# The value relevance of integrated reporting

The Value Relevance of Integrated Reporting

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**Declaration**

The work presented in the thesis is my own.

Ibrahim Haidar,

December 2023

**Abstract**

Integrated Reporting (IR) is a principle-based reporting framework that aims to enhance the quality of information available to capital providers in the context of value creation. However, the literature provides evidence on both meaningful and meaningless application of IR. The aim of this thesis is to investigate whether one of the fundamental characteristics of information – relevance – has improved after the advent of IR. To this end, the thesis investigates the effectiveness of IR through exploring its influence on the value relevance of accounting information. To achieve this purpose, the thesis utilises a quantitative design and adopts different regression models such as Least Squared, Seemingly Unrelated, and Quantile Regressions on a South African sample where IR is mandatorily applied. The findings suggest that – on average – the application of IR by firms in South Africa did not influence the value relevance of accounting summary. The findings do not align with those of Baboukardos and Rimmel (2016) and show that their conclusion about the significant influence of IR on the value relevance of equity book value and earnings were conditional on using "Cook's distance" to trim the sample. Further investigations demonstrate that only medium-size firms have experienced a change in the value relevance of accounting summary and possibly because of their financial needs. Moreover, large firms with international reporting experience were also found to enhance the value relevance of their earnings after the adoption of IR.

The thesis provides deeper insights on the granular influence of IR on value relevance of accounting summary. It demonstrates the importance of exploring the role of IR from a firm size point of view.

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# 1 Introduction

## 1.1 Context

This thesis assesses the effectiveness of Integrated Reporting (IR) by studying the value relevance of accounting summary. In other words, if the relationship between earnings and book value of equity on the one hand has changed with the market value of equity on the other hand, IR is likely to be an efficient medium of reporting between the firm directors and its capital providers.

The effectiveness of IR is evaluated by examining its usefulness to the capital providers in the market. One of the main attributes of the quality of information is its relevance to investors' decision making. Therefore, considering the information asymmetry between the capital providers and the directors, financial disclosure is one medium by which this information gap is bridged. The results of such transparency could lead to a lower cost of capital. Furthermore, the literature suggests that the application of IR may possibly influence the quality of earnings and earnings management leading to more relevant earnings in the decision making (Toms, 2002; Salama et al., 2011; Zhou et al., 2017; Cortesi & Vena, 2019; Cortesi & Vena, 2019; Pavlopoulos et al., 2019; Obeng et al., 2020; Simoni et al., 2021; Wu & Zhou, 2022).

At the same time, non-financial disclosure has become more prominent partly as a response to ethical, social, and environmental issues that impact a variety of stakeholders who are considered as principals delegating their resources to agents responsible for providing information on the value created on the long term. Consequently, many initiatives around the world were established to provide a platform for non-financial reporting alongside financial reporting. However, the plethora of international

frameworks on Environmental, Social and Governance issues (ESG), has left investors confused with an enormous amount of data and the consequent questions about its impact on a firms' financial performance. Critiques mounted on reports, including both aspects of information, without demonstrating their inter-dependencies.

Therefore, the proposition of this thesis is that if IR went beyond other non-financial initiatives and integrated non-financial information with financial information, the value relevance of accounting summary is expected to change after the application of IR. Otherwise, if the value relevance of accounting summary is not affected by the introduction of IR, then IR is not substantially different from other non-financial initiatives and does not bypass the "integration threshold". In the following section I provide detailed illustration on the proposition of this thesis.

The delegation of decision making by owners to managers whose interest may not align, results in bonding and monitoring costs to verify the actions of managers. This is known as a problem of agency (Eisenhardt, 1989). As managers are privy to superior information about the firm, one channel to mitigate the agency problem is through disclosure and financial reporting (Healy & Palepu, 2001). Current regulatory accounting frameworks are in place to mitigate the information asymmetry between directors and shareholders and proclaim the main function of financial disclosure is to provide useful information about an entity to providers of financial capital (IFRS Foundation, 2018). Therefore, the fundamental attribute of the usefulness of financial information is its relevance to the decision-making process by investors.

The concept of relevance, in the context of value relevance studies, gained its importance in the academic and practical domains and found its way into the IIRC's framework. The current value relevance concept was first discussed in the work of Ball and Brown (1968), which proposed that the dynamic change in the market value of equity is considered a reflection of information flow to the market. Consequently, the related adjustments in market prices of equity upon earnings announcements convey the importance of this information to investors.

The consideration of "relevance" as a quality of useful information is also emphasised in the "qualitative characteristics of useful financial information" in the conceptual framework of the IFRS in which relevant financial information is defined as being "capable of making a difference in the decisions made by users" (IFRS Foundation, 2018, p. A25). The significance of the relevance concept in the regulators' framework and its consequent application by the reporting entities have motivated academic research to measure the effectiveness of standard settings using value relevance. For example, to name a few, studies that measure the impact of regulatory-standard application on the accounting quality (Hung & Subramanyam, 2007; Barth et al., 2008, 2012; Emmanuel Iatridis, 2012), fair value standards (Song et al., 2010), corporate governance (Ammann et al., 2011) and many others.

The IIRC's states in its framework that it aims to "Improve the quality of information available to providers of financial capital to enable a more efficient and productive allocation of capital" (IIRC, 2013b, p. 2). Furthermore, the framework reiterates the significance of the materiality concept – reporting on issues that impact the ability of a firm to generate value – and the importance of explaining the connectedness and the

dependence between different capitals used by firms to generate value. Therefore, if information is assumed to be improved, its relevance should increase, or in other words, the effectiveness of the IIRC's framework would be demonstrated by its ability to cause a change in decision by its users. Accordingly, understanding the role of information in investors' behaviour is mainly dependent on the need for this information in the first place or the agency problem.

One of the solutions to mitigate the agency problem is to align interests through increasing managers' ownership in the firm's shares (M. C. Jensen & Meckling, 1976). However, such remedies that focus on the compensation rather than the form may complicate the situation. Jensen and Murphy (1990), in this context, argue that the issue is not only about how much money executives are paid but also how they are paid. For instance, executives with compensations aligned to maximise shareholders' wealth were motivated to take risks during the credit crisis in 2006-7 and led to poorer performance in contrast to other executive who were not paid well (Fahlenbrach & Stulz, 2011). Consequently, the corporate world had to reorient itself towards more sustainable and long-term solutions, which leads us to the second agency-type problem.

Another perspective of the relationship that exists between the firm and its stakeholders using the lens of agency problem is suggested by Woodward et al. (1996). From this point of view, the principal (the society) can be perceived as delegating the decision of utilising its resources to the agent (the firm) who is held accountable for this responsibility. Therefore, such a mandate creates an information gap between the firm and its stakeholders who require the former to be accountable through some form of disclosure and reporting (Woodward et al., 1996).

The mentioned agency problems intensified during last decades because of the conduct of corporate world suggesting a need to undergo a change in its behaviour. The actions and politics of some corporates around the world led to disasters such as Exxon-Valdez oil leak, the apartheid regime, the 2008 financial crisis, which have accentuated the need for firms to report to the stakeholders on how value is created and exchanged with them and the possible impact of corporate behaviour on the related parties. As a response to such a necessity many initiatives around the world were taken by individuals and organizations that reached unprecedented numbers[1] which in turn added to the confusion of investors (Novick, 2018) .

The IIRC's framework claims that Integrated Reporting stands out from other non-financial initiatives by its potential to connect non-financial with financial information based on the material impact of the former on the latter. The framework puts emphases on communicating information efficiently by drawing from different types of reporting, disclosing on how different forms of capitals are interrelated and interdependent (financial and non-financial) in addition to connectivity of information when it comes to value creation. Therefore, the essence of IR is derived from the "integration" of information rather than just reporting non-financial information along with the financial information. In this context it is very important to explain the difference between combined reports versus integrated reporting.

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[1] According to the Financial Times which cited the International Trade Centre, there were 230 sustainability standards initiatives around the world as the date of the original article in September 2017 (Steenis, 2019).

https://intracen.org/news-and-events/news/itc-launches-sustainability-map-to-increase-transparency-and-connectivity-in

Eccles et al. (2015) argues that what is meant by one report "a substitute name to IR" is integrating financial and non-financial information together. Another terminology that may confuse users is the "combined report" which discloses information on ESG matters and financial information in one report but does not establish any relationships between the two. Another perspective is that an Integrated Report demonstrates the relationship and interdependencies between these different types of information.

An empirical-oriented example on the distinction of reporting types is presented in the work of Maniora (2015). The work explores whether ESG and economic performance is affected by IR application through integrating ESG issues into the business model of a firm. The study finds that IR is no different from standalone ESG reports for firms reporting the two. However, the application of IR in comparison to non-ESG reporters, or reporters of combined reports appears to be superior in integrating ESG issues into the business model of a firm. Similarly, the Global Reporting Initiative (GRI) reported on the application of IR in South Africa between the years 2010 – 2012 and found that 87% of the firms that issued an IR in 2012 were either a sustainability report given the name IR or just a combined report (*The Sustainability Content of Integrated Reports – a Survey of Pioneers*, 2013).

So, what does that mean? It means that if IR is another non-financial reporting initiative it is likely that the non-financial performance has enhanced but that would not lead to an impact on the financial aspect of reporting. However, if IR has proceeded beyond a typical non-financial reporting initiative, it is likely that it established the interconnectedness of non-financial information with financial information leading to a shift in decision making by investors. In other words, the thesis contends that if the

"integration effect" exists, the value relevance of accounting summary is hypothesized to change after the application of IR in South Africa.

## 1.2    Motivation

Integrated Reporting has attracted attention from the professional and the academic worlds and recently it became part of the International Sustainability Standard Board (ISSB). When the IIRC announced its pilot program initiative to develop the corporate reporting framework in 2011, 40 leading companies participated in the program including large firms such as Microsoft, Volvo, Deloitte, Coca-Cola, PWC and others (IIRC, 2011b). In 2020, there were more than 2500 firms from more than 70 countries around the world that embeds the concept of IR in its reporting (IIRC, 2020). Likewise, IR has been given similar consideration from academics in their research endeavours. Particularly, there has been 614 journal articles published in English mentioning Integrated Reporting in their abstracts in the fields of business and economics[2]. The importance of Integrated Reporting movement gained more prominence in 2021 through its consolidation with the Sustainability Accounting Standard Board (SASB) to form the Value Reporting Foundation (VRF). The two parties aimed to develop a comprehensive corporate reporting system that promote the capital markets to report on long term value which in turn improve the welfare of people and the planet (Medress, 2020). Simultaneously, the IFRS foundation in November 2021 created the ISSB as a response to investors demand for transparency and comparability on Climate and ESG issues. To unite the efforts and endeavours of the ISSB in its mission to develop the baseline of sustainability reporting for global capital markets, it consolidated with the VRF on

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[2] According to Scopus search engine as September 2023.

August 2022 after its previous merger with Climate Disclosure Standards Board (CDSB) in November 2021 (IFRS Foundation, 2021). In its announcement on consolidating the VRF, the ISSB demonstrated that the role of IR is to establish the connectivity between financial and non-financial reports (IFRS Foundation, 2022). In this context, the thesis can provide insights on the effectiveness of the integration achieved by the IIRC through studying the value relevance of accounting summary after adopting its framework in South Africa.

In relation to the previous point, there has been many calls for further investigation of the relevance of IR and the accounting numbers in the academic literature. For example, Cheng et al. (2014) mentions the limited understanding of whether integrating strategy, governance, performance, and prospects in company reporting would be relevant to investors. Likewise, Landau et al. (2020) reiterates the dearth of studies examining the value relevance of IR in addition to its impact on investors and standard setters. Furthermore, De Villers et al. (2014) and Morros (2016) suggest the studying of IR's relevance in the financial markets. What is more, Cascino et al. (2021) highlights that the relevance of accounting information for different users is still an open and fundamental question.

## 1.3 Research objectives

With the prominent importance and relevance of studying the value relevance of IR, there has been some research on the value relevance of accounting summary after the adoption of IR in different geographical areas and under different regulatory settings. Pavlopoulos et al. (2019) and Cortesi and Vena (2019) investigate the value relevance of accounting summary for international samples of firms and provide similar conclusions on the

impact of IR on the value relevance of earnings, but contradict each other as far as the value relevance of equity book value is concerned. Loprevite et al. (2019), however, studies the impact of IR on the value relevance of accounting summary for European firms and finds that the earnings of non-IR adopters are significantly higher than IR adopters whereas the opposite is true for equity book value. In contrary to the voluntary settings in the previous examples, Baboukardos and Rimmel (2016) investigate the value relevance of accounting summary in the South African's mandatory settings between 2008-2013 before and during the adoption of IR. The study finds that IR has increased the value relevance of earnings while decreased the value relevance of equity book value.

Extant literature does not provide a cohesive conclusion regarding the impact of IR on the value relevance of accounting summary and particularly BR's findings. As mentioned before, Pavlopoulos et al. (2019), Cortesi and Vena (2019) and Baboukardos and Rimmel (2016) provide evidence on the increasing relevance of earnings, contrary to Loprevite's et al. (2019) findings. Further, while Pavlopoulos et al. (2019) and Loprevite's et al. (2019) find that IR positively impacts the value relevance of equity book value, Cortesi and Vena (2019) and Baboukardos and Rimmel (2016) reach different conclusions. However, there is a chance that the difference between the findings of these studies arises from the mandatory/optional settings in addition to the geographical distribution of the examined samples. Nevertheless, the conclusion drawn by BR (2016) came in a period when a report by Global Reporting Initiative (GRI) and a study by Maniora (2015) cast doubts on the "integration label" of IR. Therefore, this thesis explores the value relevance of accounting summary for an extended period utilising different methods and models in a mandatory reporting environment. In doing so, it also explores the robustness of the findings of BR (2016) to different methods and

periods of time, which further informs our understanding regarding the relevance of IR to the capital providers.

The thesis also addresses the request of studying the impact of IR on small and medium size enterprises. Hossain et al. (2023), for instance, sheds the light on the necessity of studying the impact of IR on small and medium firms. Likewise, Rinaldi et al.(2018) demonstrate the need to understand IR on micro or little group levels. Furthermore, one of the key points that IASB has identified as questions that need to be addressed, is whether sustainability standards for SMEs should be enacted.

Reviewing the literature suggests possible differences between large and small firms in handling and reporting non-financial matters in a cost-benefit context. Small firms may encounter many challenges with respect to non-financial initiatives and reporting. For instance, while some small firms might be committed to CSR endeavours, they resort to ad-hoc policies and tend to poorly integrate and communicate their efforts and strategies to stakeholders (Baumann-Pauly et al., 2013; Wirth et al., 2016). Furthermore, these firms are likely to implement and perceive such activities as current costs rather than future benefits (Brammer et al., 2012). In contrast, large firms enjoy abundance of recourses and excel in communicating their financial and non-financial information using formal reporting channels (Baumann-Pauly et al., 2013; Wickert et al., 2016; Schreck & Raithel, 2018).

Previous research has also established that IR adoption requires significant financial resources that renders it unaffordable for small-size firms. This is evident in the accounts of senior managers of large-size firms who describe IR to be a costly, time consuming,

and complicated process (Steyn, 2014; Chaidali & Jones, 2017; Cerbone & Maroun, 2019).

Consequently, the influence of IR on the value relevance of accounting summary for different size of firms is approached from a cost-benefit perspective and answers the calls for providing insights about IR application in these firms.

The thesis also investigates whether the exposure to financial reporting experience would impact the IR reporting. Despite that there have been studies on the value relevance of accounting summary under IR, there has been no research on the possible impact of a firm's experience in a developed financial reporting environment on its reporting of IR in the context of value relevance of accounting summary. This thesis approaches this question by studying the value relevance of accounting summary for firms cross-listing in advance financial markets such as the American and British stock exchanges.

## 1.4    Research methodology, findings, and contributions

The design adopted in this thesis is quantitative following a quasi-experiment strategy and using secondary data extracted from Datastream for South African listed firms on Johannesburg Stock Exchange (JSE). To chieve the aim of this thesis in assessing the effectiveness of IR in enhancing the quality of information, this thesis explores whether the advent of IR has influenced the value relevance of accounting summary. For this end, the thesis answers the overarching research question using three empirical chapters, each of which fragments the main query into sub-questions. The first empirical chapter (4) explores whether IR influences the value relevance of both equity book value and earnings by replicating the work of Baboukardos and Rimmel (2016) (BR) and extending

the examined period from 2008 – 2013 to 2008 – 2016. Furthermore, it examines whether the findings are robust to other methods. However, replicating the work of BR raised an emergent question regarding the robustness of BR's findings to the way outliers are treated. Using regression models following Ohlson (1995) model, Collins et al. (1997) and Barth et al. (2008), chapter (4) shows that BR's findings are not robust to either the way outliers are treated, the period under investigation, or the methods adopted. By using Cook's Distance to remove influential observations, BR (2016) excluded pioneering firms in IR reporting from the analysis which constitute 40% of the market capitalisation. Furthermore, I found no support that accounting summary is more relevant after the advent of IR over the period 2008 – 2013 and 2008 – 2016 using Winsorized data at 1% and following Collins et al. (1997) and Barth et al. (2008).

The second empirical chapter (5) (aims at exploring the value relevance of accounting summary among Small, Medium, and Large (SML) firms listed on the Johannesburg Stock Exchange (JSE). It extends chapter (4) by theorizing that the impact of IR on the value relevance of accounting summary is unique to the size category of these firms. By adopting some theoretical assumptions and using different methods, the findings suggest that IR significantly impacts the value relevance of accounting summary for firms of approximate medium size[3]. Furthermore, the adoption of IR and its reporting framework in 2013 appears to improve the integrating process of financial with non-financial information.

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[3] The main framework used Perrini's (2006) assumptions in addition to other CSR literature. Meanwhile, in this thesis I adopt different models to investigate the value relevance of accounting summary such as Ohlson (1995) regression model and Seemingly Unrelated Regression (SUR).

The objective of the third empirical chapter 6 is to find whether there is enough evidence in the literature to support the proposed similarities between IR and Cross-listing (CL). In doing so, the aim is to explore whether firms with international experience in reporting provided by CL would influence the application of IR and consequently the value relevance of accounting summary. Using LS and Quantile Regressions, the findings show that non-CL small-size (JSE) as well as non-CL medium-size (Ranking) firms benefit from the advent of IR in the South African market. This influence is concentrated in enhancing the value relevance of earnings for these companies which management appears to integrate information from the market in their investment decisions. Meanwhile, regardless of the influence of CL on the value relevance of accounting summary for the mentioned size categories, CL firms seem to use their experience in international reporting and enhance the value relevance of earnings after the adoption of IR.

The findings of Large non-CL firms, however, show that these firms do not benefit from the introduction of IR in enhancing the quality of information to the providers of financial capital. In contrast, the relationship between earnings and share price of these firms was negatively influenced by the introduction of IR in South Africa. This finding may suggest that IR exposes the poor quality of earnings of large-size firms, who adopt IR symbolically, leading to a negative reaction by capital providers. Moreover, there were no significant evidence supporting the conjecture that the management of these firms are benefiting from market information in their decision making to a greater extent than before. In contrast, the findings among Large CL firms suggest that these companies benefit from their international experience in enhancing the value relevance of their

earnings after the adoption of IR. Moreover, the directors of these large CL firms appear to benefit from the market price in their investment decisions.

This thesis provides many contributions to the literature by providing granular and deeper understating of the impact of IR on the value relevance of accounting summary and consequently the quality of information delivered by IR. First, IR – on average – does not appear to enhance the quality of information to capital providers in JSE as far as the value relevance of accounting summary is concerned. In other words, firms listed on JSE appear to ceremonially apply IR for legitimacy purposes and investors – on average – do not seemingly benefit from IR in enhancing the allocation of their capital. Furthermore, the work highlights the challenges and limitations associated with eliminating cases identified by Cook's distance in a balanced setting. That is, it is likely that the firms dropped by BR (2016) are leading firms in IR reporting and excluding them from a study concerned with the impact of IR on the value relevance of accounting summary results in biased findings.

Second, exploring the role of IR on the relationship between the market value of equity and both earnings and equity book value in firms of different size, reveals that IR is efficiently used by firms of medium size. This is consistent with idea that medium-size firms in a growth stage level up their reporting performance to attract investors and funding. To put it differently, it seems that the IIRC's intentions to improve the quality of information through mandatory settings is not achieved equally by all JSE listed firms. This understanding constitutes an opportunity for future research to explore whether medium-size firms are indeed using IR to attract funds or whether it is a by-product of

reporting for legitimacy purposes. Another domain that needs further explorations is the reasons that prevent small-size firms from adopting IR efficiently.

Third, another contribution to the literature is the role of international experience through cross-listing in addition to the willingness of managers to learn from the market in influencing the adoption of IR and the enhancement in the quality of information. If cross-listing can be interpreted as a signal for financial needs or an intention to promote the quality of information, growth appears to be a real motive for a serious implementation of IR on JSE. In conclusion IR appears to significantly influence the quality of information for non-cross-listed, medium size firms and large cross-listed firms consistent with the conjecture that financial needs to expand in addition to reporting experiences are key factors in IR reporting.

The findings of this research highlight the importance of providing support for small-size firms with tailored reporting frameworks. Furthermore, given the recent development in financial reporting by establishing the International Sustainability Standard Board (ISSB), it is important not to limit the support to firms by only providing reporting guidance but also through internal mechanism of support.

The findings and conclusions reached by conducting this research are limited by a few factors. First, the small sample of firms and the mandatory setting of South Africa may not render the findings to be generalisable to other countries or settings such as the voluntary adoption. Second, a simple interaction term between an IR dummy variable and both of earnings and equity book value is not the best proxy to capture the interaction between financial and non-financial information. In fact, the previous limitation

constitutes an opportunity to develop a proxy for the interrelatedness between financial and non-financial information and study its relevance to the capital providers.

## 1.5    The thesis structure.

The next chapter introduces some background on the rationale behind conducting this thesis in addition to the history and background of non-financial reporting and IR. Chapter 3 provides a generic literature review on concepts related to financial reporting and evaluation in addition to relevant studies on Integrated Reporting. The ensuing chapter (4) constitutes the first empirical chapter which replicates the work of BR (2016) and extends it. Chapter (5) extends the previous one to a new empirical chapter that deals with the value relevance of accounting summary for Small, Medium, and Large (SML) firms. Chapter (6) is the third empirical chapter that discusses the impact of international reporting experience, Cross-Listing (CL), on IR and consequently the value relevance of accounting summary. Chapter (7) provides a comprehensive conclusion for all three empirical chapters.

## 2    Background and IR development

Before delving into the literature review, I provide a generic background on the concept of Integrated Reporting. I first start with a simple explanation of the concept of value creation and the role of understanding the dependency of information on financial decisions. Then I proceed to provide a brief history of the non-financial reporting in which I focus on Integrated Reporting. The aim of providing the chronology of the IIRC is to highlight the relevance and the importance of this organization and its reporting framework. Lastly, the third section presents IR concepts and discusses the Integrated Reporting Framework.

### 2.1    Simple explanation of IR and the main research question

Even though an integrated report facilitates the story narrative of how value is created, IR's framework is presented with many conceptual and applied challenges which probably makes it hard for users to adopt and readers to understand (Perego et al., 2016). Consequently, to simplify the research question examining the effectiveness of IR using the value relevance channel, I explain the concept of value creation using anecdotes and (analogies).

Imagine a small parcel of land in a fertile area where many plants (firms) coexist with each other and each of which is considered a biological system. These beings transform inputs – *water and nutrients from soil, carbon dioxide and sunlight from the surrounding atmosphere* – through chemical activities – *photosynthesis* – to produce outputs - *glucose and fruits* – in addition to outcomes – *oxygen* – and the whole process aims for the continuity of this life form (*What Is Photosynthesis*, 2017). These different plants compete against each other for the limited resources to survive. Among them an olive

tree has survived by producing enough glucose to stay alive and bears some olive fruits. A peasant (customer/society) looking for olives would be willing to provide their hard work in exchange for the fruits; they would cultivate the ground to eliminate unnecessary plants to free more resources for the olive tree and clear the space for the sunlight to reach its leaves. The peasant's appreciation of the fruit in addition to their knowledge about the basics of how a tree produces its fruits (the business model) allowed them to provide the necessary mean and resources (social and environmental resources).

