introduction to Difference and System GMM in Stata. The Stata Journal, 9(1), 86–136. https://doi.org/10.1177/1536867X0900900106

Ralph, P. (2018). The two paradigms of software development research. *Science of Computer Programming*, *156*, 68–89. https://doi.org/10.1016/j.scico.2018.01.002

Ryan, G. (2018). Introduction to positivism, interpretivism and critical theory. *Nurse Researcher*, *25*(4), 14–20. https://doi.org/10.7748/nr.2018.e1466

Sibbald, S. L., Asif Jiwani, A., & Martin, J. (2022). Recycling quotes or personal plagiarism? A methodological contribution on integrity in qualitative health research. *SSM - Qualitative Research in Health*, *2*(April), 100084. https://doi.org/10.1016/j.ssmqr.2022.100084

Saleem, Q., & Rehman, R. U. (2011). Impact of Liquidity Ratios on Profitability. Interdisciplinary Journal of Research in Business, 1(7), 95-98.

Silva, I. M. da, Nogueira, T. Q. da S., Couto, D. N., Lima, P. C. T. M., Bonfim, N. S. C., Sousa, I. G. V. de, … Ramos, H. E. (2022). Feasibility of a snowball sampling survey to study active surveillance for thyroid microcarcinoma treatment among endocrinologists and surgeons of Brazil. *Brazilian Journal of Otorhinolaryngology*, (xx). https://doi.org/10.1016/j.bjorl.2022.01.005

Smith, J. D., & Hasan, M. (2020). Quantitative approaches for the evaluation of implementation research studies. *Psychiatry Research*, *283*(August 2019), 112521. https://doi.org/10.1016/j.psychres.2019.112521

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*(July), 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Suryananda, T. D., & Yudhawati, R. (2021). Association of serum KL-6 levels on COVID-19 severity: A cross-sectional study design with purposive sampling. *Annals of Medicine and Surgery*, *69*(6), 102673. https://doi.org/10.1016/j.amsu.2021.102673

Thillini, H. & Sampath, K. (2020). The Impact of IFRS Adoption on firm Performance: Evidence from Sri Lanka. *International Journal of Auditing and Accounting studies 1(2), 2019.* https://www.researchgate.net/publication/340163435_The_Impact_of_IFRS_Adoption_on_Firm_Performance_Evidence_from_Sri_Lanka

Tubaro, P. (2019). Whose results are these anyway? Reciprocity and the ethics of "giving back" after social network research. *Social Networks*, (xxxx), 1–9. https://doi.org/10.1016/j.socnet.2019.10.003

Umobong, A. (2015). IFRS Adoption and Firms Performance: Comparative Analysis of Quoted Food and Beverage Manufacturing Firms in Nigeria. *European Journal of Accounting, Auditing and Finance Vol.3,N°8, pp.77-88, August 2015.*Published by European Centre for Research Training and Development UK (www.eajournals.org)77ISSN 2053-4086(Print), ISSN 2053-4094(Online)

Wang, X., & Ji, X. (2020). Sample Size Estimation in Clinical Research: From Randomized Controlled Trials to Observational Studies. *Chest*, *158*(1), S12–S20. https://doi.org/10.1016/j.chest.2020.03.010

Xu, Y., Naidoo, A. R., Zhang, X. F., & Meng, X. Z. (2019). Optimizing sampling strategy for Chinese National Sewage Sludge Survey (CNSSS) based on urban agglomeration, wastewater treatment process, and treatment capacity. *Science of the Total Environment*, *696*, 133998. https://doi.org/10.1016/j.scitotenv.2019.133998

Xue, D., Zhang, Z., Chen, C., Zhou, J., Lu, L., Sun, X., & Liu, Y. (2021). Spatial correlation-based characterization of acoustic emission signal-cloud in a granite sample by a cube clustering approach. *International Journal of Mining Science and Technology*, *31*(4), 535–551. https://doi.org/10.1016/j.ijmst.2021.05.008

Ye, M., Yan, G. W., & Ye, H. N. (2016). Random Small Probability Sample Matrix Used in Compressed Sensing Imaging. *Procedia CIRP*, *56*, 451–455. https://doi.org/10.1016/j.procir.2016.10.088

Yeboah, M. & Takacs, A. (2018). The Effect of IFRS Adoption and Corporate Performance: Evidence of South Africa. *WSEAS Transactions on Business and Economics.*

Yu, H., Zou, W., Wang, X., Dai, G., Zhang, T., Zhang, G., … Shi, H. (2020). Research Note: Correlation analysis of interleukin-6, interleukin-8, and C-C motif chemokine ligand 2 gene expression in chicken spleen and cecal tissues after Eimeria tenella infection in vivo. *Poultry Science*, *99*(3), 1326–1331. https://doi.org/10.1016/j.psj.2019.10.071

Zahid, E., Shabbir, J., & Alamri, O. A. (2022). A generalized class of estimators for sensitive variable in the presence of measurement error and non-response under stratified random sampling. *Journal of King Saud University - Science*, *34*(2), 101741. https://doi.org/10.1016/j.jksus.2021.101741

Zamri, N., Rahman, R.A and Fourati, Y. M., 2012. The effect of mandatory adoption of IFRS on earnings quality: Evidence from the European Union. *Journal of International Accounting Research, 11(2), pp. 125*