Another related anecdote fitting well in this context is the story of Thales the Greek philosopher of Milesian around 600 BCE. Thales (the investor), who was criticised for his fruitless wisdom and philosophy which did not alleviate his poverty, wanted to provide a counter argument about the capability of philosophers to make money (Aristotle: Politics | Translated by Jowett, 1885). Thales, through his deep understanding of astrology and the effect of weather (opportunities and risks) on plants, was capable of forecasting – during a winter of one year – that an abundant olive season was coming about (Grayling, 2019). Thus, he decided, with a little money he had (financial resources), to rent all the olive-presses in that area (Chios and Miletus) at a low deposit as he was the only person with such anticipation. When the harvest season came, there was a high demand for olive-presses and he was monopolistically capable of renting out his contracted sites for the amount of money he wished (Aristotle: Politics | Translated by Jowett, 1885; Grayling, 2019). The possible question to follow the previous narratives might be: how do these stories relate to the current research?

If the idea of comparing an organization to a plant – system-wise – is acceptable, the previous examples serve as analogies for the context of a for-profit organization. In

addition to the carbon dioxide from the air, the olive tree uses limited water and minerals in soil corresponding to raw materials and other inputs in the case of a firm from its surrounding environment. To process these inputs through photosynthesis (business activities), the plant (the firm) requires energy in the form of sunlight (energy) to produce outputs in the form of glucose and olive fruits (product and services) and outcomes such as oxygen (green gasses).

In one aspect the peasant who sought the fruit, which is a value that the plant (firm) created for itself, corresponds to customers interested in the products and services produced by the firm. Thales (the investor), in the second story, was probably capable of understanding the impact of weather (opportunities and risks – nonfinancial information) on the inputs and the ensuing activities of the plant (the value creation process). In this situation he represents investors with enough knowledge of the business model and the effects of the environment on the value creation processes. Therefore, this investor – Thales – had superiority of knowledge compared to other investors (with information asymmetry) and factored it in his decision to rent out (the financial activity) all the olive presses and eventually making a profit from his investment.

To conclude, the ability of an investor like Thales to outperform other investors in the market, lies in their understanding of the relatedness between financial and non-financial information. Therefore, if firms utilising IR framework are capable of disclosing and clarifying the role and impact of non-financial information on the financial information, IR can be perceived as superior to other non-financial reporting schemes. Assuming that the main function of an IR and the related research question is clear, in the next section

I present a brief history of the evolution of IR in the context of non-financial reporting until its latest developments.

## 2.2    The story of non-financial reporting

*"I shall draw from the heart of suffering itself the means of inspiration and survival"*

*Winston Churchill*

The civil rights and gender equality movement in the U.S.A during the 1960s and 70s, and the opposition to the Vietnam war, apartheid in South Africa and other controversial issues, awoke different communities and individuals to their capabilities to make a change during paramount events (H. S. Brown et al., 2009). Such atmosphere provoked the establishment of many Socially Responsible Investment (SRI) movements to apply pressure on the corporate world to behave in a more favourable way to the new paradigm. A lobby of religious groups, orders and universities demanded divestment of pension and other funds from firms involved in the escalation of the Vietnam war or the South African apartheid (Welker & Wood, 2011). In this contextual awareness, particularly two interrelated tragedies - apartheid in South Africa and the catastrophe of crude oil spilling in Valdez-Alaska (Eccles & Krzus, 2011) - were the contributing factors in developing voluntary disclosure mechanisms to hold the corporate world accountable for its behaviour.

The segregation and discrimination between races in American firms operating under the apartheid regime in South Africa, led - during a General Motors (GM) annual meeting - to an unsuccessful call from Paul Neuhauser, a lawyer representing the Episcopal church in the meeting, for GM to withdraw from South Africa (*History of ICCR*, 2020). However, Reverend Leon Sullivan, a social activist for the rights of African Americans

and a newly appointed member of GM board at the time, took the initiative to carry on these endeavours. Eventually, after some years he was successful in motivating some American firms operating in South Africa during 1977 to sign up to and align to a code of conduct created and named after him: the "Sullivan principles" (L. Sullivan, 1980; Welker & Wood, 2011). This document focused on the end of the segregation of races and the implementation of fair practises in employment, training and promotions for non-white employees. His push, though not totally successful in achieving its goals, built a pressure on the apartheid economy that ended up with the cessation of 154 American-firm activities and the drain of around $480 billions of investment funds by the end of 1986 (Sanyal & Neves, 1991). The mechanism by which this code came into practise was through periodic questionnaires filed by signatory firms, later audited by well reputed auditors, and rated by Arthur D. Little. The grading system was available for public and was later used by SRI and large investors to punish low rated and noncompliant firms through divestment (Pink, 1990). During this atmosphere of rich movements and disturbance a book related to these events was published by Clark C. Abt (Eccles & Krzus, 2011). Abt (1977) focuses on the fact that a company cannot ignore its social performance within the community in which it operates. If it does, there could be a backlash from dissatisfied customers, demoralized employees, environmentally damaged communities or increased governmental regulation (de Neufville, 1979).

In between the two events, South African apartheid and the Valdez accident, different trends emerged. The need for reliable reporting on corporate activities increased with the growth of socially responsible investment funds. Consequently, the business of conducting research and providing consultation on companies' performance started to flourish such as the Franklin Research and Development company (currently known as

Trillium Asset Management). Furthermore, these developments led to the Social Investment Forum (SIF) through alliances of funds and research centres with environmental NGOs and labour unions (H. S. Brown et al., 2009).

In March 1989 a tanker of oil owned by Exxon was aground in Valdez-Alaska leaking millions of gallons of crude oil. This accident led to the decease of hundreds to hundreds of thousands of different wildlife animals in a matter of days ('Exxon Valdez', 1990). This resulted in the collaboration of Social Investment Forum through the efforts of Joan Bavaria – the founder of Franklin Research and Development – with environmentalists, different organizations and individuals into what is named the Coalition of Environmentally Responsible Economies (CERES) (Pink, 1990; Sanyal & Neves, 1991; H. S. Brown et al., 2009). Inspired by Sullivan's principles and the possible resulting pressure that such a lobby can put on firms to adopt sustainable business practices for the environment, CERES published a code of conduct named the Valdez principles (Sanyal & Neves, 1991). In a similar way to the Sullivan principles, the Valdez code sought to oversee the compliance of industry, publicizing its performance through voluntary adoption of its principles (Pink, 1990).

## 2.3 The development of Integrated Reporting

After the previous two events, many trends in reporting started to emerge. During early 1990s CERES's president at the time, Robert Massie, collaborated with Allen White, from Tellus institute which was providing consultation services to CERES, to establish what was later known as the Global Reporting Initiative (H. S. Brown et al., 2009). Price Waterhouse Coopers has been an organization which contributed immensely to the development of value reporting concepts and disclosure. The Institute of Charted

Accountants in England and Wales (ICAEW) worked on the reporting of business risk, strategy, the measurement of intangible assets, future oriented information, sustainability and the creation of shareholder value (Eccles & Krzus, 2011). In South Africa, many editions of governance reporting were issued such as the King Report II (2002) and King Report III (2009). Concepts of non-financial performance measurements, particularly intangibles, fell under the scope of Harvard Business Review' publications. Eccles and Krzus started to raise awareness through interviewing executives and investors about the disconnectedness of different reports and the need to have a single integrated information experience: "one report". Accounting for Sustainability (A4S) developed a framework for "connected reporting".

Consequently, the existence of different teams developing distinct and fragmented reports underlined the needs to combine them in "one report" as termed by Harvard Business School (HBS) (Eccles & Krzus, 2011). A meeting by Professor Robert Eccles of HBS and Mike Krzus of Grant Thornton was held with representatives of different auditing firms, Accounting for Sustainability (A4S) and Global Reporting Initiative (GRI), to discuss different aspects of developing the "one report". Many follow up meetings with these parties, as well as Professor King of the South Africa's King report, ended up in laying the foundation of a new committee (Eccles & Krzus, 2011). In 2010 the necessity to integrate these different reporting schemes into a single integrated report that explains how value is delivered over time, led to the birth of the International Integrated Reporting Council (IIRC).

The IIRC establishment was just the first step towards further developments which eventually resulted in the establishment of the International Sustainability Standard

Board (ISSB). After the announcement of its formation, the IIRC released its discussion paper to develop a reporting framework combining various strands of reporting into one coherent report (IIRC, 2011a). The release of the discussion paper was followed by a pilot program joined by 40 renowned firms from around the world in 2011. These efforts led to the publication of the IIRC's framework in December 2013.

The IIRC took the initiative to respond to market calls for more aligned corporate reporting disclosure and introduced the Corporate Reporting Dialogue (CRD) which forms a platform to share experience and coordinate the efforts of different standard setters (IIRC, 2014). Among the participants in CRD were key organizations such as the International Accounting Standards Board (IASB), the Financial Accounting Standards Board (FASB), the Climate Disclosure Standards Board (CDSB) and the Sustainability Accounting Standards Board (SASB). During 2019-2021, the IIRC published its second framework after a period of revision and feedback by different users and market participants. The latter event coincided with a memorandum by most of the CRD members to work together towards a comprehensive corporate reporting framework. As a result, the IIRC and SASB announced their merger into Value Relevance Foundation to develop and orient the corporate world towards long term and sustainable reporting (Medress, 2020). Simultaneously, the IFRS foundation decided to create a new standard setting board for sustainability in response to demands for high quality reports on climate and ESG reporting. Consequently, the IFRS foundation established the International Sustainability Standard Board (ISSB) in which it merged the Value Reporting Foundation (VRF) in August 2022.

These chronological events highlight the relevance of the thesis to the current developments especially with the ISSB assigning the mission of integrating sustainability matters with financial statements to the Integrating Reporting Framework (IFRS Foundation, 2022).

## 2.4    The Integrated Report

The International Integrated Reporting Council (IIRC) defines the integrated report as "a concise communication about how an organization's strategy, governance, performance and prospects, in the context of its external environment, lead to the creation of value in the short, medium and long term" (IIRC, 2013b, p. 7). The distinguishing feature that IR has over other reporting formats is the explanation of the process by which value is created over time. However, the previous definition does not say much about the nature of this report, or the parties involved in the process of its preparation.

The International IR Framework emphasizes that any report which is prepared in accordance to their framework can be considered Integrated Reporting. The same way as the Generally Accepted Accounting Principles govern the preparation of the US financial statements in a way that assures comparability and relevance of the communicated information of financial results among different companies (*FAF*, 2017), the IR framework is principles-based and sets the foundations for constructing reports through a small number of requirements. This approach aims to provide an appropriate balance between flexibility and prescription to accommodate a wide range of organizations while enabling a sufficient degree of comparability and relevance of information (IIRC, 2013b).

The purpose of Integrated Reports is to communicate how value is created over time. Therefore, the formats they take do not matter as long as they communicate how the value is created per IR's principles. Consequently, an Integrated Report can be prepared as a standalone report or be included as a distinguishable, prominent and accessible part of another report, i.e., part of a report that includes the organization's financial statements (IIRC, 2013b, p. 8).

Reporting about value creation requires an understanding of the process by which value is produced. The following diagram, developed by the IIRC, summarizes the idea.

**Figure 1** The value creation process under the IIRC's framework



http://integratedreporting.org/what-the-tool-for-better-reporting/get-to-grips-with-the-six-capitals/
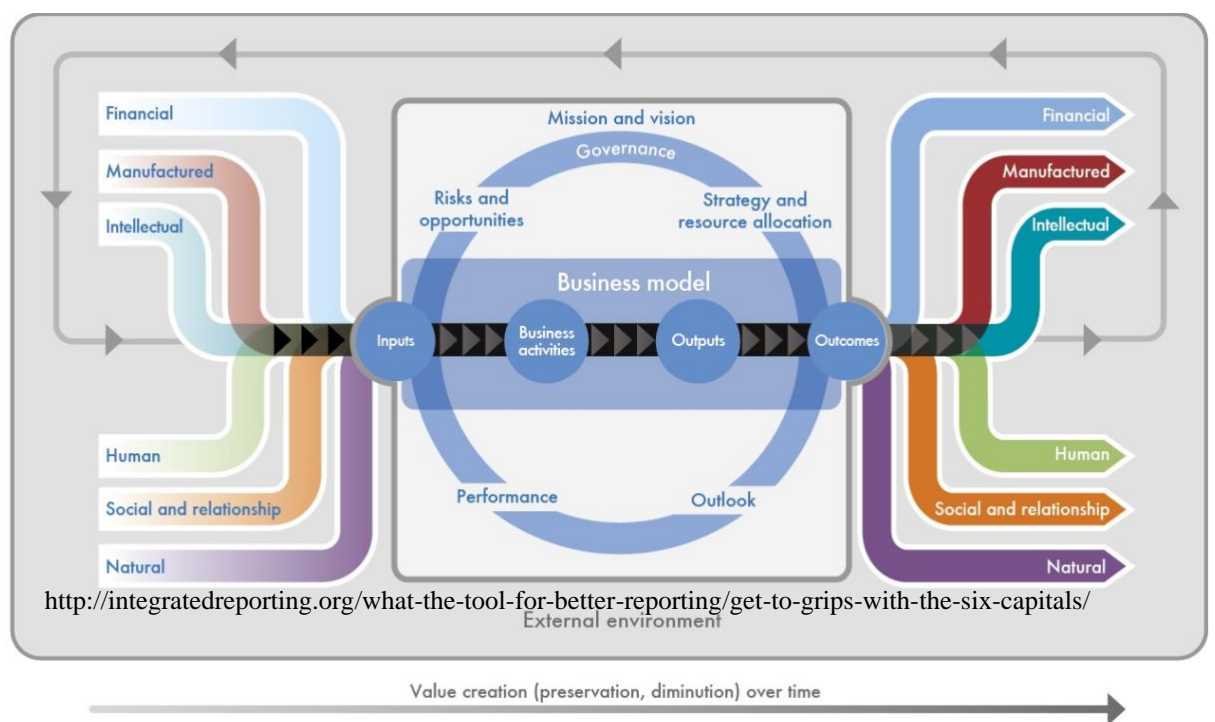
The value created by a firm may have different aspects: quantitative and qualitative ones. The financial value, the quantitative manifestation of value, takes on different forms such as stock price, profits, balance sheet and organizational growth. However, assessing value creation is not fulfilled only by considering one side of the coin (the monetary

face), but also by taking the other side, the qualitative manifestation of value, into account. The latter, the utility value, derives its source from three overlapping areas: functional utility, economic utility and emotional utility. Furthermore, this utility differs in the eyes of its beneficiaries in that different types of value are important to different stakeholders (TCG - EY, 2013).

Creating and sustaining this value by an organization is accomplished through its business model, which is defined as "the chosen system of inputs, business activities, outputs and outcomes that aims to create value over short, medium and long term" (CIMA et al., 2013, p. 1).

The inputs, which are converted into outputs and outcomes by the organization's actions or activities, as depicted in figure 1, consist of so called "capitals".[4] These are referred to by IR as "any store of value that an organization can use in the production of goods or services" (TCG, 2012, p. 2). These capitals are:[5]

1. Financial capital: the source of funds that an organization receives whether it was debt or equity finance.

2. Manufactured capital or tangible capital: the equipment, infrastructure and tools which are owned, leased or controlled by an organization and contribute in providing its products and services without being embodied in the organization's outcomes.

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[4] The capitals are also referred as resources and relationships.

[5] These capitals are defined based on the IR capital paper in a concise way that serve in understanding the IR principles.

3. Intellectual capital: knowledge-based intangibles critical for the future earning potential of an organization that has a tight link and contingency between investment in: R&D, innovation, human resources and external relationships.

4. Human capital: current and potential capabilities and knowledge, skills and experiences of the company's personnel. It may also include the relationships under the company's control either with its employees or stakeholders.

5. Social and relationship capital: relationships within an organization or with its stakeholders. These ties are based on shared norms, values and understanding in a way that builds trust and cooperation between the organization and the different parties. It worth noting that 3, 4, and 5 overlap with each other resulting in considering the intellectual capital as a composite capital. However, for simplicity and relevance purposes it would be better to differentiate these capitals from each other (TCG, 2012).

6. Natural capital: "any stock of natural resources or environmental assets that provides a flow of useful goods or services, now and in the future" (Brand, 2009, p. 608; TCG, 2012).

These capitals change over time, they can be increased, decreased, or transformed. From an organization's perspective, for instance, when employees are trained, the organisation incurs a cost which is considered a decrease in the financial capital. However, enhancing the efficiency of the employees is considered an increase in human capital.

However, the transformation happens when a company's business model converts these inputs into outputs ("the key products and services … as well as the waste or other by-products" (CIMA et al., 2013, p. 1) through its business activities. These activities

involve "the use of processes, tools, technologies and innovation to achieve intended outputs and outcomes" (TCG - EY, 2013, p. 9). The outcome in the last statement represents "the internal and external consequences (positive or negative) for the capitals as a result of an organization's business activities and outputs" (IIRC, 2013b, p. 10). To illustrate, as depicted by IR business model paper, cars are the output of a car manufacturer. While the outcome to customers are mobility, comfort and status, the outcome to the environment includes the impacts arising from the emissions.

The extent to which value is created depends on the outcomes (CIMA et al., 2013, p. 8), for instance, when the produced cars meet the expectations of customers in terms of comfort, that may increase the demand on the company's outputs and increase revenues which eventually turn into profits that increase the financial capital.

## 2.5   The concept of value relevance

Taking the previous assumptions into consideration, it is possible to reach an understanding of the meaning of value relevance of accounting summary and how IR can contribute to this concept. Earnings are a key number that investors and financial analysts use as an input into their valuation models to gauge the intrinsic value of a firm (R. G. Barker, 1999; Cascino et al., 2014). In other words, there is an implicit value in earnings which if carefully adjusted to investors' expectation and their risk-adjusted rate of returns, can produce a representative price reflecting the economic reality of a firm. To put it in the words of value-relevance pioneers:

> *"Because net income is a number of particular interest to investors, the outcome we use as a predictive criterion is the investment decision as it is reflected in security prices"* (Ball & Brown, 1968, p. 160)

In relation to the economic reality of a firm, Barth et al. (2008) emphasize that such a reality as reflected in the price of a stock will be more associated with higher quality of earnings and book value. The importance of book value, on the other hand, comes in times of financial difficulties when firms are traded at a discount (Aleksanyan & Karim, 2013). Therefore, a stronger relationship between prices with earnings and - to a lesser degree - book value, represents useful information reflected in stock prices. To put it differently, in an efficient market where the value of a firm is manifested in its market price, a piece of information about the firm is considered valuable, ceteris paribus, if it has a significant relationship with the stock price. In the case of a long-term horizon, however, a piece of information is suggested to be transmitted into earnings projection as the next sections show.

### 2.5.1   Value relevance of accounting summary under IR

The previous section provides a basic explanation of value relevance. However, to align value relevance in the context of IR, it is useful to use the words of Ohlson who developed the model used in this research:

> "*it follows that value-relevance now becomes a question of how information contributes to earnings forecasting rather than how it explains value*" (Ohlson, 1998, p. 70).

This statement shows that when information has the power to predict earnings it becomes value relevant. Next, I will manifest my understanding of how Integrated Reporting may affect earnings forecasting using IIRC's framework which in turn will result in a stronger relationship with the price, or in other words a stronger value relevance.

The reporting of value creation over time is regarded as the niche of Integrated Reporting in the reporting market (IIRC, 2013b). Therefore, reporting on the relationship and

resources, the inputs used in the value creation process through a firm's business activities, or otherwise "the capitals", is perceived to be a fundamental part of integrated reporting. The relationship and resources (the capitals) are categorized into the following classes: financial, manufactured, intellectual, human, social and relationship, and natural (IIRC, 2013b). These inputs are used (increased – decreased or preserved) through the business activities to create and add value which takes the forms of products and services that meets the needs of firm customers.

### 2.5.2 The possible points to be addressed following IIRC's Framework

Figure 2 provides an example on the usual items included in the income statement of a company. In the following I demonstrate how integrating some non-financial information to the items of income statement may assist investors in assessing the value creation process in a firm.

**Figure 2** Corporate Income Statement

| |
|---|
| Sales |
| Cost of Goods Sold |
| Gross Profit |
| Operating exp |
| Selling Exp |
| Admin exp |
| EBITAD |
| Amortization & Depreciation |
| EBIT |
| Interest |
| EBT |
| Tax |
| Net Income |

The scenarios discussed in this section are not exhaustive, the following comments shed light on the possible points to address in an integrated reporting linking its non-financial information with the items listed in an income statement.

The possible ways to provide relevant and valuable information on Sales, for example, are possible by addressing the following points in the IIRC's framework. First, under point 2.6 (IIRC, 2013b, p. 11), Sales can be linked to the ability of an organization to create value for others (its own customers). Moreover, the trend in revenue figures can be explained and related to customers' satisfaction through showing how different products and services meet their expectations "its connectedness with other information" under point 3.8 (IIRC, 2013b, p. 17). Second, the role of competition with rival firms and the effect of any by-product waste of material on the business activities (4.18) (IIRC, 2013b, p. 27). Are there any environmental effects for generating these revenues? (IIRC, 2013b, p. 27). Are sales aligned with the firm's strategic plan? (IIRC, 2013b, p. 28)

The previous example provided further non-financial information that can aid investors in evaluating the riskiness of earnings through assessing the risks and opportunities associated with sales. In a parallel way, other non-financial information can assist decision makers to assess earnings by understanding the impact of such information on the items included in the income statement. For example, the possible questions to be addressed in the case of Cost of Goods Sold; Is there any raw materials on which the firm is dependent (point 4.13)? How much the prices of such raw materials are sensitive to the economic or surrounding environment? Is it a source of differentiation for the organization (point 4.14)?

Similarly, in the case of administrative costs, is there any highly skilled workforce? Does any high turnover exist? Any opportunities to grow innovative practices and initiatives (point 4.24)? What is the role of innovation and how to develop intellectual capital?

In the case of amortization, depreciation, interest rate and tax, can I predict the effect of inflation or government's monetary or fiscal policy on our business (risks and opportunities 4D)? What kind of technology is used in the production? Is it sensitive to technological advancements and competition (risks and opportunities)?

In summary, the previous sections introduced the possible ways by which the value relevance of accounting summary can be affected by the introduction of IR. Understanding how value is created for firm customers affects the value perceived by investors. Therefore, the introduction of IR can unveil the uncertainties related to the inputs, business activities, outputs, and the outcomes of a business model. After I posed the assumptions governing this study, I demonstrated how the non-financial information reported via IIRC's framework may affect the assessment of forecast future earnings by clearing any ambiguity regarding the income statement items. In the next section, I introduce the literature review relating to value relevance of accounting summary in general and in the context of South Africa.

## 3    Literature Review

The IIRC, as stated in a previous chapter, aims at enhancing information quality for investors in order to improve the productivity of capital allocation (IIRC, 2013b). To investigate the IIRC's claims, the quality of information is investigated through its relevance to the providers of financial capital. The relevance of information constitutes one of the fundamental characteristics of useful information in a financial context (IFRS Foundation, 2018). Therefore, to arrive at hypotheses and appropriate methodology regarding the usefulness of integrated reports to investors, I preface the empirical chapters by first identifying the target audience of Integrated Reporting. Afterwards, I introduce the agency problem and information asymmetry which form main concepts and theories in the context of financial reporting. Nonetheless, before reviewing some generic literature on Integrated Reporting, I review the accounting and finance literature on what can be relevant information for investors in order to understand the relevance of accounting summary figures to the users of IR.

## 3.1    The Audience of the Integrated Reporting

There are different points of view in the literature in terms of identifying the beneficiaries of an Integrated Report. The first stream of studies believes that Integrated Reporting involves all the stakeholders of a company. The second stream argues that IR addresses a constituency of stakeholders, namely the providers of capital.

### 3.1.1    The stakeholder perspective

The term "sustainable", popularly attached to Integrated Reporting (IR), infers that this report is prepared for a wider set of stakeholders. The King II report of 2002 in South Africa defines sustainability from a corporate context as balancing "the need for long-

term viability and prosperity […] with the requirement for short term competitiveness and financial gain" (Institute of Directors in South Africa, 2002, p. 91). These definitions echo what some academics believe is the main aim of IR. For example, IR is perceived to promote a dialogue with stakeholders thereby increasing the accountability of firms Camilleri (2018). Adams (2016) explores how firms applying IR combined communal and environmental issues in their reports and linked social investments to their strategies. Vitolla et al. (2019) provides empirical evidence that the stronger the pressure of shareholders in a firm, the better the quality of IR is. In other words, Integrated Reporting is a comprehensive report that provides value-relevant information to most of the stakeholders. However, despite this perspective on IR's role as a step forward in sustainability reporting, many academics raised doubts on its inclusion of different stakeholders' interests.

### 3.1.2 The capital-provider perspective

Another stand of research contends that Integrated Reporting is a trojan horse in a sustainable disguise. For example, Flower (2015) argues that the IIRC focuses on the concept of value from the investor's point of view regardless of society's perspective and does not put any obligations for firms to report harmful behaviours to outsiders when there is no impact on the firm itself. Furthermore, the study speculates that the original movement of Integrated Reporting was hijacked by professional and large corporates, who made up more than the half of the IIRC's council, to align the organization to their interests. Thomson (2015) also criticizes IR for diverting from sustainability promotion and for not integrating the voice and value of different communities and the natural world in the report. These former studies echoed Cheng's et al. (2014) critiques on the IIRC's focusing on the capital providers as the main audience of IR. Similar doubts are raised

in other studies too. For example, Rensburg and Botha (2014) express the view that few stakeholders use IR as their source of information for their investment and financial decision. Likewise, Chaidali and Jones (2017), shows through an interview conducted with IR preparers that the IIRC's project is a self-focused initiative that serves the professionals leading the organization, which may impair any real change in sustainability reporting and keeps it at the service of the shareholders.

Despite these differing views about for whom IR is reporting, the IIRC's framework clearly mentions that it addresses the needs of "the providers of capital" to enhance their capital allocation. The framework, as Flower (2015) criticised, either promotes reporting on what is financially material for capital providers, or what is material for stakeholders but also financially impacts the interest of capital providers. This indirect substantial impact of stakeholders' issues on investors' return, I contend, constitutes the heart of the "integration function" that IR is supposed to deliver. Therefore, what determines the inclusion of information in an integrated report is both the needs of capital providers and any other information related to stakeholders but impact the return of investors. In this context, the agency problem between managers and both of shareholders and stakeholders, is a key factor in the information asymmetry between the two sides and consequently the needed information for the various stakeholders.

## 3.2 Agency problem and Information asymmetry

The separation of ownership and control in addition to the delegation of decision making between investors and managers create the agency problem (M. C. Jensen & Meckling, 1976; Eisenhardt, 1989; Healy & Palepu, 2001). Capital providers (stakeholders) delegate the decision making regarding their financial (and non-financial) resources to

managers, who may not always be inclined to act in the best interest of their principals, forming an information gap between the two parties and resulting in an information asymmetry.

### 3.2.1 The stakeholder-manager conflict

Another perspective of the relationship that exists between the firm and its stakeholders using the lens of agency problem is suggested by Woodward et al. (1996). From this point of view, the principal (the society) can be perceived as delegating the decision of utilising its resources to the agent (the firm) who is held accountable for this responsibility. Therefore, such a mandate creates an information gap between the firm and its stakeholders who require the former to be accountable through some form of disclosure and reporting (Woodward et al., 1996). The failure to provide relevant and reliable information to stakeholders for the sake of short-term profitability may provoke retaliation from surrounding communities if long-term solutions were not considered (Kulkarni, 2000). Accordingly, disclosure on matters that impact the firm surroundings is important to capital providers as it decreases the information asymmetry regarding non-financial matters and its impact on the firm's financial performance.

### 3.2.2 The shareholder-manager conflict

The evolution of business forms and the related delegation of decision making from shareholders to managers creates the agency problem and results in information asymmetry between the two parties. The activities of profit-based organizations are basically driven by generating excess revenues over costs. Therefore, at some point in the life cycle of some private organizations, one among other reasons to go public is to achieve higher rates of growth which can be fulfilled through expansion or acquisition

(Brau & Fawcett, 2006). Some consequences of such decisions are the introduction of new shareholders and the relative diffusion of both the ownership and the decision making and control of the firm's affairs (Boot et al., 2006). The new de-concentration of ownership leads to the delegation of control and decision making to the new management team while shareholders still bear the risk and the financial responsibility. This agency problem results in an imbalance of information between the two parties which requires an information system that verifies the actions of agents and decreases the information divergence between the two parties.

The delegation of decision making withholds investors from detailed information and exposes them to information risk. Managers are acquainted with productivity and individual asset details in addition to the expected profitability of its projects all the time, while investors are only informed about highly aggregate information in one point of time leading to asymmetric information between the two parties (Aboody & Lev, 2000; Beyer et al., 2010). In these uncertain situations, buyers (prospective investors) understand the seller's superiority (Managers) in terms of quantity and quality of information and anticipate the probable inclination of managers to act opportunistically (Pavlou et al., 2007). This case, in the context of financial markets, can be exacerbated with different levels of information exposures by different parties leading to information risk. In a market where investors are offered multiple investing opportunities in an asymmetrical environment, a reliable source of information becomes valuable.

The availability of information and its quality determine the levels of information risk. A line of research understands the lack of information between managers and investors or the information asymmetry as information risk (Alam et al., 2014; Easley & O'hara,

2004). Other research comprehends low quality reports as a source of risk. For example, Alam et al. 2014 identify it as "low-quality reporting which impairs the coordination between firms and their investors with respect to firms' investment decision" (Alam et al., 2014, p. 6). Similarly, Chen et al. 2005 defines it as "the probability that firm-specific financial statement information pertinent to investor pricing decisions is of low precision"(S. Chen et al., 2007, p. 1). It is one of the central tenets of IR to reduce information asymmetry and provide higher quality of information enabling higher precision in investor pricing decisions.

Therefore, tackling the undesirable effects of information asymmetry improves the function of capital markets. The uneven distribution of information among market participants has a detrimental impact on the market. For example, when uninformed investors trade along with other informed investors, they protect themselves from probable loss through price buffering (Akerlof, 1970; Bhattacharya & Spiegel, 1991; Welker, 1995). Accordingly, reducing information asymmetry may reduce the risk of information that new investors could encounter. Furthermore, it decreases the cost of acquiring information for analysts leading to an increase in coverage (Bailey et al., 2006).

In this context, Integrated Reporting is seen as a medium to decrease information asymmetry and increase the quality of information. The role of integrated reporting set by the IIRC to increase the quality of information for better allocation of capital, suggesting that the report alleviates the agency problem through bridging the information gap between the two parties. Indeed, there has been some empirical evidence proposing that IR decreases information asymmetry between investors and managers and

consequently mitigating the agency problem (García-Sánchez & Noguera-Gámez, 2017; Obeng et al., 2020).

In summary, the agency problem is an inherent problem that coexists with non-sole proprietorship businesses leading to the agency problem of information asymmetry. The scarcity of information for capital providers, or its low-quality, exposes investors to information risk that leads to dysfunctional markets. The IIRC considers integrated reporting to be an instrument that increases the quality of information and leads to better allocation of capital. More specifically, IR is expected to integrate non-financial with financial information leading, as contended in this research, to better value relevance of accounting summary. Therefore, the type of financial information that investors seek gets special importance.

### 3.2.3   Assumptions

The main interest of this work is to examine whether the relationship between the share price and accounting earnings and equity book value, respectively, has changed after the adoption of Integrated Reporting (IR). However, the rational question to pose is why such a relationship would be affected by the introduction of IR? To provide an answer to such an inquiry, I use the framework provided by the International Integrated Reporting Committee (IIRC) to discuss the aims of its implementation.

Every organization exists for a purpose and in the case of for-profit organizations it revolves around generating more money than it spends. However, making a profit necessitates creating a product or service that delivers value to the target customers and meets their needs. Therefore, the value is manifested and presented in an output that

requires inputs and value-adding activities to reach its final form. The canvas by which an organization or a business demonstrates how value is created is what the IIRC and other literature call the business model. To put it differently in the words of Joan Magretta of Harvard Business School:

*"They are, at heart, stories—stories that explain how enterprises work. A good business model answers Peter Drucker's age-old questions: Who is the customer? And what does the customer value?"*(Magretta, 2002).

The more successful a business is in serving its purpose by creating products and services that meets the needs of its customers, the more value it delivers to its investors in the form of profits. Therefore, the prosperity of a firm and its investors is dependent on the impact of the surrounding environment affecting its business model and consequently the final product and service.

Integrated Reporting is a corporate reporting system that aims to enhance the quality of information through disclosing and interpreting the concept of value through the concept of business model.

"*An organization's business model is its system of transforming inputs, through its business activities, into outputs and outcomes that aims to fulfil the organization's strategic purposes and create value over the short, medium and long term.*" (IIRC, 2013b, p. 25).

According to the IIRC's framework, each firm has a specific design to transfer specific inputs, resources, or capitals into outputs through engaging in business activities. The inputs or capitals are not fully under the control of an organization and there is some uncertainty around them. Furthermore, the operating activities exerted on these capitals are also not in isolation from the surrounding environments. Therefore, economic conditions, societal and environment issues affect the capitals and inputs in use.

Additionally, technological changes and competition affect the innovative ways of running business activities to create a value.

The later factors determine the success of an organization to achieve its purpose, creating a value for itself and eventually exchange it for a financial reward. Investors are interested in the ability of a firm to create value in the form of profits, they are interested in assessing the extent to which the inputs, business activities and the outputs are sensitive to such factors in the context of value creation. In other words, how the surrounding environment affect the components of a business model and eventually the value creation process can help investors in adding layers of understanding and meanings on how their financial return may be affected. Furthermore, a clear understanding of the mission of a firm and the strategy in place to achieve it in addition to the related outlook and performance of a firm and how this constellation is at work through the business model, can help investors identifying risks and opportunities and their effect on value and financial reward (IIRC, 2013b).

To summarize, the value creation activities rest in the heart of a business model which receives its inputs (capitals) from the surrounding environment. The efficiency of a business model revolves around creating valuable outputs to the firm's customers and consequently profits to its investors. Reducing ambiguity around the process, therefore, aids investors in making informed decisions.

Before exploring the relevant information to investors, there are some assumptions to make to set a framework for the analysis and any further enquiries:

1. The IIRC set the IR framework to assist providers of financial capital in understanding the value creation process of a firm to increase capital allocation efficiency. This purpose holds only if investors are assumed to be rational. Therefore, there is an implicit assumption by the IIRC about the rationality of investors and the consequent use of information for efficient allocation of capital.

2. The South African market exhibits some extent of market efficiency. In other words, any public and useful information is reflected in stock prices with low possibilities to earn abnormal returns – This assumption is an extension of the previous one, in other words, rationality of investors results in an efficient market that reflects information in prices.

3. Investors estimate firm value by discounting future cash flows (earnings, EBIT, dividends, or free cash flows) on the required rates of return.

## 3.3   Types of relevant information

The previous section dealt with the problem of agency and the resulted information asymmetry between managers and both capital providers and stakeholders. This section, however, identifies the information needed by investors to clarify the areas which a report should cover to mitigate the information asymmetry between users and managers. The literature categorizes the need information into financial and non-financial information.

For example, Kothari et al. (2010) find that investors look for financial information on current and prospective performance in order to assess the value of equity[6]. Similarly, Rowbottom and Lymer (2009) find in a study on a sample of FTSE 350 that the most online requested information by professional investors and creditors are for quantitative content of annual reports.

In this context, the IIRC's introduction of a new framework that considers the shareholders' interest over other stakeholders is established on a reasonable ground. According to the IIRC, the introduction of Integrated Reports aims alongside other objectives to "Improve the quality of information available to providers of financial capital to enable a more efficient and productive allocation of capital" (IIRC, 2013b, p. 2). Nonetheless, evaluating the efficiency of alternative forms of reporting requires an understanding of what sources and kind of information investors use in their investment or divestment decision-making.

### 3.3.1 Relevant financial information

It is found in the literature that the accounting information extracted from both the balance sheet and income statements are necessary for the decision making by the providers of financial capital. The literature provides early evidence on the importance of accounting and financial-based items in investment decision making (Buzby, 1974)[7].

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[6] Kothari et al, (2010) emphasise the idea that the GAAP designed to facilitate the efficient capital mechanism through optimal resource allocation and minimizing cost of capital by increasing the quality and quantity of financial information.
[7] Examples on the related items are: changes in accounting methods, capital expenditure, foreign subsidiaries, historical summary, breakdown of income by product line, depreciation calculation methods and periods, sources and uses of funds, breakdown of sales by product lines, inventory accounting methods, earning per share calculations and current and accumulated depreciation charges, capital expenditure for the coming year.

Investors seem to extract information from the balance sheet and its notes when it comes to firm-valuation tasks. For example, (Cascino et al., 2021)[8] finds that useful information for valuation objectives is specifically extracted from the balance sheet and is particularly related to information on financial instruments. Similarly, Drake et al. (2019) survey investment professionals to investigate information-overload phenomenon and finds that the users attach importance to balance sheet information when performing firm-value estimation, risk and uncertainties estimation and credit-risk assessment tasks. The evidence provided by the literature shows that information from the balanced sheet – which will be later proxied by equity book value – is likely to find its way to the market value of the firm. In other words, a suggested channel by which IR can impact the value relevance of equity book value is probably by explaining how value creation process can impact relevant information presented in the balance sheets and its notes.

Information extracted from the income statement are also important as much as what is provided in the balance sheet if not more. For example, professional equity investors and financial analysts, who use fundamental valuation models and heuristics, require accounting data collected from financial statements as inputs to their models such as proforma earnings, EBITDA and revenues (Cascino et al., 2014; Drake et al., 2019; Cascino et al., 2021). Similarly, it is found that finance directors, financial analysts and investment managers use accounting-based indicators in addition to financial ratios in their heuristics valuation models such as sales growth, Dividend yield, P/E and Price-Earnings-Growth (PEG) models (R. G. Barker, 1999; N. C. Brown et al., 2014; Yin et

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[8] The study conducts a face-to-face survey experiment on 81 investment professionals from 16 countries around the world.

al., 2018). Therefore, it is also possible that the impact of IR can be traced through its influence on the relationship between earnings and the market value of equity.

Additionally, investors may use information from annual reports and other financial statements in the valuation process of firms. For example, creditor, professional investors, and accounting firms may utilise the content of annual reports in their decision-making process (Rowbottom & Lymer, 2009). Furthermore, Brown et al. (2014) finds that financial analysts, in part, assess higher quality of earnings if it is backed by operating cash flow and whether it was repeatable and sustainable.

From what is mentioned, it can be concluded that because investors use financial statements in their valuation assessments, any difference in the relationship between earnings and equity book value on the one hand with the market value of equity on the other hand are likely to proxy the IR's efficiency.

### 3.3.2   Relevant Non-financial information

The need for financial information is not the only aspect of information asymmetry between managers and capital providers, but it also includes other relevant non-financial information. Management quality in addition to other non-financial information are important factors integrated in the decision-making process which later represented in business model canvas.

#### 3.3.2.1   *Management quality*

Researchers have recognized the importance of management's stewardship in the process of firm valuation as it is prominent for investors to understand the role of management

in generating revenues other than what is a result of external factors (Beyer et al., 2010). For example, in a study on individual investors' most valued aspects in their decision making, Baker and Haslem (1973) find that the quality of management is among the most important factors in the process of acquiring information by investors. Investment decision makers assess the management quality and value this assessment as the most important part of their work, as it can appraise the management ability to fulfil their promises and plans (J. R. Barker, 1993). Similar conclusions are drawn too by Brown et al. (2014) which finds that financial analysts consider private communication with firm directors to be the most prominent input to their valuation models. This is because analysts can validate their assumptions about the firm and the industry in addition to the access to further details not publicly available (N. C. Brown et al., 2014). Furthermore, non-accounting data were found important when it can add meaning to the accounting information. Therefore, direct contact with company's personnel is very influential and important as it makes sense of the numbers and probes the management ability to achieve the corporate's strategy (Cascino et al., 2014, 2021). These examples on the role of managements quality in the valuation process shed the light on possible channels for Integrated Reporting to impact the value relevance of accounting summary. Furthermore, the literature highlights other non-financial information that is relevant to investors' decision-making, and which were, on a later period, presented in a business model framework adopted by the IIRC.

### 3.3.2.2 Other relevant qualitative information

Other studies highlight different dimensions of non-financial information that are also relevant to the decision making of investors. For example, future economic outlook of a company, future economic outlook of an industry, are important for investors (Baker &

Haslem, 1973). Furthermore, information on sustainability, industry competition and corporate strategy are prominent for forecasting as long as they are reliable and predicted for the near future (R. G. Barker, 1999). Other examples on influential items for professional and non-professional investors in their decision-making process are: corporate specific-performance [9], firm products in addition to its research and development details and its ability to fund its operations and investments (Sutton et al., 2012). Despite that Buzby (1974) finds that some information pertaining to non-financial data are less important [10]. It is possible that investors' perception of non-financial information at the time of the study were not matured as nowadays capital providers. These additional aspects of non-financial information, however, have been reconceptualised by the IIRC and represented in a value creation context which make it relevant to the current research.

### 3.3.2.3 *Non-financial information in the context of the business model*

The non-financial information needs of investors have developed over time to include elements of ESG reporting in addition to reframing management's commentary and quality besides strategy and future perspective in a business model concept. While the elements of ESG reporting will be discussed in detail in chapter 1, I will discuss the business model in the context of the IIRC's framework.

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[9] Company-specific performance is identified in Sutton's paper as the discussion of outcomes on key performance indicators (including definitions) specific to a company's strategy, including both financial (e.g., percentage of revenues from products introduced in the last three years) and non-financial (e.g., employee turnover) metrics.
[10] Such as the description of products produced, factors affecting the following year's performance, company's directors, and other descriptive items.

Integrated Reporting provides investors with information related to how value is created over time in the context of the firm's surroundings. That is, IR explains how value is created given the inputs (capitals), outputs and outcomes in the context of a firms' strategy, outlook, performance, risks and opportunities (IIRC, 2021). In other words, non-financial information can impact the quality of IR in the context of value relevance. An example on such possible influence is the work of Mechelli et al (2017) examining the impact of optional disclosure of "the management commentary" as suggested by ISAB 2010 on the value relevance of accounting summary. This commentary includes, according to the study, five basic elements of business-model reporting that are highly synchronized with the IIRC's framework capitals: financial, human, intellectual, and relationship resources. The authors conclude that when the elements are treated as a composite, the value relevance of accounting summary increases for firms providing rich disclosure following IASB framework. Furthermore, once the composite components are individually examined the risk and relationship resource is found to significantly affect the value relevance of both earnings and equity book value at 1%. Another example is the work of Sukhari and Villiers (2019) which finds that the adoption of IR has promoted the reporting business model and expanded the disclosure on strategic matters.

To summarize, there is evidence of the importance of non-financial information in the decision-making process by investors. These information needs cover aspects related to management quality and commentary in addition to other related non-financial information. However, the IIRC provides a framework that represents this information in a new way which may facilitates its use by investors and impacts the value relevance of accounting summary.

### 3.3.3 The interrelatedness between financial and non-financial information

Furthermore, in a sample of firms in the South African settings and using content analysis, Simoni et al. (2021) find no evidence of a relationship between the business model disclosure and the market value of a firm. However, once business models are linked to how earnings are generated, the information becomes material, resulting in a difference in the decision taken by investors. Accordingly, appealing to capital providers to allocate their funds in a specific firm depends on their understanding of how value is created in the firm of interest. If the board of directors fairly understands the business model of its firm and is willing to communicate the related information to investors, the communicating medium becomes a crucial tool in assisting investors' decisions.

### 3.4 Information risk and valuation

Finance theory suggests that the value of a financial security is equal to the present value of the cash payoffs that an investor in that security expects to receive, most analysts state that they very frequently rely on price-earnings (P/E) or price- earnings-growth (PEG) models to support their stock recommendations (N. C. Brown et al., 2014).

### 3.4.1 Discounted Cash Flow

To reach a decision for investing in an asset or a stock, investors and sell-side analysts tend to use either rigorous valuation techniques such as the Discounted Cash Flow (DCF) model and its alternatives as Dividend Discount methods, or valuation heuristics like multiples. While the latter were found to be popular among analysts, the former is thought to be more precise (Bradshaw, 2004; Gleason et al., 2013). In both scenarios, the financial theory in general relies on the assumption that investors are rational and risk

averse. For example, to determine the required rate of return or to adjust their heuristic judgements, the investors need to gauge the riskiness of their investments.

### 3.4.2 The Capital Asset Pricing Model

Whether it is the Weighted Average Cost of Capital (WACC) in the case of firms, or the cost of equity in the case of stocks to be determined or calculated by an investor or analyst, the most important model to calculate the cost of capital is the Capital Asset Pricing Model (CAPM). For instance, Graham and Harvey (2001) find that 73.5% of the Chief Financial Officers surveyed always or almost always used CAPM in estimating the cost of equity. What is more, Bruner et al. (1998) find in an earlier survey using a sample of 27 American leading corporations and a sample of 10 of the most active advisors that; 81%, 80% respectively used CAPM to estimate the cost of equity. More surprisingly, however, despite the criticisms articulated to CAPM in terms of its validity, Brotherson et al. (2013) updated Bruner's et al. (1998) survey results using well reputed corporations and financial advisors and find that 90%, 100% respectively of the previous surveyed parties used CAPM to estimate the cost of equity. In the same fashion, Truong et al. (2008) state that 72% of Australian companies use the CAPM in estimating their cost of capital and that makes it the most popular used method.

In the process of stock valuation, users of CAPM discount the future cash flows on the required rate of return. Since most of them face diverse information in a market with multiple risky assets, each of these traders has different risk-return trade-off (Admati, 1985). Therefore, their rate of return will differ as well and it would not be a matter of debate to argue that if the clients of Goldman bank during the financial crisis, as mentioned in the U.S. senates' report, had not been a victim of moral hazards by their

bank, they would have been able to factor the information into a higher required rate of return and most probably abandon their risky investments.

### 3.4.3   Mitigating agency problem

Because of the magnitude and diversity of today's public corporate investors, it is not practical for them to daily follow management's activities and a need to monitor the agents' expenditure and performance emerges. One way to provide such a supervision is by the election of a board of directors to serve this purpose. However, the literature presents distinctions between a board that is aligned with the interest of investors and in other cases when it is captured by the firm's management which in turn creates more complicated forms of agency problem (Shleifer & Vishny, 1997). Another way to oversee managers is through financial reporting which is an instrument to rebalance the information gap among the interested parties such as shareholders and bondholders from one side and with the executives on the other side. To put it differently, annual reports might be one of the suitable channels to alleviate agency conflict and information asymmetry (Healy & Palepu, 2001).

The literature provides evidence on the negative impact of non-financial reporting on information asymmetry (Romito & Vurro, 2021). For example, reporting on Corporate Social Responsibility (CSR) matters is found to reduce information asymmetry among market participants and particularly in strong stakeholder-oriented context and among firms with high reputation risks (Martínez-Ferrero et al., 2016; Cui et al., 2018). Furthermore, Kulkarni (2000) highlights that manipulating environmental information for short-term profit may provoke unpleasant reactions from surrounding communities. Likewise, disclosure on issues related to climate matters was found to decrease

information asymmetry. For instance, Adhikari and Zhou (2021) find that firms that opt to provide voluntary Carbon emission disclosure enjoy lesser degrees of information asymmetry in comparison to providers of incomplete information and non-reporting companies. Similarly, Schiemann and Sakhel (2019) conclude that the disclosure on physical risks associated with climate change generally decreases information asymmetry and more specifically for firms whose physical risks are higher in comparison to their peers and are listed in regulated markets.

The impact of disclosure on information asymmetry is not limited to non-financial reporting but it extends to influence the elements of financial performance. Hickman and Cote (2019) find that reporting on CSR and its mitigating impact on information asymmetry is a result of both stakeholders' pressure in addition to operational and financial benefits recognized by the reporting firms. Furthermore, Michaels and Grüning (2017) report a negative relationship between CSR reporting with both information asymmetry and the cost of capital. It was also found that poor corporate governance policies in firms decrease the relevance of financial data for professional financial analysts (Cascino et al., 2021). Similarly, Fonseka et al. (2019) concludes that the disclosure on environmental information and the source of energy used by a firm decreases information asymmetry and the cost of equity capital. In the same fashion, Alsaifi et al. (2020) reports that the disclosure on carbon emission in a UK context decreases systematic and unsystematic risks.

To sum up, the firm is viewed as an agent for stakeholders who delegate the decision making of their resources to the firm and are expected to be reported to. The reporting on non-financial information is found to impact information asymmetry between

managers and providers of capital. It is established too that non-financial reporting does not only decrease information asymmetry but also enhance some aspects of financial performance. These findings demonstrate the relevance of agency theory and information asymmetry in creating a theoretical framework for integrating financial and non-financial information. In fact, a study by García-Sánchez and Noguera-Gámez (2017) provide evidence of a decrease in information asymmetry when firms issue integrated reporting. In the next section, I discuss the agency problem form the capital providers-managers perspective.

## 3.5   Integrated Reporting

This section revisits the literature on issues related to integrated reporting and helps provide insights about it. First, it discusses the possible audience of this new reporting trend, whether it satisfies the need of different stakeholders for information or if it serves the need of a limited group of interested people. Second, it explores studies that compare integrated reporting as a reporting framework with other reporting systems, in addition to other studies investigating the efficiency of IR by itself as a reporting framework. Third, the motives behind endorsing IR as a reporting instrument, is it because it brings some advantages for the participating companies? Or is it for legitimacy reasons? Fourth, is the use of IR justified as a better tool to report non-financial information such as environmental and sustainable performance? Fifth, is the integrated thinking which results from the application of integrated reporting worthwhile?

### 3.5.1   Integrated Reporting and other formats.

There are different perspectives on perceiving IR in comparison to other reporting formats. While some views provide evidence to its superiority over other non-financial

reporting mechanisms, other studies argue about its empty rhetoric reporting. Maniora (2015) empirically studied whether IR could be a superior mechanism for the integration of ethics into firms' core business model over alternative Environmental, Social and Governance (ESG) reporting strategies. It uses three subsamples of companies reporting on the ESG spectrum: those with no ESG reporting, those with ESG reporting in the annual report, and those with a stand-alone ESG report. The analysis shows that companies with IR reports do not exhibit as high integration of ESG issues into their business model as stand-alone ESG reporting. Moreover, companies with stand-alone ESG reports have better Environmental, Governance and economic performance than IR companies. The last finding was justified by the recent application of Integrated Reporting framework. IR, in other words, is still a new concept and integrating ESG issues into the business model is seen as a long process that takes years to be fully developed and to pay off financially and non-financially (Maniora, 2015; Serafeim, 2015). Another investigation on the difference between IR and ESG reporting was carried out by Mervelskemper and Streit (2017) for 43 international firms between years 2010-2014. The study finds that as far as the market valuation is concerned, IR is superior to stand-alone ESG reporting. Conversely, Ackers and Grobbelaar (2021) finds that South African mining firms did not experience a significant difference in their CSR disclosure after the adoption of IR when years 2012 – 2015 were compared.

The previous literature cast some doubts on the effectiveness of IR and emphasize the necessity to investigate whether IR is another non-financial reporting initiative, or it does deliver the missing piece of the financial reporting – that is the integration.

### 3.5.2 Legitimate and impressionistic perspective

Organizations operate in an environment that may impose challenges over their survival. Therefore, such organizations face the threat of gradually being eliminated for non-compliance attitudes or adapting to their dynamic surroundings. Accordingly, institutions demonstrate different patterns of behaviour, which is economically viable, legal and legitimate and will pursue actions that fulfil them all (Dowling & Pfeffer, 1975). In this context, many studies examined the adoption of integrated reporting using the lens of legitimacy theory, which involves "a change in the organisation's mission or the use of symbols to identify the organisation with legitimate social institutions or practises" (Dowling & Pfeffer, 1975, p. 127), to examine and evaluate the compliance of such companies with regulators' requirements.

Using legitimacy as a theoretical framework, Setia et al (2015) studied the behaviour of the largest 25 companies in terms of market capitalisation in the Johannesburg Security Exchange (JSE) of South Africa. They investigated the behaviour of these organisations after the requirement by JSE to "apply or explain" approach of issuing Integrated Reports starting from March 2010. The change of the legal requirements, as per the authors, will create a gap between the new norms of reporting and the past status that companies used to operate in. Consequently, some companies, as proposed in the study, may embrace the substantive or symbolic management as a micro legitimation strategy. In the former, companies will make every faithful endeavour to meet the societal expectation (bridging). While in the latter they act in a way that insulates the organization from external interferences or influences (buffering). Despite that the results show an increase in the extent of disclosure, only the proposition of symbolic

management is supported, in other words companies merely attempted to follow the framework just to legitimate their actions.

Attention should be paid while dealing with the results of the mentioned study. First, the small sample of companies (25) that were under scrutiny may not be enough to generalise the results. Second, while snapshot evidence (one year before and after the compulsory framework) contributes to our understanding of the change, a longitudinal study will be a plus in terms of explaining the trend of reporting over time. Third, the study verified its propositions by partially drawing from IIRC' 2013 framework while their sample included 2009/2010 and 2011/2012 annual reports. Fourth, it is essential to recognize that the increase in quantity is completely different from enhancement in quality. For example, the perception of environmental reputation among investors is likely to be influenced by the quality of environmental disclosure rather than the quantity of such information (Hasseldine et al., 2005).

Vigilant with the drawbacks of the above study, among other earlier and similar line of research, Ahmed Haji and Anifowose (2016) examine the trend of IR in South Africa by using a larger sample of the largest 82 companies in the JSE over a period of three years (2011 – 2013). The study explores whether the legitimacy seeking behaviour of IR practice is; Symbolic or substantive by undertaking significant actions to abide by the regulatory requirements. The study concludes that there is evidence that the sampled firms showed combined symbolic and substantive legitimacy behaviour. However, they suggest that the reporting practice at the time is ceremonial in nature because of the "limited application of key IR aspects such as connectivity of information, materiality

determination process and trade-offs between the multiple capitals, or components of a capital, in the integrated reports" (Ahmed Haji & Anifowose, 2016, p. 192)[11].

Van Bommel (2014), focused on the sustainability aspect of Integrated Reporting and found that there are four orders of worth (market, industry, civic and green orders of worth), with Integrated Reporting privileging the market and industry orders at the expense of the others. This will endanger Integrated Reporting form being a durable and widely shared compromise in the future. Therefore, a dialogue among the actors of the field is necessary to reach a compromise that would be stable and durable[12].

Drawing from previous studies, Beck et al. (2017) finds that even though organizations adopting expansive non-financial guidelines such as GRI's[13] framework, there is still incomplete disclosure on the activities of the reporting firms. Implying an implicit criticism of GRI as incomprehensible and inferring that firms use reporting as a legitimising tool. By studying a firm suffering scandalous loss and becoming a pioneer in IR, the study shows how stakeholder perceived ZITA as moving "from seeking to restore legitimacy to defining material issues and framing the report around the business story rather than the guidance" (C. Beck et al., 2017, p. 202). In other words, a framework for applying strategic legitimacy[14].

Lai et al. (2016) examine using IR as a means of managing corporate legitimacy. By exploring firms adopting IR after poor rating of ESG reporting by Bloomberg, the study

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[11] Further analyses and commentary for this study are provided in Appendix A - 9.1
[12] Further analyses and commentary for this study are provided in Appendix A - 9.1
[13] Global Reporting Initiative (GRI)
[14] Further analyses and commentary for this study are provided in Appendix A - 9.1

was motivated to explore whether such firms use IR in response to such risks. By comparing international firms drawn from a sample of firms participated in the IIRC's pilot program with other matched firms, the authors concludes that "[the] firms are not using IR to repair the poor evaluation of the quality of their sustainability disclosure, as measured by Bloomberg's score." (Lai et al., 2016, p. 173)[15].

In order to evaluate whether IR is considered a legitimising tool, Botha et al. (2022) explores the water governance disclosure for firms belonging to food, beverage and tobacco industries listed on South African, Australian, and American exchanges. The study finds that the performance of IR adopters as far as the water governance disclosure is concerned, is higher than non-IR firms. That suggests, according to the authors, that IR is a supportive tool for firms to legitimise their existence in the surrounding societies. Similarly, Beske et al. (2019)investigate the disclosure on materiality using the legitimacy lenses on a sample of German companies applying sustainability or integrated reports between years 2014-2017. The study finds that some ambiguity in respect to materiality disclosure and its underlying processes suggesting the use of such reporting for legitimate purposes.

To summarise, some IR adaptors genuinely use the reporting scheme to substantially legitimate their existence like the findings of Botha et al. 2022 and Lai et al. (2016) demonstrate in respect to water governance disclosure and repairing poor sustainability scores respectively. Conversely, other firms appear to use IR as a tool to legitimize its existence with leads to symbolic reporting practises.

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[15] Further analyses and commentary for this study are provided in Appendix A - 9.1

### 3.5.3   Is IR a sustainability report and to whom

The term "sustainability reporting" may refer to any disclosure by firms that goes beyond financial information or reporting about the impact of corporations on its social and natural environment especially on issues that concern stakeholders (Gray, 2002; Cho et al., 2015). Meanwhile, IR interrelate financial and non-financial inputs in the context of value creation to provide capital providers with higher quality of information for better allocation (IIRC, 2013b). Consequently, the question of whether IR is a sustainability report and whether it serves other stakeholders in addition to shareholders is a relevant query when the relevance of accounting information is at the stake.

There are two steams of literature that argue on whether IR is indeed a sustainable report that discloses on concerning matters for a variety of stakeholders or it is a corporate hijack of the non-financial disclosure initiative concealed by attractive labels. Jensen and Berg (2012), for example, assume that both IR and other Traditional Sustainability Reporting (TSR) disclose on Corporate Social and Environmental Responsibility (CSER). However, while TSR has retrospective focus, IR is conversely more future oriented with a feature of integrating financial and non-financial information, which makes it more informative and valuable. Other views suggest that firms of high-quality IR are the ones who issue and interrelate a sustainability report with an Integrated report (Malola & Maroun, 2019). In contrary to the previous perspectives, Permatasari and Narsa (2021) find in a European and African context that firms reporting under sustainability reporting formats have higher value relevance that IR. Nonetheless, IR is found to impact the value relevance of earnings and equity book value more than sustainability reports.

The opposers to the notion that IR is a sustainability report for various stakeholders, agree that it effectively serve nobody better than the investors and the corporate professionals. Milne and Gary (2013), for instance, show that by focusing on investors' needs and presenting that as a synonym to sustainability, a long history of research in the field of sustainability is forsaken. Furthermore, they believe that by concentrating on the interests of the providers of financial capital, IR has "nothing – and certainly nothing substantive – to say about either accountability or sustainability" (Milne & Gray, 2013, p. 20).

Similarly, John Flower (2015) supports the previous point of view by showing how IIRC contradicted the foundations of its establishment. The IIRC was initiated through a joint effort of both Accounting for Sustainability project (A4S) and the GRI to create a framework that provides clear and comprehensive information for decision makers on the world's challenges: "over consumption of finite natural resources, climate change, and the need to provide clean water, food and a better standard of living for a growing population" (A4S & GRI, 2010; Flower, 2015). However, according to Flower, there was no meaningful use of the word "sustainability" in the IIRC's framework of 2013 which was replaced by the concept of capitals [I will explain later the concept of capital in the introductory about IR]. The natural resources are part of these capitals, and sustainability, as Flower interprets it, happens when a decrease in one capital is compensated by the increase of others. Yet, he contends that this facilitates the exploitation of this concept, and he gives an example of it from the IIRC's framework "creating employment through an activity that negatively affects the environment". Therefore, "Such damage [to the environment] may be justified by an increase in another

category of capital, including financial capital" (Flower, 2015, p. 8). Furthermore, he sheds light on the intentional change of the IIRC's basic thesis from reporting material issues to "investors, employees, customers and, more broadly, society" (Flower, 2015, p. 3) to what matters only for investors, or the firm that reflects investors' interest.

Moreover, Flower in his criticism of IR explains how IIRC's perspective changed from criticising the fragmented information across different reports and justifying the necessity for one integrated report connecting the various parts of the puzzle, into giving the reporting companies the allowance to publish IR as either a standalone report or as a part of other reports.

Another drawback, from Flower's perspective, is the IIRC's lenience with management in terms of reporting about material issues. He argues that dropping the obligation on reporting material issues if the firm has either one of the following: legal prohibition, unavailability of data or competitive harm, encourage some managers to keep material issues undisclosed. In addition to that, Flower believes that the IIRC has not set an assurance policy that verifies the complete and full disclosure of material issues. He draws an example about it from a previous study about how prestigious firms did not disclose – using GRI's framework – some serious events in 2007 at all or reported about it in a poor manner while they were rated as best reporting practice. As a conclusion, Flower (2015) believes that IIRC has failed to fulfil their initial objectives and he attributes that to the dominance of accountancy profession, preparers and regulators over the IIRC's council.

The capture of the IIRC by professionals and consequently the probable lack of credibility in sustainability reporting, is also an opinion held by Thomson (2015)in favour of Flower's point of view. He alluded to the whole outlook of Integrated Reporting as being a "neo-liberal ideology dressed up in green camouflage" (Thomson, 2015, p. 19). Furthermore, he criticises the idea of the "great shareholder" proposed by Mervin King, in which the powerful citizen is able to "monitor, reward, discipline and punish large self-interested organizations using dividing practices associated with corporate decency" (Thomson, 2015, p. 20). Therefore, this perspective concurs with Flower's about being disappointed by the late progress of IIRC's framework.

However, despite the fact that assessing this framework against what was set in the launching of IR concept may be interesting, Adams considers judging its success or failure to be an early process (C. A. Adams, 2015). Furthermore, Adams believes that as the language of businesses is about numbers and the level of profits achieved, it would be difficult for managers to consider value to society if it was not aligned with value to investors. The interest of professional accounting bodies in reporting about non-monetary issues, is a concern that Adams shares with Flower. Further research is suggested by Adams to reveal the reasons behind such a sudden interest. Moreover, the study suggests that any dominance by professional bodies over other parties in the IIRC council is a result of the weak participation by the latter parties and particularly the academics.

Limited disclosure requirements are another thing Adams worries about. However, if the maturity and development of the accounting profession in terms of sustainability reporting is taken into consideration, such a drawback can be justified with the recent

existence of sustainability reporting. Moreover, sustainability reporting is seen to be performing a different function than IR. For example, sustainability reporting targets a wider audience than just investors and focuses on the many impacts on the environment, society and the economy, while IR is concerned about value creation over time (C. A. Adams, 2015).

### 3.5.4 Integrated Thinking

Integrated Thinking was defined by the IIRC as "The active consideration by an organization of the relationships between its various operating and functional units and the capitals that the organization uses or effects" (IIRC, 2013b, p. 33). Understanding the relationships between units requires realizing the importance of a unit itself and its ties with other ones. In this context, Oliver et al. (2016) define two ways of system thinking; hard and soft system thinking. Hard system thinking works within a silo area that defines objects then identifies techniques, costs and resources to achieve these objects (P. Checkland, 1981; P. B. Checkland, 1988; P. Checkland & Scholes, 1999; Daellenbach, 1994; Oliver et al., 2016). For example, systems of management performance in a department which is part of the traditional management systems, could be considered a hard-system thinking (Bamber et al., 2000; Oliver et al., 2016). Nonetheless, soft systems thinking is more aligned with fuzzy environments and is dependent on individuals' value systems (P. Checkland, 1981; P. B. Checkland, 1988; P. Checkland & Scholes, 1999; Daellenbach, 1994; Oliver et al., 2016). It is more about connecting the different parts of the system like a theory does, the different silos of the hard system thinking. However, the relationship between the two systems is in reciprocal and dynamic interactions (Oliver et al., 2016).

Oliver et al, (2016) stress the role of senior management: "if senior management are not engaged with deeper dynamics of the organization and actively working to break down silos created by the performance measurement system, an evidence of soft integrated thinking is minimal" and "the ability for senior managers to engage in discussion with others, to not only reason decisions but foster important relationships, is evidence that soft integrated thinking is occurring in organizations" (Oliver et al., 2016, pp. 241–242).

Integrated thinking (IT) is likely to influence the performance of Integrated Reporting through its impact on non-financial and financial information which in turn may impact the value relevance of accounting summary. For instance, Reimsbach and Braam (2023) finds from an international sample of firms over the period 2006 - 2018 that Sustainability Performance (SP) is promoted by the level of IT. Furthermore, this improvement in SP is associated with long-term financial performance on the cost of the short-term one. In a similar context, Barth et al. (2017) find firms with higher quality of IR have higher values as proxied by Tobin's Q. The impact on the quality of IR was found to be associated with the firm's cash flow which may have resulted from the improvement of investors understanding or the positive impact of IT on managers' decisions.

### 3.5.5   Literature Review Conclusion

In summary the literature demonstrates that the separation between ownership and control whether it was between managers and investors or organizations and societies leads to agency problem. Such an issue requires the disclosure of information from the side of directors to other parties with lack of information. While investors' main interest is likely to focus on quantitative financial information, other parties (Stakeholders) are

concerned with how non-financial information impact their interests. Consequently, there is a possibility that a firm's board of directors may have either to balance the information disclosure between the two parties (shareholders and stakeholders) or favour one to the other.

In this context, despite the defence of some parties on the role of IR in promoting sustainability reporting for stakeholders, the IIRC's framework - as Flower (2015) explained - aims to report for stakeholders as long as the information is material to capital providers. Therefore, one can conclude that the effectiveness of IR is dependent on demonstrating to investors how non-financial information may impact financial information. In this context, the literature provides examples on non-financial information such the quality of management, future-oriented information, and sustainability information (i.e., ESG, CSR). Likewise, financial information may involve any piece of information that can be used as an entry to a valuation model.

Considering the previous argument, this thesis postulates that one way to measure the effectiveness of IR is by assessing the value relevance of accounting summary after the introduction of IR. The fact that South Africa is the only country in which IR was mandatory, the thesis examine a sample of firms listed on JSE during the years 2008 – 2016.

# 4    Integrated Reporting and the value relevance of accounting summary

## 4.1    Introduction

Recently, enhancing the quality of information for investors to improve the efficiency of capital allocation in a sustainable manner has become a central topic for academic and professional investigation. In this context, the establishment of the International Integrated Reporting Council (IIRC) aimed to contribute to raising the quality of financial information through highlighting how value is created in reporting firms over short-, medium- and long-term horizons. Acknowledging the importance of IIRC's role in establishing integrative mechanisms of financial and non-financial information, the International Accounting Standard Board (IASB) decided to merge the IIRC in its Sustainability Accounting Standard Board (SASB). The latter board issued its first standards during June 2023. One approach to investigate the improvement of information quality is through examining its relevance to the providers of financial capital (IFRS Foundation, 2018).

This thesis contends that if Integrated Reporting (IR) fulfils its purpose to integrate non-financial information with financial information in the context of value creation, the value relevance of accounting earnings and book value of equity are expected to change. It is proposed that if IR enhances the quality of disclosed information to providers of capital, the association between these accounting figures and share prices will increase. The economic mechanism behind the proposed influence is likely to be defused through either or both non-financial and the financial channels. The improvement in the quality of reporting may decrease the information asymmetry which in turn may influence the cost of capital and consequently the intrinsic market value (Toms, 2002; Salama et al., 2011; Zhou et al., 2017; Cortesi & Vena, 2019). On the other hand, IR is likely to

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influence the quality of reported earnings through less discretionary accruals, lower income smoothing and higher level of earnings persistence (Cortesi & Vena, 2019; Pavlopoulos et al., 2019; Obeng et al., 2020; Simoni et al., 2021). Moreover, the adoption of IR can also mitigate accrual-earnings management (Wu & Zhou, 2022). Similarly, IR might help investors in identifying unbooked liabilities which is likely to be detected through negative book value coefficients (Hughes, 2000; Clarkson et al., 2004). The previous studies provide channels through which IR may influence the relationship between accounting summary figures and the market price of equity.

In this context, studying a sample of firms that are mandated by a regulatory body to report IR, provides the foundation to reliably compare the reporting performance of these firms over time. Therefore, the South African market, where IR has been mandatory since 2010, constitutes a suitable setting to investigate the impact of IR on the value relevance of accounting summary (de Villiers et al., 2017).

The literature, as will be discussed in detail in section 4.2, provides contrasting views on the effectiveness of IR, which in turn cast doubts on the possible impact of IR on the value relevance of accounting summary.

Pavlopoulos et al. (2019) examine the value relevance of accounting summary in an international context that includes data from South Africa. The study finds that IR has a positive impact on the value relevance of both earnings and equity book value. In contrary, Cortesi and Vena (2019) report a negative impact of IR on the value relevance of equity book value for BRICS[16] firms but reconfirm its positive impact on the value

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[16] Brazil, Russia, India, China, and South Africa.

relevance of earnings. Similar findings to Cortesi and Vena (2019) were reported by Baboukardos & Rimmel (BR) (2016) in respect to the value relevance of accounting summary after the application of IR in South Africa (following King III reporting framework). These studies, provide some empirical evidence on the value relevance of IR.

However, there is other evidence pointing to the lack of meaningful implementation of IR in South Africa. For example, the impact of IR on the economic performance of a firm is not different from a standalone ESG report in the South African and the Australian contexts (*The Sustainability Content of Integrated Reports – a Survey of Pioneers*, 2013; Maniora, 2015). Furthermore, reports prepared under the label of "Integrated Reporting" are found not to be representative of the spirit of IR and are found to negatively influence the market value of a firm (Ahmed Haji & Anifowose, 2016; Pistoni et al., 2018; Landau et al., 2020).

Therefore, this chapter aims at assessing the effectiveness of IR in enhancing the quality of information to the providers of financial capital. To chieve this objective, I evaluate the effectiveness of IR by exploring its possible impact on the value relevance of accounting summary in South Africa. In doing so, this thesis provides another opportunity to investigate the robustness of the findings of BR (2016) considering the depicted-above criticism of IR's ineffectiveness. The relevance of accounting summary is assessed using Ohlson (1995) model in a balanced-panel setting using Least Square Regression. Moreover, further robustness methodologies were adopted following Collins et al. (1997) and Barth et al. (2008) during different periods (2008 – 2013) and (2008 – 2016).

Exploring and replicating the work of BR (2016) revealed that using Cook's Distance (CD) technique to confine the impact of influential observations resulted in dropping IR-pioneering firms from the analysis. Consequently, two questions arose regarding whether the results are sensitive to the way outliers are treated or/and to the time's window chosen for investigation. Simultaneously, other methods were used to explore the effectiveness of IR in influencing the value relevance of accounting summary and to compare their findings with BR's.

The findings provide further evidence on the ineffectiveness of IR which might be the outcome of ceremonial use of IR as concluded by Ahmed Haji & Anifowose (2016) and Maniora (2015). IR appears to be influential only if CD is applied to tackle influential observations. In contrary, Winsorizing the data at 1% level, not treating the data, or examining the role of IR on the value relevance of accounting summary over the periods, 2008-2013 and 2008-2016 do not confirm BR's findings. Moreover, using other methods and models following Collins et al. (1997) and Barth et al. (2008) lead to the conclusion that IR has no significant influence on the decision making of capital providers. The findings of this chapter contribute to the literature by providing counter evidence on the effectiveness of IR on the value relevance of accounting summary. The findings support the likelihood that firms listed on JSE ceremonially apply IR for legitimate purposes and investors – on average – do not benefit from IR in enhancing the allocation of their capital. Furthermore, it highlights the problematic aspects of eliminating outliers or influential observations by applying data-eliminating techniques in balanced settings without studying the excluded cases. It is important to note that these finding are limited to the context of South African firms and the mandatory settings. Furthermore, considering the nature and special legislation of the financial industry, the examined

sample did not include this sector and therefore the findings are not representative to all the South African industries.

This chapter starts with literature review and hypothesis generation before discussing the research design. The ensuing section describes the results of this chapter for the different periods under investigation and other robustness methods to check the validity of my findings before concluding the chapter.

## 4.2   Literature Review and Hypothesis

Because value relevance studies investigate the relationship between a dependent variable with the equity market price, the literature is classified according to the type of examined information (financial, non- financial) and whether it is applied under a reporting framework.

Furthermore, there has been extensive studies in the domain of value relevance in different regions and across countries with inconsistent findings attributed to the reporting framework in place, the type of country's legal system, shareholder protection, corporate governance systems and other factors [17] (Hung, 2000; Barth et al., 2008; Ammann et al., 2011; Barth et al., 2012; Ntim et al., 2012). This literature, therefore, examines the value relevance studies in the context of South Africa as it is likely to be more informative in generating the hypotheses of this chapter.

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[17] Using Scopus database for academic articles, a search for "value relevan*" term in the abstract of journal articles for Business, Management, and Accounting as well as Economics, Econometrics and Finance produces 1505 journal articles as July 2023.

While the first level of classification is related to the absence/existence of a reporting framework (accounting – non-accounting), the second level of categorization regards the type of information (financial, nonfinancial, or both) as it is demonstrated in Table 1.

Table 1 The classification of the literature review

| Framework | Kind | Type of information | Articles |
|---|---|---|---|
| Non-reporting-framework studies | | Financial variables | Badenhorst et al. (2016); Sixpence et al. (2019); Zulu et al. (2017); Badenhorst and von Well (2023) |
| | | Non-Financial variables | Sewpersadh (2019) |
| | | Financial and non-financial variables | de Klerk & de Villiers (2012); Marcia et al. (2015) |
| Reporting-framework studies | Accounting-reporting frameworks | Financial variables | Prather-Kinsey (2006); Hillier et al. (2016); Hlatshwayo & Zulu (2019). |
| | Non-Accounting reporting frameworks | Non-Financial variables | Ntim et al. (2012); Gyapong et al. (2016); Lee & Yeo. (2016); Barth et al. (2017); Tlili et al. (2019); Moloi & Iredele. (2020) |
| | | Financial and non-financial variables | Baboukardos & Rimmel. (2016); Tshipa et al. (2018); Loprevite et al. (2018); Matsane et al. (2022) |

## 4.2.1   Non-reporting-framework related studies

Studies under this category are divided into three classes according to the type of the independent variables examined in the relationship with the market price of equity. Accordingly, non-framework reporting literature includes research on the value relevance of financial, non-financial and both financial and non-financial information.

### 4.2.1.1 *Studies on the value relevance of financial information.*

Relating to the financial information category of value relevance studies in the South African context, the relationship between balance sheet or income statement items and market value of stock prices has been investigated. For example, Sixpence et al. (2019) study the value relevance of both debt-to-equity ratio and total liabilities as a proxy of financial risk for listed firms on the Johannesburg Stock Exchange (JSE). The study examines the period between 2010-2017 and concludes that the ratio of debt to equity is value relevant for high-risk and low-risk firms while the total liabilities are only value relevant for low-risk firms. In the same context, Badenhorst et al. (2016) investigate whether accounting for investments in associates following equity or fair value methods is factored in investors' valuation assessments. The study infers from a sample of South African, Australian, and British firms over years 2005 to 2011 that both methods are value relevant for investors. Zulu et al. (2017) provide another example on the relevance of financial information. The study examines and contrasts the value relevance of interim and annual accounting summary and finds that interim book value is more value relevant than the reported annual equity book values. Furthermore, while the authors find little evidence of the value relevance of annual equity book value, Zulu et al. (2017) report a significant relationship between annual earnings and the market value of equity.

Unlike Zulu et al. (2017),  Badenhorst and von Well (2023) only examine the value relevance of earnings for all listed firms on JSE between 2010 – 2019. The study examines whether GAAP (IFRS) earnings, headline (JSE) earnings and discretionary earnings are assessed differently by investors. Badenhorst and von Well (2023) find that discretionary earnings are more value relevant than both GAAP and headline earnings,

suggesting that managers use this channel to transmit value relevant information about the firm and the industry.

These studies highlight that items from the balance sheet are relevant to investor valuation in the South African context. This in turn, provides rational grounds on which equity book value is used in value relevance studies and the justifications to utilise Ohlson's (1995) model.

### 4.2.1.2   *Studies on the value relevance of non-financial information*

In the second category, non-financial information is quantified and linked directly to the market value of equity without using mediators such as earnings or equity book value. For example, Sewpersadh (2019) was interested in the effect of a powerful CEO in a weak board of directors on the growth of JSE firms. The study involves data of JSE listed firms over the year 2011-2016 and it finds that while the growth of a firm is positively associated with the presence of a newly appointed CEO of a professional background, it is negatively associated with the length of the CEO's tenure. Studies in this context demonstrate how non-financial information can impact the market price of equity. In other words, despite the possibility that IR may enhance the relevance of non-financial information, its effectiveness is evident when it integrates non-financial information with financial information.

### 4.2.1.3   *Studies on the value relevance of financial and non-financial information.*

In this category, the studies focus on the Environmental Social and Governance (ESG) reporting and their influence on the bottom-line figures. For example, De Klerk & De Villiers (2012) explore the value relevance of Corporate Responsibility Reporting (CRR)

and its effect on accounting summary in South Africa between years 2007-2008. The study finds significant value relevance for CRR and accounting summary all together. However, once CRR is included in the model, there is a decreasing tendency in the coefficients of accounting summary but with an increase in the factor of determination suggesting a positive role of CRR in explaining the market price variation. After the conclusion drawn by de Klerk & de Villiers (2012) that CRR provides layers of interpretation that contribute to additional value relevance of accounting summary, Marcia et al. (2015) replicate their study to investigate whether the previous understanding continues to be valid after the introduction of King III framework on corporate governance. In contrast to the findings of de Klerk & de Villiers (2012), Marcia et al. (2015) find that while the book value of equity is value relevant, both CRR and earnings are not. As a result, the study suggests the possibility of poor integration of non-financial information with financial information that does not provide any further clarity to the investors. In this context, if IR is to meet the purpose of its constitution, the integration of financial and non-financial information is assumed to be enhanced.

In summary, the literature related to the non-reporting dimension provides examples of the possible relevance of information of different types with the market value of equity without the existence of a reporting framework. Therefore, what can be inferred is that value relevance studies under a reporting framework should be designed in a way that allows comparison between pre- and post- application periods. This later conclusion provides some grounds to use of the regression models utilised in this thesis.

### 4.2.2    Reporting framework related studies

Studies in this category examine the value relevance of information – financial, non-financial, or both – under accounting reporting frameworks and non-accounting framework. While some studies investigate the value relevance of information after the introduction of IFRS or GAAP (an accounting reporting framework), other strands of research assess the relevance of information after the adoption of CSR, King II, King III, IR (non-accounting reporting frameworks).

#### *4.2.2.1    Accounting reporting framework*

Regarding the studies related to value relevance under a new accounting framework, Prather-Kinsey (2006), Hillier et al. (2016) and Hlatshwayo & Zulu (2019) are interested in understanding the effects of introducing IFRS in the context of South Africa.

Prather-Kinsey (2006) examines the usefulness of converging towards international standards such as IFRS and GAAP from local accounting standards in developing markets. For this purpose, the author studies the usefulness of adopting IFRS and US GAAP in terms of value relevance and timeliness in South Africa and Mexico respectively. Using a sample of JSE listed firms from 1998 to 2000, the study finds that value relevance of equity book value and earnings are value relevant in South Africa. However, the value relevance of accounting summary – as measured using the coefficient of determination – has decreased over the years of investigation in JSE. Furthermore, while the regression coefficient on equity book value increased during the studied period, the coefficient on earnings decreased.

Similarly, Hillier et al. (2016) explore the value relevance of accounting summary after the adoption of IFRS for a sample of firms belonging to different African nations to assess its role in underdeveloped economies. The study is interested in the possible quality-enhancing role of IFRS in general and particularly in the context of secretive cultures[18]. Most of the data in their sample belongs to South Africa (almost 70% of the year/observations) and covers from the year 2002 to 2007. Once data is segregated into its country sub-samples, Hillier et al. (2016) find no significant change in the value relevance of earnings after the application of IFRS. On the other hand, the study finds an increase in value relevance of book value after introducing IFRS in JSE.

It is worth noting that, while some studies conducted on value relevance of accounting summary exclude financial firms during the sample selection process (Baboukardos & Rimmel, 2016; Burgstahler & Dichev, 1997; Zulu et al., 2017), the samples employed by Prather-Kinsey (2006) and Hillier et al. (2016) include financial firms and that may explain any discrepancies of their results with other studies.

Finally, Hlatshwayo & Zulu (2019) study the value relevance of fair value pricing of financial instruments in the context of IFRS 7 which introduces three fair value levels to disclose the fair value of different asset/liabilities financial instruments. The study postulates that the introduction of a later standard (IFRS 13), which demonstrates how the three fair value levels are measured, could improve the performance of IFRS 7. Yet,

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18 Hillier et al. (2016) identifies a secretive setting in which managers manipulate the reporting system in alignment to their interests resulting into less relevant information.

it finds that the post IFRS 13 period was only value relevant on the third level of assets disclosure for the financial firms listed on JSE between 2009 -2015.

To summarize the first dimension of research revolving around introducing an accounting framework in the context of South Africa (mainly around 1998-2007), there is some discrepancy between the findings of the reviewed studies as far as the value relevance of accounting summary is concerned after the introduction of IFRS. These differences might be caused by the choice of the period under investigation or the inclusion of some industries in the sample firms. Furthermore, it appears that while the introduction of IFRS has a positive impact on the equity book value, it is hard to determine the exact impact on earnings.

These insights demonstrate the importance of exploring the impact of IR on accounting summary over two periods (2008-2013) and (2008-2016) to investigate the stability of IR's influence on the bottom-line numbers. Furthermore, it highlights the possible limitation of the findings resulted from the inclusion or exclusion of some industries.

### 4.2.2.2   *Non-Accounting reporting frameworks*

Studies under this category examine the value relevance of information under a non-financial reporting framework. The literature can be subdivided according to the type of information studied into value relevance studies of non-financial information and both financial and non-financial information.

*4.2.2.2.1 Studies on the value relevance of non-financial information*

Studies in this context can be classified according to the framework under which the study is conducted. For simplicity, I divide them into non-IR frameworks and IR frameworks.

In respect to non-IR framework studies, Ntim et al. (2012) and Gyapong et al. (2016) were conducted in South Africa after the application of King II framework. While Gyapong et al. (2016) explore the value relevance of some Corporate Governance (CG) elements, Ntim et al. (2012) study CG practices on shareholders and stakeholders matters[19]. Regardless of the spectrum investigated, both studies find the independent variables to be value relevant. Moreover, Ntim et al. (2012) finds that efficient reporting on shareholders' CG issues strengthen the reporting on shareholders' matters. Furthermore, Gyapong et al. (2016) find that both gender and ethnic diversity are value relevant, but the latter loses relevance once it exceeds a certain number of board members.

Extant research examining the IR framework mainly focuses on the relationship between IR quality (Lee & Yeo, 2016; Barth et al., 2017; Moloi & Iredele, 2020), or organizational capital with the market value of equity.

The relationship between IR quality (IRQ) and the firm value is found to be significant (Lee & Yeo, 2016; Barth et al., 2017; Moloi & Iredele, 2020). Particularly, the

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[19] While Gyapong et al. (2016) study the impact of board diversity in terms of gender and ethnic composition on the market value of equity for JSE listed firms between 2002-2007, Ntim at al. (2012) investigate the CG practices over 2007-2008.

relationship is positive and stronger for firms with more intangible assets and diverse operations (Lee & Yeo, 2016), or IRQ is found to be associated with the value of a firm through the liquidity and expected cash flow channels (Barth et al., 2017)[20]. Moreover, there is little evidence that the market value of firms with top IRQ scores is significantly different from firms with low IRQ scores (Moloi & Iredele, 2020)[21].

After the introduction of Integrated Reporting in South Africa, Tlili et al. (2019) examine the value relevance of organizational capital before and after the introduction of King III framework and implicitly the IIRC's framework. The study finds that the value relevance of organizational capital increased after the adoption of IR using the date of introducing King III framework in 2010.

To conclude, reporting on CG issues (non-financial reporting) is found to be relevant in the context of King II reporting framework. Moreover, it appears that reporting on what impact shareholders' governance influences other stakeholders' interest as suggested by the IIRC's framework (Ntim et al., 2012; IIRC, 2021). Furthermore, IRQ is found to be significantly related to firm value. These insights highlight the impact of non-accounting framework on the relevance of non-financial information. Therefore, IR is contended to influence the value relevance of non-financial information. However, as has been emphasized, IR's genuine function is rooted in its impact on the integration of financial and non-financial information.

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[20] Lee and Yeo (2016) choose a sample of JSE listed firms between 2010-2013 which account for 73% of the market capitalization of all JSE listed firms. Barth et al. (2017), however, collect data of the top 100 listed firms on JSE for the years 2011-2014.
[21] Moloi and Iredele (2020) investigate 20 firms that belong to the top 100 firms of JSE listed firms over the years 2013-2017.

*4.2.2.2.2 Studies on the value relevance of financial and non-financial information*

The research in this category explores the impact of a non-accounting framework on both financial and non-financial information. In particular, the impact of IR or King II & III frameworks on the market value of equity and the influence of the framework on the relationship between accounting summary figures and the market value of equity.

In relation to the IR framework, two studies use a sample of South African firms to examine the value relevance of accounting summary. While Baboukardos and Rimmel (2016) – hereafter BR (2016) – collect data of firms listed on JSE for the years 2008 – 2013 using King III framework as a reference for IR, Loprevite et al. (2018) utilise data of firms listed on Johannesburg and other European stock markets for years between 2012 – 2016 using King III and the IIRC frameworks. The latter study finds that Accounting for Sustainability is relevant in both of Europe and South Africa. However, the value relevance of both equity book value and earnings are significant in South Africa but not in the European context using 95% confidence threshold. On the other hand, despite that BR (2016) find the accounting summary figures to be value relevant, the interaction term between IR and the equity book value is found to be significantly negative. This finding was justified by the possibility that the new framework provided investors with more reliable information that assisted in the valuation of un-booked liabilities.

In respect to King frameworks for corporate governance, Tshipa et al (2018) using a sample of all firms listed on JSE with complete data over the period 2002-2014, finds accounting summary to be relevant. However, the impact of internal corporate governance was found to be more evident on the value relevance of earnings. Similarly,

Matsane et al. (2022) examine the value relevance of fair value instruments and the impact of CG structure using a sample of firms listed on JSE between 2013 – 2018. Matsane et al. (2022) explore whether investors evaluate the fair value of financial instruments of level 3 different from level 1 and 2 given the scarcity of active markets for such products. They also investigate whether the CG structure decreases information asymmetry by interacting fair value financial instruments with a dummy variable representing firms with high score on CG. The study finds that management commentary is more relevant than CG in assessing these financial instruments.

The previously mentioned studies demonstrate the possible effects of non-financial information on financial information through both the accounting earnings and equity book value. However, while these studies investigate the relevance of accounting summary, it does not predict the direction of the relationship of equity book value and earnings with the market value of equity.

### 4.2.3   Hypothesis generation

Based on prior literature, three hypotheses emerge: IR may bring about changes in the value relevance of earnings, book value as well as a common (joint) effect.

The empirical evidence provided by the literature suggests a positive impact of earnings on the market value of equity. However, the controversy may arise if other factors are introduced in the analysis. For example, Prather-Kinsey (2006) and Hillier et al. (2016) provide empirical evidence on the relevance of earnings for South African investors. However, the introduction of the International Financial Reporting Standards in South Africa appears to provide no significant increase in the value relevance of earnings

(Hillier et al., 2016). Similarly, in studies concerned about the relevance of accounting summary in the presence of non-financial information, earnings are found to be relevant to investors valuation assessments. For instance, in Corporate Responsibility Reporting (CRR) studies (de Klerk & de Villiers, 2012; Marcia et al., 2015), Accounting for Responsibility (A4R) studies (Loprevite et al., 2018), Integrated Reporting studies (Baboukardos & Rimmel, 2016) and Organizational studies (Tlili et al., 2019), earnings positively influence the market value of firms. Nonetheless, Tshipa et al. (2018) finds earnings to be negatively associated with the market price of equity when corporate governance composite is introduced in the regression analysis.

However, considering the contended role of IR is to increase the quality of information to the providers of capital (IIRC, 2021) and its probable impact in decreasing information asymmetry between investors and the firm, the research contends:

**H1-1**: The value relevance of earnings will change after the adoption of IR.

The hypothesis reflects the probability that IR can provide further insight into how non-financial information can positively or negatively impact accounting earnings.

The value relevance of equity book value appears to be more consistent than earnings as far as extant empirical evidence is concerned. While most of previous studies provide evidence on the positive impact of equity book value on the market value with and without the existence of other factors (de Klerk & de Villiers, 2012; Hillier et al., 2016; Loprevite et al., 2018; Marcia et al., 2015; Prather-Kinsey, 2006; Tshipa et al., 2018), some studies provide counter evidence. For example, BR (2016) and Tlili et al. (2019) find that despite the positive role of equity book value in the valuation process, Integrated Reporting and Organizational Capital respectively negatively impact the value relevance

of equity book value. However, because the role of IR is seen as mitigating the information asymmetry between investors and managers, it is contended IR will impact the value relevance of equity book value regardless of the positive or negative impact.

**H2-1**: The value relevance of equity book value will change after the adoption of IR.

Finally in respect to the common influence of both equity book value and earnings which are measured using the adjusted factor of determination $R^2$, the literature shows different conclusions in different settings. For instance, Tshipa et al. (2018) concludes that the value relevance of both equity book value and earnings increase when their interaction term with corporate governance components is introduced to the regression model. However, Prather-Kinsey (2006), provides empirical evidence of the decrease of the value relevance of accounting summary after the introduction of IFRS in South Africa. Nonetheless, provided that the role of IR is to disseminate information on how non-financial data is interconnected with financial data in the context of value creation, IR is expected to mitigate the asymmetry of information between internal and external financial users leading to the increase of the determination coefficient $R^2$.

**H3-1**: The value relevance of accounting summary will increase after the adoption of IR.

## 4.3 Research design

The main purpose of this thesis is to examine whether the relationship between the share price on the one hand and earnings and book value on the other has changed after the adoption of Integrated Reporting. This chapter examines whether changes in the value relevance of accounting summary are robust to using different empirical methods and time periods.

To achieve the goal of this chapter, I use qualitative research design starting by replicating the work of BR (2016) using their exact procedures aiming to produce similar results to theirs. I then discuss the bias of BR's (2016) findings and examine whether their results are robust to using other procedures. Next, I extend the studied period from 2008-2013 to 2008-2016 using different statistical techniques to examine the robustness of BR's (2016) results and conclude that its findings are sensitive to the statistical approach and probably does not represent the JSE population.

Before discussing the sample and the models used, I preface the section with the rationale behind replicating BR's (2016) work and some literature that discuss the models used in value relevance studies with their possible advantages and disadvantages in the context of the current work.

### 4.3.1   The rationale behind replicating previous studies

The replication of previous work is not a new practise, and it assumes importance when there is enough evidence or rationale on the validation of past research as a result of different empirical methodologies or just because of the pass of time. Similar practices build more confidence in the findings of previous work and become critical if a scientific endeavour is considered a cornerstone to other important works such as the highly referenced paper by Baboukardos and Rimmel (2016)[22] (BR) in the field of Integrated Reporting.

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[22] The work is cited by 153 academic papers on Scopus and 358 on Google scholar in November 2023.

For example, Mohanram and Rajgopal (2009) replicated the work of Easley et al. (2002) in which the latter showed that the Private Information risk is a priced risk in investors' financial decision. By extending the studied period and using different specifications, Mohanram and Rajgopal (2009) demonstrate that the euphoria in the citation of the work of Easley et al. (2002) was premature action as they didn't find enough evidence to support the work of Easley et al (2002). Another example on replicative studies as far as the data handling is concerned, is Brown et al., (1999) reapplying the research approach of Collins et al., (1997) in which the latter challenged the professional opinion of the decline in the value relevance of accounting summary over the period 1953-1993. After obtaining close results to the criticised paper, Brown et al., (1999) control for scale effects and reach a different conclusion from the original study showing a declining value relevance over the same period. Similarly, Payne and Thomas (2003) discuss the problems associated with using stock-split adjusted I/B/E/S data and the actual data in academic research. For this purpose, they replicate prior studies in terms of the methods undertaken in the methodology sections of the related papers and reach contradicting results to what was reported by adjusting the data. All the mentioned studies initiated their investigation when a convincing rationale did not align with the logic of the published work (S. Brown et al., 1999; Payne & Thomas, 2003) or when the findings of the criticised work contradict the findings of similar research.

Given the previously depicted contradiction between the findings of BR (2016) on the effectiveness of IR and the findings of other studies pointing out to the ceremonial use of IR (*The Sustainability Content of Integrated Reports – a Survey of Pioneers*, 2013; Maniora, 2015; Ahmed Haji & Anifowose, 2016; Pistoni et al., 2018; Landau et al., 2020), verifying the findings of BR (2016) assumes greater importance.

### 4.3.2 The suggested models and their assumptions

Return and price models are the main specifications used in the value relevance studies; the former, as can be referred from the name, depicts the relationship between accounting earnings and stock returns, while the latter describes the relationship between the accounting earnings and the price per share (Kothari & Zimmerman, 1995; C. J. P. Chen et al., 2001). There has been a debate in the literature regarding which model is superior, however, the work of Kothari and Zimmerman (1995) has set a framework for suitable use of each model with its related recommendations and limitations. One advantage of the return model when compared to price models is that it is less prone to heteroscedasticity problems (Kothari & Zimmerman, 1995). However, one of its main flaws is yielding a downside bias in the earnings coefficient (Kothari & Zimmerman, 1995; C. J. P. Chen et al., 2001). On the other hand, earnings coefficients on price models are considerably less biased in this regard leading to more economically sensible coefficients (Kothari & Zimmerman, 1995). Another important aspect of the price model is its capability to accommodate book value variable in the analysis alongside earnings (C. J. P. Chen et al., 2001). Which, as will be demonstrated later, is more suitable to capture the effect of Integrated Reporting on the firm's accounting summary from both managerial and proprietorial perspectives. To overcome the problem of heteroscedasticity in price models, Kothari and Zimmerman (1995) suggests adjusting the reported t-statistics according to White's (1980) standard errors.

The price specification demonstrates many advantages over the return model for the following reasons:

1. The return model reflects information only capturing the surprise component of current earnings resulting in an error in the coefficient of earnings. However, the price model accounts for both the surprise and the stale components of earnings (Kothari & Zimmerman, 1995).

2. The fact that this research is interested in investigating the value relevance of earnings and book value gives the price model an advantage against the return model which is restricted to the earnings components in its model.

3. Despite the heteroscedasticity challenge accompanying price models, it stands out as the best option for its precise coefficient on earnings in comparison to return models in addition to the extent possibility of minimising the effect of heteroscedasticity through reporting the results with robust standard errors as per White (1980).

However, as mentioned earlier the current work does not only use the price model, but it also utilises other alternative methods introduced by Collins et al. (1997) and Barth et al. (2008) who use the change in explanatory power $R^2$ to explore changes in the value relevance. Technical details on the price level with its assumptions in addition the use of explanatory power models is provided in Appendix 9.2.

### 4.3.3 The sample

As was mentioned in previous sections, this research replicates the work of BR (2016) in an effort to achieve similar results to their study to establish a basis for comparison and later to extend the period and examine the stability of their results. The sample, therefore, resembles BR's with an extension to the period of interest from 2008-2013 to 2008-2016.

Following BR, only primary listed firms were analysed even though all firms listed on JSE are required to adopt IR on an apply or explain basis. That is, secondary listed firms were excluded from the analysis for different reasons; first the JSE listing requirements articulate that these firms are only required to comply with their home exchange rules and therefore have the discretion whether to adopt IR or not. Second, exploring the data for secondary listed firms showed that only some firms had adopted IR. Third, such a treatment could be justified following the logic of Bartov et al. (2005) who used only national companies (German companies listed on German stock exchanges) in their sample to investigate the earnings' value relevance. In this case, as per Bartov et al. (2005), such procedure assists in controlling for factors surrounding the firms under analysis such as macroeconomic, cultural, and institutional variables.

Two sets of data will be used over this research: S1 and S2. S1 includes extracted data from Thomson Reuters DataStream and were only examined for mistakes or typos. This set will be used to replicate the results of BR (2016) which did not mention any adjustments to their dataset.

The latter data set – S2 – is extracted too from the above-mentioned resource, but it diverges from the first set in terms of quality and completeness. For example, the data was adjusted to reflect stock splits in addition to filling missing values and correcting mistakes whenever it was possible [23]. The adjustments on the model's variables

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[23] For example, the average and standard deviation for all the variables were calculated over the examined period. Then any datum that has a z-score more than 2 standard deviation was closely examined and compared with the original financial statements of the firm to check whether there were any added or missing zero or it was unusual observation.

accounted for stock splits are made for two reasons; First, such adjustments intend to diminish scales effects which may affect the regression parameters (S. Brown et al., 1999). Second, these amendments were also considered following the steps of previous value-relevance literature that adjust data for this end (Amir et al., 1997; Collins et al., 1997, 1999; Easton, 1998; Gordon et al., 2010). Furthermore, any corrected mistakes or missing values were handled by revising many different databases and websites[24]. The second set of data will be used when extending the period from 2008-2013 to 2008-2016 because the use of the second set exhibited some discrepancies in the significance level compared to the first set of data[25].

Following BR (2016), I extend Model 1 with further control variables in addition to controlling for time and industry fixed effects as shown in Model 2[26]

Model 1

$$P_{it} = y_{it} + \alpha_1 x_{it} + \alpha_2 v_{it}$$

Where $P_t$ is the stock price at time t, $y_t$ is end-of-year book value of equity, $x_t^a$ is the abnormal earnings for period t which equals to current earnings minus the beginning of

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[24] As was mentioned before, enormous efforts have been made to fill missing data and correct for mistakes using, for example, Capitaliq.com, finance.yahoo.com, South African websites such as sharenet.co.za and in many cases visiting firms' websites.

[25] For example, the reported coefficients following S1 were very close to what was reported in BR (2016). However, when S2 was used there has been differences in the value of the reported coefficients and the interaction term of equity book value and IR became insignificant.

[26] The main reason behind using Model 2 instead of Model 1 is that the later requires the clean surplus assumption which does not hold true for the South African Sample. For further information on the rationale behind using Model 1 and how it was developed refer to the Appendix 9.2

year book value of equity multiplied by the cost of capital, $v_t$ is other value relevant information.

Model 2

$$P6_{it} = \beta_0 + \beta_1 BVS_{it} + \beta_2 EPS_{it} + \beta_3 IR_{it} + \beta_4 (IR_{it} \; X \; BVS_{it}) + \beta_5 (IR_{it} \; X \; EPS_{it})$$
$$+ \beta_6 LOSS_{it} + \beta_7 (LOSS_{it} \; X \; EPS_{it}) + \beta_8 LEV_{it} + \beta_9 ROE_{it} + \beta_{10} SIZE_{it}$$
$$+ \sum_{j=1}^{j=8} \beta_{11} IND_{it} + \sum_{y=2008}^{y=2013} \beta_{12} YR_{it} + \varepsilon_{it}$$

(P6$_{it}$); is the market value per share six months after the fiscal year (*t*) of company (*i*), (BVS$_{it}$) is the equity book value and (EPS$_{it}$) the earnings before interest and tax per share for company (*i*) during the fiscal year (*t*). $IR_{it}$ is a dummy variable for firm (i) that takes zero if the fiscal year is before 2011, otherwise it equals one[27]. $LOSS_{it}$ is another dummy variable for a firm (i) that takes the value of 1 if EPS is negative during period (t), otherwise null. $LEV_{it}$ represents the leverage of a firm (i) during period (t) and is calculated by dividing total liabilities to total assets. $ROE_{it}$ represents the Return on Equity for firm (i) during period (t) and is defined as Earnings Before Interest and Tax divided by book value of Equity. $SIZE_{it}$ is the natural logarithm of total assets for a firm (i) during period (t). $IND_{it}$ is a multi-dummy variable which represents the industry to which a firm (i) belongs to during period (t). $YR_{it}$ is a multi-dummy variable that controls for the year effect for firm (i) during time (t). After summarising the methodological part

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[27] BR divided the period under consideration into two sub-periods, the first one was before the mandatory application of King III framework of Integrated Reporting. The second period included all primary listed firms on JSE that must apply or explain their adoption of IR for fiscal years ending at February 28th 2011 and later.

of BR, the following subsections describes the sample selection process and the findings of replicating BR's settings.

## 4.4 The results

### 4.4.1 2008-2013

This chapter aims to replicate the work of BR (2016) to provide a basis for comparison and discussion of the results and findings of subsequent analyses with those of BR's. The next section (4.4.1.1) compares the selection process, summary statistics, and further tests of this study with BR's to highlight the similarities and discrepancies between the two studies.

#### *4.4.1.1 Descriptive statistics*

Table 2 has dual functions, it describes the selection process of the samples used in the analysis and compares it with BR's work. The difference among the last three samples arises from the way influential observations are handled. Furthermore, the main reason to contrast the selection process in this work with BR's is to highlight the discrepancies in the selection process and demonstrate the effect of the application of Cook's Distance (hereafter CD) on dropping further observations.

To remain consistent with BR's setting by requiring a balanced panel to analyse the results, column (4) exhibits the observations in a balanced panel after excluding the influential ones using Cook's distance. In other words, firms that had influential observations were dropped from the analysis to keep a balanced number of observations for each firm in the panel, further details regarding the dropped firms in terms of industry is provided in Table 6.

Despite that BR did not include the last line of Table 2 (line 8) in their reported table, it is likely that their paper followed the same procedure but included the dropped observations in line number (6)[28]. An emphasis of this conclusion will be made when illustrating Table 3 – Panel A and B.

Table 2 Sample Selection for the Period 2008-2013

|   | Sample Selection | Firm/year obs. | | | |
|---|---|---|---|---|---|
|   |   | 1 | 2 | 3 | 4 |
| 1 | Observations for the period 2008-2013 | 1,654 | 1,992 | 1,992 | 1,992 |
| 2 | Duplicates | (74) | 0 | 0 | 0 |
| 3 | Observations of utilities firms | (6) | (6) | (6) | (6) |
| 4 | Observations of financial firms | (331) | (588) | (588) | (588) |
| 5 | Observations with negative book value of equity | (11) | (21) | (21) | (21) |
| 6 | Observations of firms with limited data over the 6 years | (240) | (369) | (369) | (369) |
| 7 | Influential observations identified CD | (38) | | (44) | (44) |
| 8 | Observations left unbalanced after CD | | | | (34) |
|   |   | 954 | 1,008 | 964 | 930 |

Column (1) reports the selection process of BR (2016). Column (2) reports the selection process for this thesis before using Cook's Distance (CD)[29]. Columns (3) reports the selection process after dropping only influential observation identified by CD. Column (4) reports the selection process after balancing the data because of dropping influential observation[30].

Table 3 – panel A reports the summary statistics of the model's variables in three sequential steps; the first section in this panel represents the summary statistics before excluding influential observations. The second section displays the summary statistics after excluding influential observations using CD but before deleting observations to balance the panel. The last section of panel A exhibits the summary statistics after

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[28] According to BR's paper, the 954 firm/observations represent a balanced panel for 159 firms with data available over the whole examined period.

[29] Cook's Distance (CD) a statistical measure used in the work of BR (2016) to identify and eliminate influential observations. It measures the relative sensitivity of regression's coefficients to the omission of each case and sets a threshold of n/4 to consider a certain outlying value as an influential observation that need to be deleted (Cook, 1977; Stevens, 1984).

[30] Because the examined period spans over 6 years, each variable should have 6 observations to keep the panel balanced.

excluding influential and related observations to keep the panel balanced. The reason behind tabulating these summaries in such manner is first to show the effect of excluding few observations from the analysis on the mean, median and standard deviation of the main variables of interest. Second, to demonstrate the resemblance between the summary of this study with what reported by BR tabulated in panel B of Table 3.

Table 3 Comparing the Summary Statistics with BR (2016)

**Panel A - differences in summary results because of CD**

|      | Before applying CD | | | After applying CD | | | CD and Balanced | | |
|------|------|--------|------|------|--------|------|------|--------|------|
|      | Mean | Median | S.D. | Mean | Median | S.D. | Mean | Median | S.D. |
| P6   | 41.6 | 10.9   | 82.2 | 31.8 | 9.6    | 50.3 | 28.3 | 8.5    | 42.7 |
| BVS  | 19.3 | 6.1    | 33.0 | 15.0 | 5.3    | 22.6 | 13.1 | 5.0    | 18.1 |
| EPS  | 4.7  | 1.3    | 10.4 | 3.8  | 1.2    | 6.6  | 3.4  | 1.1    | 5.3  |
| LEV  | 0.5  | 0.5    | 0.2  | 0.5  | 0.5    | 0.2  | 0.5  | 0.5    | 0.2  |
| ROE  | 0.3  | 0.2    | 2.9  | 0.2  | 0.2    | 1.5  | 0.2  | 0.2    | 1.5  |
| Size | 14.6 | 14.6   | 2.1  | 14.5 | 14.5   | 2.0  | 14.4 | 14.5   | 1.9  |
| Loss | 0.1  | 0.0    | 0.3  | 0.1  | 0.0    | 0.3  | 0.1  | 0.0    | 0.3  |
|      | (N=1008) | | | (N=964) | | | (N=930) | | |

Observations were dropped had they Cook's Distance (CD) factor above 4/n

**Panel B – a comparison between the study's results with BR's**

|      | CD and Balanced | | | BR's Results | | |
|------|------|--------|------|------|--------|------|
|      | Mean | Median | S.D. | Mean | Median | S.D. |
| P6   | 28.3 | 8.5    | 42.7 | 28.9 | 8.1    | 43.8 |
| BVS  | 13.1 | 5.0    | 18.1 | 13.0 | 5.1    | 18.0 |
| EPS  | 3.4  | 1.1    | 5.3  | 3.3  | 1.1    | 5.3  |
| LEV  | 0.5  | 0.5    | 0.2  | 0.5  | 0.5    | 0.2  |
| ROE  | 0.2  | 0.2    | 1.5  | 0.3  | 0.2    | 2.9  |
| Size | 14.4 | 14.5   | 1.9  | 14.4 | 14.4   | 2.0  |
| Loss | 0.1  | 0.0    | 0.3  | 0.1  |        |      |
|      | (N=930) | | | (N=954) | | |

**Panel C – detailed summary statistics for the whole period.**

|      | Mean | Median | S.D. | Skew  | Kurt  |
|------|------|--------|------|-------|-------|
| P6   | 28.3 | 8.5    | 42.7 | 2.2   | 8.3   |
| BVS  | 13.1 | 5.0    | 18.1 | 2.1   | 7.8   |
| EPS  | 3.4  | 1.1    | 5.3  | 2.3   | 9.6   |
| LEV  | 0.5  | 0.5    | 0.2  | 0.1   | 2.5   |
| ROE  | 0.2  | 0.2    | 1.5  | (12.6)| 395.4 |
| Size | 14.4 | 14.5   | 1.9  | (0.2) | 2.5   |
| Loss | 0.1  | 0.0    | 0.3  | 2.4   | 6.8   |

**Panel D – a comparison of the summary statistics between pre and post adoption periods of IR.**

|      | Full period | | | 2008-2010 | | | 2011-2013 | | |
|------|------|--------|------|------|--------|------|------|--------|------|
|      | Mean | Median | S.D. | Mean | Median | S.D. | Mean | Median | S.D. |
| P6   | 28.3 | 8.5    | 42.7 | 24.0 | 8.0    | 36.2 | 32.6 | 10.2   | 48.0 |
| BVS  | 13.1 | 5.0    | 18.1 | 11.5 | 4.4    | 15.6 | 14.7 | 5.5    | 20.1 |
| EPS  | 3.4  | 1.1    | 5.3  | 3.4  | 1.1    | 5.2  | 3.3  | 1.1    | 5.4  |
| LEV  | 0.5  | 0.5    | 0.2  | 0.5  | 0.5    | 0.2  | 0.5  | 0.5    | 0.2  |
| ROE  | 0.2  | 0.2    | 1.5  | 0.3  | 0.3    | 1.2  | 0.1  | 0.2    | 1.7  |
| Size | 14.4 | 14.5   | 1.9  | 14.3 | 14.4   | 1.9  | 14.5 | 14.6   | 1.9  |
| Loss | 0.1  | 0.0    | 0.3  | 0.1  | 0.0    | 0.3  | 0.1  | 0.0    | 0.3  |
|      | (N=930) | | | (N=465) | | | (N=465) | | |

In Panel A of Table 3, the means, medians and standard deviation for the price, book value and earning per share are lower when applying Cook's distance to remove extreme values as is expected. The reported numbers become closer to what is reported by BR (2016) once the panel is balanced. Whilst the sample still differs from BR's in that it has 24 fewer observations, once the steps described in BR are followed, (to remove extreme observations as per CD and remove firms with fewer than 6 observations), the summary statistics are similar. This is highlighted in panel B where the summary statistics are presented next to those of BR.

Examining the summary statistics of all the variables apart than (LEV, ROE, and Size) in Table 3 panel D show that the means are many times the medians for each of the variables with a positive kurtosis making the distribution right skewed (For further discussion visit 9.3).

These figures show the heterogeneity of firm size which may affect the implicit regression assumption of the representative average firm (Na et al., 2017). What can be inferred from these figures too is the lack of homogeneity regarding our main variables of interest which are; prices, equity book values and earnings per share which are likely a result of size heterogeneity in addition to the existence of outliers which probably results from bundling firms of various sizes together in one sample. Considering that South Africa is a developing market, such heterogeneity amongst firms is a reoccurring feature of African samples (Cahan et al., 2000).

Furthermore, comparing the means and medians before the adoption of IR with their counterparts in the post application period, reveals a significant statistical difference

between the two periods (Appendix A - 9.3). This finding contradicts what BR (2016) indicates that the there is no significant difference between the variables in the two periods suggesting that the regression results won't be driven by firm characteristics but by the introduction of IR in South Africa.

After investigating the regression assumptions, the related tests do not completely rule out the existence of multicollinearity problem, but they suggest that the way outliers are treated affects the severity of the problem (for further details, refer to Appendix A - 9.9). In other words, if the observations identified by Cook's Distance are not eliminated, the multicollinearity effect becomes less troublesome. Furthermore, like most of the research in accounting and finance studies, the regression model displays heteroscedastic patterns that are accounted for using White as suggested by Kothari and Zimmerman (1995) (For further details refer to Appendix A 9.4 & 9.5).

#### 4.4.1.2   Findings

The results of regressing the stock market values on both the book value of equity and the earnings per share are tabulated in Table 4. The table reports the coefficients of the independent variables along with other control variables for a balanced panel using Model 2 The first three columns in Table 4 are structured in a way to exhibit the differences between the samples due dropping observations as a result of using CD for influential observations while the fourth column reports BR's results.

Another dimension considered in the analysis is the use of CD technique by BR to exclude influential observations as this may substantially change the results. Furthermore, as suggested by Leone et al. (2019) after identifying influential/outlying

observations, a careful examination is needed before dropping such observations from the analysis which will be addressed in the discussion section (before analysing the Cook's Distance findings).

Table 4 Regression results considering CD

| | 1 | 2 | 3 | BR |
|---|---|---|---|---|
| BVS | 0.851 | 0.953*** | 1.041*** | 1.187*** |
| | (0.652) | (0.195) | (0.249) | (0.24) |
| EPS | 2.716** | 2.942*** | 2.540*** | 2.325*** |
| | (1.228) | (0.477) | (0.669) | (0.626) |
| IR | 14.925*** | 10.261*** | 7.871*** | 8.089*** |
| | (4.822) | (2.434) | (1.977) | (2.035) |
| IRxBVS (+/-) | -0.155 | -0.446*** | -0.431** | -0.474*** |
| | (-0.319) | (-0.132) | (-0.17) | (-0.173) |
| IRxEPS (+) | 0.681 | 2.328*** | 2.956*** | 3.164*** |
| | (1.159) | (0.513) | (0.609) | (0.624) |
| Loss | 1.653 | 2.830* | 2.288 | 2.939* |
| | (4.358) | (1.682) | (1.625) | (1.629) |
| LOSSxEPS | -5.177** | -1.266 | -1.866 | -2.584* |
| | (-2.036) | (-1.789) | (-1.84) | (-1.326) |
| LEV | 0.795 | 3.733 | 7.232 | 4.922 |
| | (21.18) | (6.08) | (5.999) | (5.862) |
| ROE | 0.208 | 0.333 | 0.411 | 0.143 |
| | (0.175) | (0.425) | (0.435) | (0.12) |
| Size | 8.065** | 3.013*** | 2.197*** | 2.254*** |
| | (3.599) | (1.009) | (0.797) | (0.825) |
| Constant | -122.224*** | -52.260*** | -42.300*** | -43.42*** |
| | (-40.858) | (-13.693) | (-11.055) | (-11.706) |
| Fixed effects | Yes | Yes | Yes | Yes |
| N firm/year | 1,008 | 964 | 930 | 954 |
| Adj. R^2 | 0.582 | 0.81 | 0.781 | 0.79 |

The signs next to the interaction terms suggests the predicted direction of the impact of IR on the value relevance of accounting summary. Robust t-statistics in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Column (1) of Table 4 lists the variable coefficients and their t-statistics before the application of CD while column (2) reports the results after dropping influential observations. Column (3) reports the results after dropping influential observations and other observations to keep the panel balanced. To put it more simply, because the panel data is balanced there are six observations for each firm (from 2008 to 2013). However, because some of these observations are dropped after exceeding a threshold of 4/n according to CD criteria, the panel becomes unbalanced. Therefore, to keep it balanced

the remaining observations for firms that had observations removed due to CD are dropped. Finally, the fourth column of Table 4 reports the results of BR (2016) for comparison purposes.

What can be inferred from Table 4 is that the interaction terms of equity book value and earnings per share in post adoption period altered from being irrelevant to relevant only after dropping influential observations. Comparing column (1) to (2) and (3) shows how the coefficients of the interaction terms increased both in magnitude and significance levels after dropping CD observations. Furthermore, the coefficients of our focal variables in column (3) of Table 4 (the squared area) are close and similar to what is reported by BR's in column (4) which support the notion that BR used primary listed firms and balanced their panel after dropping influential observations. Therefore, it is concluded that following CD technique has rendered the accounting summary's findings significant after both equity book value and earnings were not. This point will be discussed further in the discussion section.

To verify the consistency of its findings, BR (2016) follows Clacher et al. (2013) in comparing the regression results of each year after adopting IR with the results of the whole pre-adoption period to detect if the findings persist through time. Indeed, BR (2016) finds an incremental rise in the value relevance of earnings in every year after adopting IR. Furthermore, it also reports a decline in the value relevance of book value as it is evident from the negative sign of its related regression coefficients. BR (2016) also concludes that because the coefficient of equity book value is not significant in 2011, the impact of IR seemed to be more traceable starting from 2012 (Figure 15 in the Appendix).

Like BR (2016) and Clacher et al (2013), I compare each year after adopting IR with pre-adoption periods using the method followed by BR (2016) (Table 53 - Appendix A - 9.6) and utilising an improved method that yields different conclusions to theirs (Table 5).

Following BR's method produces similar results with faint nuance; while the earnings' coefficients of BR (2016) show an incremental increase in every year after IR, Table 53 illustrates a peak in 2012 then a drop in 2013. Furthermore, the results in Table 53 corresponds to BR's (2016) as far as the interaction of IR with equity book value is concerned. However, the coefficient on equity book value for year 2013 is less significant (5%) as reported in Table 53.

However, the method applied by BR (2016) is likely to be biased and therefore I improved the way the analysis was conducted and reached different conclusions[31]. First, Table 5 reveals that the equity book value is relevant in 2011 but not in 2013 contradicting the findings of Table 53. Second, the coefficient on earnings increases to 2012 and then decreases in magnitude and significance during 2013. These findings suggest that extending the study from 2013 to 2016 may reveal further insights which suggests the necessity of studying the behaviour of the value relevance after 2013.

To conclude, the exclusion of influential observations using Cook's distance changes the significance of the results. To extend on the work of BR, I study the excluded firms to understand the significance of omitting such observations.

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[31] For more information refer to Appendix A - 9.6.

Table 5 Regression analyses: pre vs post adoption period results

| | Full period (1) | Pre- vs 11 (2) | Pre- vs 12 (3) | Pre- vs 13 (4) |
|---|---|---|---|---|
| BVS | 1.041*** | 1.145*** | 1.158*** | 1.170*** |
| | (0.249) | (0.152) | (0.161) | (0.193) |
| EPS | 2.540*** | 2.499*** | 2.385*** | 2.271*** |
| | (0.669) | (0.536) | (0.548) | (0.602) |
| **IR** | **-7.871*** | **-1.993** | **-1.846** | **-3.358** |
| | **(-1.977)** | **(-0.801)** | **(-1.174)** | **(-1.533)** |
| **IRxBV1** | **-0.431** | **-0.424*** | **-0.601*** | **-0.12** |
| | **(-0.17)** | **(-0.156)** | **(-0.168)** | **(-0.234)** |
| **IRxEPS** | **2.956*** | **1.984*** | **3.699*** | **2.335** |
| | **(0.609)** | **(0.58)** | **(0.715)** | **(0.902)** |
| Loss | 2.288 | 1.331 | 2.652 | 0.223 |
| | (1.625) | (1.761) | (1.837) | (1.82) |
| LOSSxEPS | -1.866 | 0.352 | -2.224 | -0.489 |
| | (-1.84) | (-2.201) | (-2.416) | (-1.88) |
| LEV | 7.232 | 7.322 | 4.937 | 6.673 |
| | (5.999) | (4.852) | (5.672) | (5.415) |
| ROE | 0.411 | 0.47 | 1.389* | 1.552* |
| | (0.435) | (0.438) | (0.735) | (0.815) |
| Size | 2.197*** | 1.274** | 1.780** | 1.407* |
| | (0.797) | (0.643) | (0.765) | (0.831) |
| Constant | -42.300*** | -19.707** | -25.884** | -21.848* |
| | (-11.055) | (-8.774) | (-10.338) | (-11.075) |
| Fixed effects | Yes | Yes | Yes | Yes |
| N firm/year | 930 | 704 | 668 | 628 |
| Adj. R^2 | 0.781 | 0.784 | 0.777 | 0.768 |

Column 1 lists the regression results for the whole period (2008-2013). Column 2 lists the regression results of the period (08-11). Column 3 lists the regression results of the period (08-10 and 12). Column 4 lists the regression results of the period (08-10 and 13). Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

### 4.4.1.3 Discussion

Table 6 exhibits the distribution of firms across different industries for the examined sample. Contrasting columns (3) with (1) of Table 6 highlights interesting facts about the cost of achieving a balanced sample and excluding influential data in terms of dropping interesting observation from the analysis. Firms from basic material, health care and technology sectors lost between 40, 44 and 37% of their population to reach a balanced sample after eliminating influential observations from the analysis. Likewise, if the absolute number of dropped firms is our focal point, the industrial sector lost a big portion of its observations.

Table 6 The Distribution of CD dropped firms by Industry (08-13)

|  | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Oil & Gas | 1 | 1 | 1 | 100% |
| Basic Materials | 45 | 32 | 27 | 60% |
| Industrials | 72 | 53 | 51 | 71% |
| Consumer goods | 28 | 19 | 18 | 64% |
| Health Care | 9 | 6 | 5 | 56% |
| Consumer Services | 42 | 35 | 32 | 76% |
| Telecommunication | 8 | 6 | 5 | 63% |
| Utilities | 1 |  |  | 0% |
| Financials | 98 |  |  | 0% |
| Technology | 28 | 16 | 16 | 57% |
| **Total** | **332** | **168** | **155** |  |

Column (1) reports the number of firms in each industry before balancing the panel. Column (2) reports the number of firms after dropping utilities and financial firms and after balancing the panel (dropping firms with any missing observation between (2008-2013)) but before the application of CD[32]. Columns (3) reports the number of firms in each industry after the application of CD. Column (4) reports the percentage of firms left in each industry after balancing the data and applying CD.

Furthermore, dropping influential observations from the analysis has changed the value relevance of the interaction term of both equity book value and earning per share with the time dummy variable from being irrelevant as stated in column (1), to be relevant at a significant level in column (2) of Table 4.

Despite the limited number of firms dropped from the analysis (13 firms out of 166), the effect of this deletion has had a significant change in the value relevance of both book value and earnings per share in terms of the size and significance of their coefficients. In this situation, when excluding influential observations substantially impacts the regression results, Rencher and Schaalje (2008) suggests checking whether the dropped outliers are due to recording errors, belonging to another population, or if they are simply

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[32] Cook's Distance (CD) a statistical measure used in the work of BR (2016) to identify and eliminate influential observations. It measures the relative sensitivity of regression's coefficients to the omission of each case and sets a threshold of n/4 to consider a certain outlying value as an influential observation that need to be deleted (Cook, 1977; Stevens, 1984).

unusual observations. If no satisfactory answer can be provided, Rencher and Schaalje (2008) outlines three potential actions:

1- Reporting the statistical results after dropping outlaying observations without conducting any investigation (a passive approach like that of BR's).

2- In case the results differ substantially by including or excluding outliers, then the analysis with and without these unusual observations should be presented until more data is available to clear the difference in the results. Likewise, Wooldridge (2013) recommends reporting the OLS results with and without these outliers.

3- Using robust methods which deals with outliers (Rencher & Schaalje, 2008).

### 4.4.1.4 Analysing the effects of CD

BR (2016) have not provided any details on the discarded observations in their analysis. Despite that presenting no explanation to such an exclusion is still an option under Rencher and Schaalje (2008), most of the statisticians do not agree with such treatments. For example, Draper and Smith (1998) discourage the rejection of outliers from the analysis as they might contain prominent information. Moreover, they accept the deletion of such extreme observations only if they are a result of recording. Likewise, Klienbaum et al. (1997) consider outliers to be interesting observations that need further investigation and should not be dropped unless evidence is provided to prove them as recording errors. Therefore, I next explore the nature of the deleted firms and investigate whether there is enough evidence to discard them for being recording errors.

Table 7 lists the dropped firms from the panel data whose Cook's Distance are above the threshold value[33].


Table 7 The dropped firms using CD

| Name | Sector |
| --- | --- |
| ANGLO AMERICAN PLATINUM | Basic Materials |
| ANGLOGOLD ASHANTI | Basic Materials |
| KUMBA IRON ORE | Basic Materials |
| MONDI | Basic Materials |
| SASOL | Basic Materials |
| TIGER BRANDS | Consumer goods |
| AFRICAN & OS.ENTS. | Consumer Services |
| NASPERS | Consumer Services |
| REX TRUEFORM GROUP | Consumer Services |
| ASPEN PHMCR.HDG. | Health Care |
| BRIKOR | Industrials |
| REMGRO | Industrials |
| TELKOM SA SOC | Telecommunication |


Most of the excluded firms in Table 7 are from the Basic Materials and the Consumer Services sectors. However, scrutinizing the excluded firms presents the following facts:

1- Two of the excluded companies, Sasol and AngloGold Ashanti were among the pioneers in taking part of the IIRC pilot programme that aimed to develop the IIRC framework. Particularly, Sasol were among the first 5 firms in South Africa to be part of an international group of firms (75 international businesses) developing the IIRC's framework in 2012 (IIRC, 2012). On the other hand, AngloGold Ashanti was among 7 firms from South Africa that were developing the framework in 2013 (from 100 international businesses (IIRC, 2013a).

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[33] The threshold to identify an observation as an influential one if it has a Cook's factor above 4/n, which is in this case 4/1008.

2- The Integrated Reports of Six companies in Table 7 including the above mentioned two firms, are ranked from good to best Integrated Reports for 2013 as per EY survey for 100 South African companies (EY, 2013). Sasol is among the top 5 IR reporters, Anglo Gold Ashanti, Kumba Iron Ore, and Aspen Pharmacare Holdings among the excellent reporters while Anglo American Platinum and Mondi as good reporters. Most of the other firms belong to the 100 list.

3- Excluding these 13 firms from the regression analyses does not resonate with the best practise in the field of financial accounting nor with studies in a South African context. For example, while Barth et al. (2017) studies the top 100 JSE listed firms on JSE because it represents 90% of the market capitalisation, BR (2016) drops these 13 firms that represent more than 40% of the market capitalisation of the sample. This is arguably the most concerning flaw in the design choice of BR, using Cook's distance.

The previous points highlight the prominence of the dropped firms and question whether the CD technique is valid for the analysis. In other words, if the focal point of the research is to study the effect of IR on accounting summary, firms that are ranked as IR leaders should not be excluded from the analysis as outliers or influential observations. Moreover, the weight of the dropped firms, as far as the market value is concerned, raises questions whether the selected sample by BR (2016) represents the population of firms listed on JSE. As a result, there are two points that need more investigation:

1- Whether changing the technique to identify outliers would alter the results.

2- Whether extending the time period as suggested by Rencher and Schaalje (2008) would bring about different results through collecting more data.

The next sub-section will deal with first point, while the second issue is highlighted in detail in section 4.4.2.

### 4.4.1.5 *Other techniques to deal with outlaying observations.*

As it is demonstrated in the previous section, there is a controversy in the findings as a result of excluding influential observations from the analysis. According to my results which replicates BR (2016), the firms dropped using CD were part of the pilot study by the IIRC and/or have been ranked by EY as excellent IR reporters. Therefore, the inclusion / exclusion of influential observations plays a key role in shifting the results suggesting further investigation to examine whether using other techniques would shift the findings.

Accordingly, I study the sensitivity of the findings by assessing whether ignoring outliers or mitigating their influence through Winsorizing would differ from the outcomes reported under Cook's Distance. However, before proceeding in the analysis, the following section highlights the limitation associated with every option.

First, one of the main critiques of using Cook's Distance and other similar techniques to deal with influential observation is their reliance on the normality assumptions (J. Adams et al., 2019). As was demonstrated in the descriptive summary most of the variables follow non-normal distributions which may affect the efficiency of CD. Second, another critique to Cook's Distance is suffering from a masking problem which means that the technique is successful in identifying a single influential observation but fails when there are many others (J. Adams et al., 2019; Kleinbaum et al., 1997).

In respect to Winsorizing, while it is regarded to be an efficient technique in a univariate setting, this approach is not as effective in a multivariate setting (J. Adams et al., 2019). However, I will explore the discrepancies in the results due to the technique used and carry out using the appropriate method in the rest of this paper with the caution of the limitations associated with the technique. Furthermore, in addition to examining the different techniques to deal with outliers, I introduce to the analysis the cleaned set of data S2 and I compare the results of running the regression analysis of S2 with S1 for any significant difference in the results.

Table 8 exhibits the results of regressing the dependent variable on the independent variables using data set S1 & S2 in addition to applying different techniques in dealing with outliers. Comparing the regression results reported in column (1) of Table 4 (No treatment for outliers using dataset S1) with column (1) of Table 8 (using Winsorizing using dataset S1) reveals that the accounting summary is not value relevant after the adoption of IR if CD is not used. Furthermore, columns (2) / (3) / (4) from Table 8 list the regression results using dataset S2 using no outlier technique / Winsorizing / Cook's Distance technique respectively. From the latter mentioned columns, there are two observations to highlight:

1.  First, indeed not using any statistical technique to tackle outliers or using Winsorizing technique suggest that IR does not impact the value relevance of accounting summary. Only, when Cook's Distance is used are the results significant.
2.  Second, even after adopting Cook's Distance utilising the dataset S2 produces different results from what is provided by BR (2016). The regression results infer

that equity book value is negative but there is little evidence on its significance using the cleaned dataset S2.

To conclude, there is strong evidence that the results of BR (2016) are biased because of utilising Cook's Distance technique to tackle influential observations. Replicating their work using different datasets S1 and S2 and adopting Winsorizing technique or not treating influential observations yields no significant evidence on the impact of IR on the value relevance of accounting summary. Following the suggestion of Rencher and Schaalje (2008) which indicates the need to collect more data to find whether the difference between analysing the results with and without outliers can be reconciled, I extend the analysis by extending the period under analysis from 2008-2013 to 2008-2016 in the next section.

Table 8 Regression results using different sets of data and outlier techniques

|  | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| BVS | 0.839 | 0.433 | 0.337 | 0.656* |
|  | (0.567) | (0.904) | (0.894) | (1.85) |
| EPS | 2.491* | 3.331*** | 3.528*** | 2.868*** |
|  | (-1.273) | (-3.191) | (-3.212) | (-4.16) |
| IR | 11.793*** | 4.713 | 1.082 | -1.65 |
|  | (3.484) | (1.118) | (0.35) | (-1.045) |
| **IRxBVS (+/-)** | **0.067** | **0.042** | **0.086** | **-0.340*** |
|  | **(0.406)** | **(0.196** | **(0.331)** | **(-1.914)** |
| **IRxEPS (+)** | **0.789** | **0.184** | **0.737** | **3.089*** |
|  | **(1.665)** | **(0.166)** | **(0.5)** | **(5.074)** |
| Loss | 19.245*** | 2.816 | 7.261* | 3.259* |
|  | (6.739) | (0.695) | (1.795) | (1.726) |
| LOSSxEPS | -0.965 | -4.149** | -3.346 | -2.147 |
|  | (-9.7) | (-2.005) | (-0.575) | (-1.085) |
| LEV | -2.242 | -9.182 | -10.162 | 3.231 |
|  | (-18.127) | (-0.529) | (-0.622) | (-0.547) |
| ROE | 20.818** |  |  |  |
|  | (9.482) |  |  |  |
| Size | 7.438** | 9.801*** | 9.425*** | 3.687** |
|  | (3.21) | (3.184) | (3.348) | (2.439) |
| Constant | -117.655*** | -128.868*** | -122.098*** | -49.459*** |
|  | (-38.843) | (-3.538) | (-3.521) | (-2.667) |
| Fixed effects | Yes | Yes | Yes | Yes |
| N firm/year | 1,008 | 1068 | 1,068 | 990 |
| Adj. R^2 | 0.646 | 0.55 | 0.606 | 0.746 |

Note. The signs next to the interaction terms suggests the predicted direction of the impact of IR on the value relevance of accounting summary. Column (1) list the regression results for dataset S1 using Winsorizing technique. Columns 2,3, and 4 list the regression results for dataset S2 using no outlier technique, Winsorizing, and Cook's Distance respectively. Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

## 4.4.2 2008-2016

The findings and discussion of previous sections highlight the sensitivity of the regression results to the inclusion or exclusion of influential observations identified by Cook's Distance technique. One of the recommendations to deal with the sensitivity of regression results to influential observations and outliers is to collect more data and examine the robustness of the findings to the inclusion/exclusion of the related observations (Rencher & Schaalje, 2008).

In this section, therefore, the work of BR (2016) is extended in terms of sample quality, time framework and panel mode. The sample S2, which is analysed in this section, is extracted from Thomson Reuters DataStream for the years 2008 to 2016 and is cleaned and modified consistent with previous research recommendations (For details review 4.3.3). The next sections compare the different aspects of methodology resulting from using Winsorizing technique in contrast to CD.

### 4.4.2.1 Descriptive statistics

Table 9 describes the sample selection process using Winsorizing and Cook's Distance (CD) as statistical techniques to deal with outliers and/or influential observations. The difference is spotted in line (7) and (8) of Table 9 due to the use of CD which in total drops 126 observations representing 14 firms from the analysis. The selection process results in a balanced sample of 153 and 139 firms when Winsorizing and Cook's Distance are respectively adopted. Table 10 provides the summary statistics for the regression variables for the whole period (2008-2016), for the pre-adoption period (2008-2010), and for the post-adoption period (2011-2016). What is reported in panel B of Table 10 in respect to comparing the variables before and after adopting IR corresponds to what was reported for the period (2008-2013) in terms of the difference between the variables.

Comparing the results of parametric (Pearson t-test) and non-parametric tests (Wilcoxon test) in Appendix A - 9.7 and 9.8 for the means and medians of regression variables in the pre and post adoption periods reveals significant discrepancy. In particular, the market and book value of equity besides the size of firms are significantly higher in the post-adoption period compared to the pre-adoption period at 1%. However, neither

earnings per share nor leverage are significantly different using Pearson t-test. However, using Wilcoxon non-parametric test, the earnings per share in the second period is higher the first period, while the leverage in the pre-adoption period is significantly higher than the post adoption period differs in terms of the statistical method used to deal with outliers or influential observation.

Table 9 Sample selection process using outliers treatments (2008-2016)

| | Sample Selection | Winsorized | Using CD |
|---|---|---|---|
| 1 | Observations for the period 2008-2016 | 3,600 | 3,600 |
| 2 | Less duplicates | (135) | (135) |
| 3 | Less observations of Utilities Industry | (9) | (9) |
| 4 | Less observations of Financials Industry | (1,170) | (1,170) |
| 5 | Less observations with negative book value | (35) | (35) |
| 6 | Less observations with limited data over the 9 years | (874) | (874) |
| 7 | Less influential observations identified by CD | | (46) |
| 8 | Less observations to balance the panel after CD | | (80) |
| | | 1,377 | 1,251 |

Table 10 Summary statistics using Winsorizing and CD for the period (2008-2016)

| Panel A - Summary statistics when Winsorizing is used | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Full period | | | 2008-2010 | | | 2011-2016 | | |
| | Mean | Median | S.D. | Mean | Median | S.D. | Mean | Median | S.D. |
| PR6 | 46.6 | 12.4 | 80.2 | 36.6 | 10.0 | 68.3 | 51.5 | 14.2 | 85.1 |
| BVS | 22.4 | 7.8 | 35.4 | 17.5 | 6.1 | 28.7 | 24.9 | 8.6 | 38.2 |
| EPS | 4.9 | 1.6 | 9.2 | 4.9 | 1.8 | 8.9 | 4.9 | 1.4 | 9.4 |
| LEV | 0.5 | 0.5 | 0.2 | 0.5 | 0.5 | 0.2 | 0.5 | 0.5 | 0.2 |
| SIZE | 14.8 | 14.8 | 2.1 | 14.5 | 14.5 | 2.0 | 14.9 | 15.0 | 2.1 |

| Panel B - Summary statistics when CD is used | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Full period | | | 2008-2010 | | | 2011-2016 | | |
| | Mean | Median | S.D. | Mean | Median | S.D. | Mean | Median | S.D. |
| PR6 | 32.0 | 9.1 | 48.4 | 24.2 | 8.2 | 35.9 | 36.0 | 10.4 | 53.1 |
| BVS | 15.1 | 6.0 | 21.6 | 11.7 | 4.4 | 16.8 | 16.8 | 6.9 | 23.5 |
| EPS | 3.4 | 1.1 | 5.3 | 3.3 | 1.3 | 4.8 | 3.4 | 1.1 | 5.6 |
| LEV | 0.5 | 0.5 | 0.2 | 0.5 | 0.5 | 0.2 | 0.5 | 0.5 | 0.2 |
| SIZE | 14.6 | 14.6 | 2.0 | 14.3 | 14.4 | 2.0 | 14.8 | 14.8 | 2.0 |

Table 11 provides Wilcoxon and Pearson correlation coefficients for regression variables using Winsorizing or CD as a remedy for outliers and/or influential observations. While

Panel A of Table 11 reports the coefficients for Winsorized variables, Panel B does it for regression variables after applying CD. Some of the coefficients of the variables of interest for this research are close or surpass the threshold of 80% indicating the likelihood of multicollinearity problem (Gujarati, 2004). Appendix A - 9.9 includes detailed discussion relating to the multicollinearity problem and concludes that the regression results are robust against the multicollinearity problem.

Table 11 Correlation Matrix for period (2008-2016)

| Panel A-Correlation Matrix (Winsorized variables) | | | | | |
|------|------|------|------|------|------|
|      | PR6  | BVS  | EPS  | LEV  | SIZE |
| PR6  | 1    | 0.880*** | 0.841*** | 0.138*** | 0.794*** |
| BVS  | 0.739*** | 1 | 0.773*** | 0.0359 | 0.786*** |
| EPS  | 0.690*** | 0.669*** | 1 | 0.179*** | 0.632*** |
| LEV  | 0.0394 | -0.0900*** | 0.0519 | 1 | 0.276*** |
| SIZE | 0.586*** | 0.584*** | 0.463*** | 0.261*** | 1 |

| Panel B-Correlation Matrix (Cook's Distance) | | | | | |
|------|------|------|------|------|------|
|      | PR6  | BVS  | EPS  | LEV  | SIZE |
| PR6  | 1    | 0.886*** | 0.865*** | 0.163*** | 0.780*** |
| BVS  | 0.751*** | 1 | 0.788*** | 0.0950*** | 0.809*** |
| EPS  | 0.775*** | 0.654*** | 1 | 0.233*** | 0.651*** |
| LEV  | 0.0879** | -0.0361 | 0.177*** | 1 | 0.296*** |
| SIZE | 0.588*** | 0.639*** | 0.513*** | 0.276*** | 1 |

**Note**. Spearman's rank correlation coefficients and Pearson's correlation coefficients are provided above and below the diagonal respectively * $p<0.05$ ** $p<0.01$ *** $p<0.001$

### 4.4.2.2 Findings

Table 12 shows the estimated coefficients and their t-statistics of the reported model over the period 2008-2016 for JSE listed firms. The results presented in Table 12 provides evidence on the common effects of using Cook's Distance and balancing the data. As can be observed from column (3) the coefficient on the interaction term IR*EPS shows little evidence on the impact of IR on the value relevance of earnings before dropping firms with influential observations to balance the panel data.

Table 12 Regression analyses: WIN/CD settings in balanced/unbalanced modes

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| BVS | 0.92** | 0.98** | 1.14*** | 1.20*** |
| | (0.36) | (0.46) | (0.24) | (0.16) |
| EPS | 2.29** | 2.38** | 2.41*** | 2.29*** |
| | (0.94) | (1.2) | (0.41) | (0.57) |
| IR | 2.3 | 5.8 | 2.57 | 3.2 |
| | (4.34) | (5.76) | (2.86) | (2.41) |
| **IRxBVS (+/-)** | **-0.08** | **-0.09** | **-0.18** | **-0.43** |
| | **(-0.17)** | **(-0.22)** | **(-0.24)** | **(-0.28)** |
| **IRxEPS (+)** | **1.65*** | **0.84** | **1.73*** | **2.91***** |
| | **(1)** | **(1.23)** | **(0.88)** | **(1.07)** |
| LOSS | 3.65 | 3.65 | -2 | 1.3 |
| | (3.08) | (4.61) | (-1.98) | (1.88) |
| LOSSxEPS | -2.44 | -0.97 | -4.85*** | -3.98* |
| | (-3.74) | (-4.96) | (-1.17) | (-2.11) |
| LEV | 5.89 | 7.28 | 5.72 | -1.66 |
| | (10.83) | (17.47) | (5.92) | (7.35) |
| SIZE | 5.54** | 7.34** | 2.18 | 1.86** |
| | (2.33) | (3.27) | (1.35) | (0.93) |
| Constant | -78.08*** | -104.56** | -31.97* | -28.93** |
| | (-29.76) | (-41.61) | (-17.23) | (-11.9) |
| Fixed effects | Yes | Yes | Yes | Yes |
| N firm/year | 1,834 | 1,377 | 1,784 | 1,251 |
| Adj. R^2 | 0.674 | 0.655 | 0.761 | 0.762 |

The signs next to the interaction terms suggests the predicted direction of the impact of IR on the value relevance of accounting summary. Columns (1) and (2) reports the results for the Winsorized settings in unbalanced and balanced panel respectively. Similarly, columns (3) and (4) list the unbalanced and balanced estimated coefficients after the application of CD. Note. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

However, once the dataset is balanced the coefficient on the interaction term becomes significant at 1%. However, the coefficient on earnings for the interaction term after Winsorizing shows little support for the impact of IR on the relevance of earnings in unbalanced settings which disappears when the dataset is balanced. Meanwhile, IR appears to have no significant impact on the value relevance of equity book value regardless the statistical technique used to address outliers or the mode of the panel.

These findings suggest that the impact of IR on the value relevance of earnings is evident over either 2008-2013 and 2008-2016 after applying CD and in balanced settings.

However, the impact of IR on the value relevance of equity is traceable for the period 2008-2013 but it not observable for the period 2008-2016 using CD.

### 4.4.2.3   Discussion

The mixed findings regarding the effectiveness of IR as evident in the literature, were the main factors behind exploring IR's roles in improving the quality of information available to capital providers in a mandatory setting. To achieve this objective, the current chapter replicated the work of BR (2016) in South Africa to compare its findings with the ones obtained through different methodologies. Repeating BR's steps, revealed the sensitivity of its finding to the adoption of CD. Following the framework provided by Rencher and Schaalje (2008) and similar recommendations by other statisticians, I collect more data by extending the examined period from (2008-2013) to (2008-2016).

Comparing the regression results in Table 12 for the balanced settings in columns (2) and (4) with columns (3) and (4) of Table 8 in section 4.4.1.5 for the period 2008-2013 highlights the similarities in the results of both tables. In other words, Winsorizing data at 1% level over the periods (2008-2013) has produced analogous results over the period (2008-2016) in which the hypotheses H1 and H2 are not supported. However, using CD as a statistical technique to tackle influential observations provided evidence in support of H1 at 1% level suggesting a positive impact of IR on the value relevance of earnings but not the book value of equity. The replication process demonstrates that the findings of BR (2016) are conditional to the use of Cook's Distance in dealing with influential observations.

The insignificant impact of IR on the value relevance of earnings using the Winsorized settings for both periods (2008-2013) and (2008-2016) are consistent with the findings of Marcia et al. (2015). Which, as previously demonstrated, examined the value relevance of CRR after introducing King III framework and finds that CRR and earnings are not relevant. Furthermore, comparing the findings related to earnings with those reported by Hillier et al. (2016) for the period 2002-2007 after the introduction of IFRS confirms the similar tendency of earnings irrelevance.

The lack of value relevant equity book value after the adoption of IR is contrary to Prather-Kinsey (2006), Marcia et al. (2015) and Hillier et al. (2016) which had found a positive effects of IFRS and King III on the value relevance of equity book value. Furthermore, this study was unable to demonstrate the significant negative effect of IR on the value relevance of equity book value as reported by BR (2016) and Tlili et al. (2019). However, both studies have dropped financial institutions from their sample in addition to eliminating observations using CD and Trimming techniques respectively in balanced settings. This indicates the problematic nature of using such techniques in balanced settings.

Examining the firms dropped using CD over the period 2008-2016 reveals similar conclusions to what is reported in Table 7 section 4.4.1.4 for the period (2008-2013). Table 13 lists the firms eliminated from the analysis as a result of using CD in a balanced setting. Comparing Table 13 with Table 7 shows that 11 out 14 firms reported in the latter table are replicants of the former table. Furthermore, the firms in Table 13 constitute 42% of the market value of the sample over the period 2008-2016. Consequently, it is hard to consider these observations as a random and insignificant

especially that they are categorized by EY as top IR reporters and constitute a substantial portion of the market capitalisation of the sample under investigation.

By comparing the methodology of BR (2016) in both periods 2008-2013 and 2008-2016 to other methods of dealing with outliers, it is evident that the use of Cook's Distance to eliminate influential observations in a balanced setting has influenced its findings. Next, to assess the impact of IR on the value relevance of accounting summary I use alternative methods in the next section.

Table 13 Firms dropped after using CD for the period (2008-2016)

| Name | Industry |
|------|----------|
| AFRICAN RAINBOW MINERALS | Basic Materials |
| ANGLO AMERICAN PLATINUM | Basic Materials |
| ANGLOGOLD ASHANTI | Basic Materials |
| KUMBA IRON ORE | Basic Materials |
| MONDI | Basic Materials |
| SASOL | Basic Materials |
| TIGER BRANDS | Consumer goods |
| AFRICAN & OS.ENTS | Consumer Services |
| CASHBUILD | Consumer Services |
| E MEDIA | Consumer Services |
| NASPERS | Consumer Services |
| REX TRUEFORM GROUP | Consumer Services |
| ASPEN PHMCR.HDG | Health Care |
| TELKOM SA SOC | Telecommunication |

### 4.4.3   Alternative models

Despite that the previous sections provided empirical evidence that supports the work of BR (2016) whenever CD technique is utilised, the findings do not hold true using other techniques. When the dataset from 2008-2013 is Winsorized at 1% or was not treated, the accounting summary variables do not appear to be influenced by the introduction of IR in the South African market. Similarly, when the period under investigation was extended to 2008-2016, the value relevance of both equity book value and earnings is

not impacted by the introduction of IR when the dataset is Winsorized at 1% or not treated.

Table 14 presents a summary of findings using different techniques to treat outliers, different datasets, and different periods. What is apparent is that utilising Cooks distance is key in finding an impact of IR on the value relevance of earnings obtained by excluding large firms from the analysis (40% of JSE's market value).

As mentioned in section 4.3.2, other methods are adopted to check the robustness of the results to different models and to investigate the impact of IR on the common part of accounting summary, in other words, whether IR simultaneously influences the value relevance of both equity book value and earnings (H3). The two methodologies that use the coefficient of determination as a measure of relevance (Collins et al. (1997) and Barth et al. (2008)) are described in Appendix A - 9.10.

Table 15 lists the results of using value relevance methodologies developed in Collins et al. (1997) and Barth et al. (2008) for both periods (2008-2013) and (2008-2016). Despite the presence of changes in R2 of the common factor of accounting summary in addition to earnings and book value of equity, these differences are not significant for the period 2008-2013 following any outlier treatment under Collins' et al. (1997) methodology. It is apparent from Table 15 that earnings are value relevant using the former method along with applying Cook's Distance. On the other hand, using Winsorizing or not using any outlier treatment exhibits no changes in the value relevance of earnings or equity book value using 95% confidence level. However, IR seems to impact the value relevance of accounting summary by Winsorizing data at 5% level for the period 2008-2016.

On the other hand, following the methodology of Barth's et al. (2008) which compares $R^2$ of the model in pre against post periods, Table 15 exhibits that the only evidence that supports the impact of IR on South African firms exist on the value relevance of earnings following CD for both periods. The resulting differences from using distinct techniques in dealing with outliers echoes with what Gu (2007) depicted after replicating the work of Brown et al. (1999). In other words, the way outliers are treated affects the explanatory power of the model in use and consequently the value relevance of the variables of interest. Furthermore, using a non-parametric regression model (quantile regression) demonstrates that the introduction of IR has not influenced the value relevance of accounting summary in JSE market for either examined periods (Check columns (1) of Table 59 & Table 60 in Appendix 11.3.

In other words, the results clearly demonstrate that the value relevance of equity book value and earnings reported by BR (2016) are biased because of the statistical method used to tackle influential observations in balanced settings. Using different methods under different techniques to deal with outliers does not provide empirical evidence of the role of IR in influencing the value relevance of either the earnings or equity book value.

Table 14 Summary results of different outlier treatments, datasets, and periods

| The period and dataset | The interaction term | All Firms | | |
|---|---|---|---|---|
| | | NT | Cooks | Win |
| (A)  BR Rep | IR*BVS | - | -0.431** | - |
| (08 - 13) (S1) | IR*EPS | - | 2.956*** | - |
| (B)   BR Rep | IR*BVS | 0.042 | -0.340* | 0.086 |
| (08 - 13) (S2) | IR*EPS | 0.184 | 3.089*** | 0.736 |
| (C)   BR Rep | IR*BVS | - | -0.43 | -0.09 |
| (08 - 16) (S2) | IR*EPS | - | 2.91*** | 0.84 |

*Significant at 10% - ** Significant at 5% - *** Significant at 1% - NT: Treatment for outliers – Cooks: Cooks' distance is used to deal with influential observations – Win: the top and bottom 1 percentile of the variables were winsorized. S1: Stands for the original dataset – S2: Stands for the modified dataset.


Table 15 Summary results using alternative methods and outlier treatments

| Paper | Accounting summary $RT^2$ | | | Book value  $RY^2$ | | | Earnings  $RX^2$ | | |
|---|---|---|---|---|---|---|---|---|---|
| | NORM | CD | WIN | NORM | CD | WIN | NORM | CD | WIN |
| Collin et al 08-13 | + | | + | | | | - | + | - |
| | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Collin et al 08-16 | | - | + | + | - | + | - | + | - |
| | NS | NS | S** | NS | S** | NS | NS | S*** | S* |
| Barth et al 08-13 | + | + | + | | | | + | + | + |
| | | | | NS | NS | NS | NS | S*** | NS |
| Barth et al 08-16 | - | + | + | + | - | + | - | + | - |
| | | | | NS | NS | NS | NS | S*** | NS |

The column of accounting summary lists whether the coefficient of determination $RT^2$ increased / decreased in the period of IR application. The significance was measured by regressing time on $RT^2$ and examining whether the coefficient on time is significant following Collins et al. (1997). Regressing time on $RT^2$ is not applied to Barth et al. (2008) as the paper compares $RT^2$ without referring to the method it follows. $RY^2$ and $RX^2$ are compared before and after the application of IR using ANOVA and corrected – Bonferroni correction. *Significant at 10% - ** Significant at 5% - *** Significant at 1%.

### 4.4.4   Conclusion

The aim of this thesis is to investigate whether Integrated Reporting (IR) has gone beyond other non-financial initiatives to improve the quality of information by providing the missing link between financial and non-financial information. In this context, it is contended that if the IIRC's framework delivers its promise to enhance the quality of information, the value relevance of accounting summary is projected to change. Following current calls to empirically investigate the effectiveness of Integrated Reporting (Veltri & Silvestri, 2020), I examine the value relevance of accounting summary in a South African context between the years (2008 – 2016). For this end, I replicate the work of Baboukardos and Rimmel (2016) to investigate the robustness of their findings which raise some controversy with other strands of research that finds IR ceremonial and inefficient (GRI, n.d.; Maniora, 2015; Setia et al., 2015; Ahmed Haji & Anifowose, 2016; Pistoni et al., 2018).

The results demonstrate that the findings of BR (2016) is conditional to the use of Cook's Distance which removes influential observations. By using Cook's distance, BR (2016) discarded 40% of the market capital of JSE for firms that were pioneers and award winners in IR reporting. All in all, I find no support for such an increase in the periods 2008-2013, 2008-2016 neither by using other techniques to deal with outliers, nor by using other methods such as Collins et al. (1997) and Barth et al. (2008).

The chapter contributes to knowledge by providing empirical support to the claims of the opposite camp which suggest the ceremonial use of IR as far as the South African sample is concerned. It is likely, as will be demonstrated in later chapters, that treating firms of different size as a homogenous group is probably not a wise option. One of the most

important implications of the current chapter is the future use of Cook's Distance as a tool to deal with outliers especially in balanced panel. Researchers are advised to check the nature and the weight of the dropped cases after using CD.

This study comes with limitations and cautions must be exercised regarding generalising the finding of this research on the efficiency of IR. First, South Africa is currently the only country in which IR is mandatory and is applied in an emerging market. Second, future research can examine the effectiveness of IR by using the return specification and findings proxies to measure the value relevance of the Integrational function of IR.

# 5 The value relevance of accounting summary for SML firms

## 5.1 Introduction

*"it is difficult to ascertain if extreme values are outliers since unusual observations will commonly occur in a reporting environment such as New Zealand."* (Cahan et al., 2000, p. 1296)

Small and medium-size (SMEs) firms react to and manage financial and non-financial challenges in a unique way in comparison to large-size firms. As far as the economic aspect is concerned, small and medium size firms have limited access to external finances and growth opportunities not to mention the difficulties related to innovative processes for products and services when contrasted against large firms (Becchetti & Trovato, 2002; T. Beck et al., 2008; Bentzen et al., 2012; Cassar & Holmes, 2003; Vaona & Pianta, 2008). Furthermore, SMEs are different regarding how they apply and perform Corporate Social Responsibility (CSR) initiatives. For example, Hernández et al. (2020) demonstrate in a Spanish context that the relationship between CSR[34] and the Economic performance EP [35] is moderated by the Micro, Small, or Medium size of firms and find that the larger the company, the stronger the relationship between CSR and EP. Not to mention that while large firms are under continuous pressure from shareholders to achieve high levels of profitability, small firms respond to influential stakeholders given their limited resources which results in different levels of performance between large and small firms as far as CSR and Corporate Governance (CG) are concerned (Dasilas & Papasyriopoulos, 2015; Wirth et al., 2016; Seroka-Stolka & Fijorek, 2020). The previous studies propose that firms of different size are likely to perform discordantly in respect

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[34] CSR was measured following Global Reporting Initiative's (GRI) model which combines Social, Economic and Environmental performance indices.

[35] The Economic Performance was proxied by measuring Operating Income, Profit and Loss, Total Assets, and the Equity of a firm.

to financial and non-financial activities which suggest, in turn, the probability of differentiated reporting performances as far as IR is concerned.

Despite the abundance in the literature regarding the distinct performance of CSR reporting among large-size firms on the one hand, and the medium and small-size firms on the other hand, there is little or no research on the difference among small, medium, and large firms in the context of IR. The latter, and other forms of sustainability reporting including CSR, however, share many aspects that intermingle and complement each other (KPMG, 2014). Accordingly, one of the aims of this chapter is to evaluate the role of IR in integrating financial and non-financial information. In other words, is IR another non-financial reporting vehicle or is it delivering on its promise to integrate financial and non-financial information in the context of value creation. Moreover, taking into consideration the previous chapter's conclusion that the findings of BR (2016) are influenced by excluding influential observations that appears to be mainly originated from the data of large-size firms, another aim of this chapter is to investigate whether the value relevance of accounting summary is heterogenous among small, medium, and large-size firms. Utilising Ordinary Least Square (OLS) and Seemingly Unrelated Regressions (SUR), the findings of this chapter demonstrate that the impact of IR on the value relevance of accounting summary is exclusively detected in medium-size firms. In contrary, the findings of small and large-size firms suggest an ineffective role of IR in enhancing the relevance of financial information. Furthermore, the results show that the integration of financial information (accounting summary) and non-financial information (CSR/ESG reporting) has increased after the IIRC issued its framework to firms suggesting the importance of such support to promote accounting disclosure.

This chapter provides a rationale for examining the effects of firm-size on the value relevance of IR in two ways. First, the background section, highlights the relationship between firm size and the possible biases resulting from the treatment of outliers. Next, in section 5.3, I review the CSR literature to generate hypotheses regarding the impact of IR on the value relevance of different size firms. Section 5.4 presents the methodology with particular emphasis on size classification. Section 0 presents the results which are further discussed in section 5.6. Section 5.7 concludes.

## 5.2    Background

Conclusions drawn from empirical research after thoughtless exclusion of outliers or influential observations are not unusual even among high rated journals and persistently cited papers such as the work of Baboukardos and Rimmel (2016). After examining how outliers were identified and treated in top-journal articles between years 2007-2018, Sullivan et al. (2021) finds that most of the undertaken research neither discuss the existence of outlier nor elaborate on the method used to identify or treat them. In a similar way, BR (2016) identify influential observations using Cook's distance and conclude that the introduction of IR in South Africa yielded to a change in the value relevance of accounting summary. However, the replication of the work of BR (2016) in the previous chapter along with extending the period under investigation and using robust methods, highlight the sensitivity of their findings to the inclusion/exclusion of outliers in the analysis.

Best practice in dealing with outliers suggest reporting the findings with and without the inclusion of these influential observations in addition to provide satisfactory explanations for discrepancy in the results (Stevens, 1984; Aguinis et al., 2013, 2021). Taking into

consideration that the firms whose observations were identified as influential and dropped from the analysis are large size, this background and the consequent sections explore the possibility of dividing the sample according to the size of a firm instead of excluding observations from the analysis. This proposal suggests that the outlying observations are "contaminant", "dirty data", "surprising value" that are evaluated in comparison to other observations based on the size of the firm (Beckman & Cook, 1983). Therefore, understanding why some observations are considered outliers may aid in evaluating the appropriate treatment to deal with such outlying cases. Some researchers suggests that the causes of outliers originate from improper specification, natural variability of data, unique distribution that is different from the rest of observations, or erroneous observations (Beckman & Cook, 1983; Davies & Gather, 1993; Osborne & Overbay, 2019). Many of the previous reasons can be presented in a framework suggested by Barnett and Lewis (2006) not to mention that this paper is considered as a reference for outlier treatment as can be inferred from its high and quality citation. Consequently, I use the previous framework to discuss the possible reasons behind spotting outliers in the South African sample and how it is related to the use of Cook's distance.

### 5.2.1 Outliers: what are they and why do they occur?

One possible perspective to understand an outlier, which is "an outlaying observation … [that] deviate markedly from other [observations]" (Grubbs, 1969, p. 1), is by studying its source of variability as suggested by Barnett and Lewis (2006);

- First, inherent variability: which reflects the features of a population like a normal distribution curve under which outliers fall in the lowest probability density areas.

- Second, measurement errors: which can be a result of different factors such as an uncalibrated measuring instrument or recording mistakes.

- Third, execution errors, which happens when data are imperfectly collected.

Analysing the outlaying observation, in the previous chapter, using the previous framework rules out the first two suggestions that could be the reasons behind the occurrence of outliers. To elaborate on this matter, plotting the standardized residuals in a histogram chart Figure 3 shows its diverse z-score distributions between (-6.21 to 14.89). In other words, the dispersion of the residuals does not follow a normal curve distribution and therefore to label these observations as outliers following the normality assumption is not sound in statistical terms. Furthermore, in respect to the second suggestion by Barnett & Lewis (1994), the data were cleaned and carefully verified using different sources of databases. In addition, re-examining BR- dropped firms' observations in chapter 4 diminishes the possibility of recording mistakes. However, the third option relating to "execution errors" needs to be considered empirically in the context of sample nature and selection.

The problem of outliers is viewed theoretically by statisticians and according to Wooldridge (2013) as being either from a random sample of some population (which overlaps with the inherent variability mentioned before), or coming from a different population ("a contaminant" Barnett & Lewis (1994)).

**Figure 3** Standardized residual distribution.
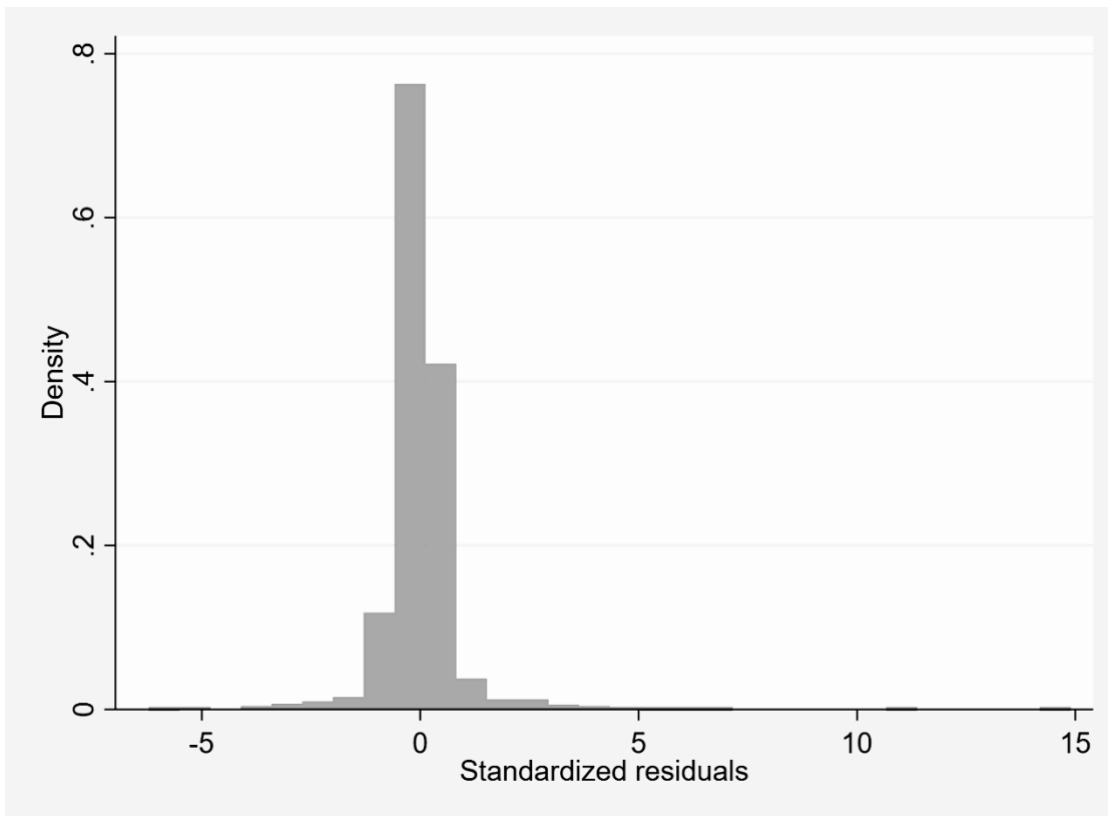


Note 1: The residuals were generated after using Model (2) for the period (2008-2013). The use of Shapiro-Wilk W test confirms the rejection of the normality assumption (**Figure 9** – Appendix 10.1).

As previously discussed, if the sample is analysed presuming the normality assumption besides a homogenous residual variance, any residual value exceeding 3 standard deviations is considered an outlier (Stevens, 1984). However, the outliers detected in the South African sample, as Figure 3 displays, have standard deviations between -3 to -6 and from +3 to +14. Therefore, the thesis that the observed outliers might simply be intruding observations coming from a different population is sensible but requires further exploration.

**Figure 4** Outlier types
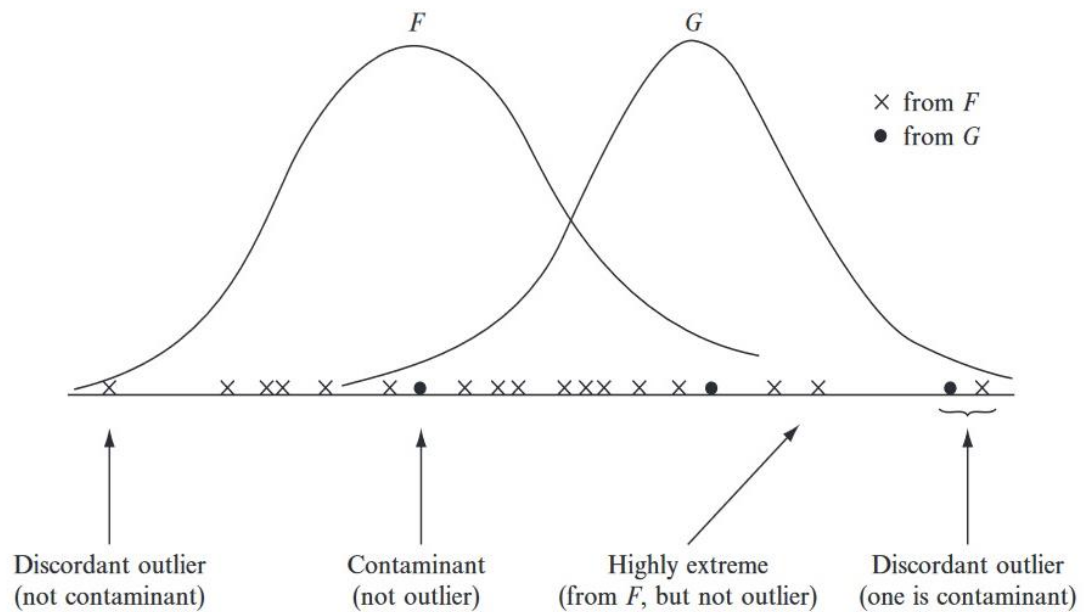


Extreme, outliers and contaminants: used in "outliers" by V. Barnett (2006)

Figure 4 shows two different populations interfering with each other; if a researcher is interested in F population, they might discard a contaminant observation as an outlier (discordant outlier which is contaminant) while, in fact it belongs to a different population (G population). Recalling that most of the dropped observations were big size companies, it is argued that dealing with JSE firms as a homogenous group neglects the heteroscedastic nature of the composing firms. Furthermore, examining Figure 5 reveals that studentized residuals increase with the size of the firm forming a fan-shape (funnel shape) distribution of the fitted values meaning that with larger firms the probability of encountering outliers increases. Therefore, next section discusses whether sub-sampling the South African sample into size-categories can be theoretically justified.

**Figure 5** The distribution of the standardized residual on fitted values.
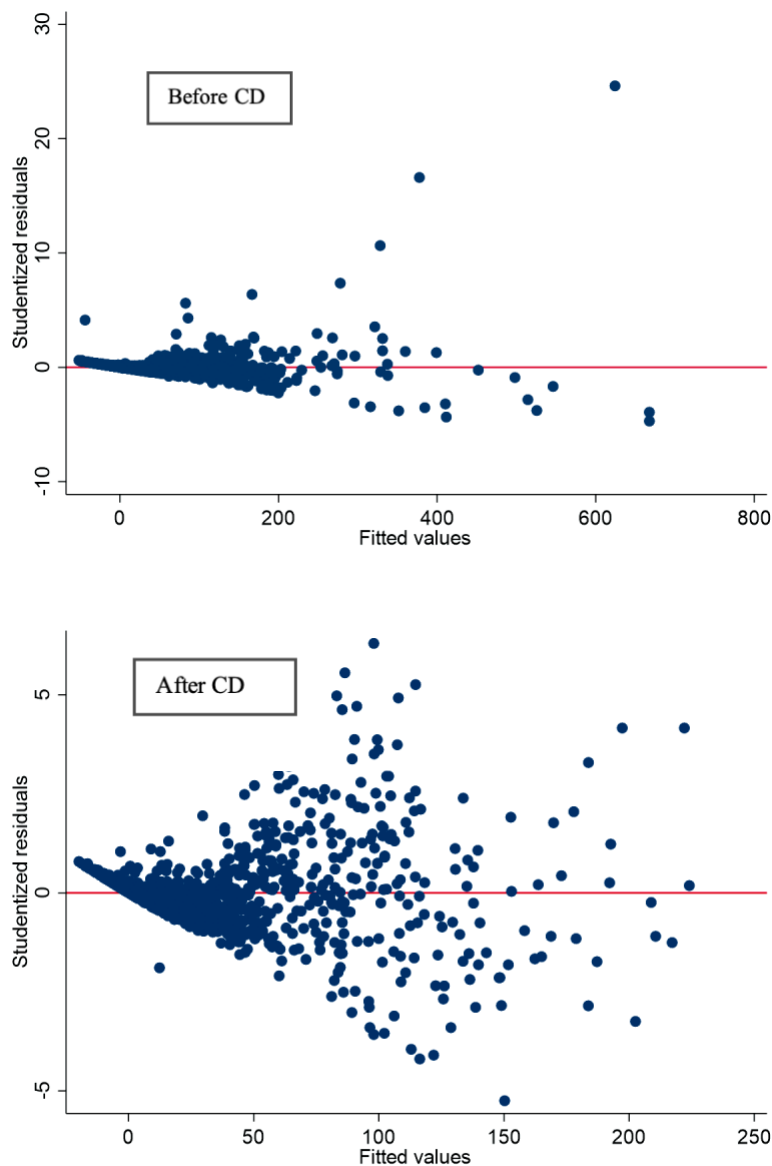




### 5.2.2 Why size classification matters

The main predicament to comprehend in this section is whether the dropped firms – using

cook's distance – are unusual in nature or are simply intruding observations coming from

a different population. The latter suggestion can be rationalized based on sub-

categorizing the sample according to the firm size into small, medium, and large firms.

Accordingly, the influential observations identified by Cook's distance and found to be

large-size firms, can be considered contaminant observations from other population. On

the other hand, deleting influential observations identified by Cook's distance on the

premises of unusuality may exclude important information carried out by these observations. So, are these influential residuals/observations unusual? Or are they intruding observations coming from other populations – such as large-size firm population"?

To address this question, I refer to the findings of the previous chapter. As it has been shown in the discussion sections 4.4.1.3 and 4.4.2.3, the firms that are excluded from the analysis using CD technique in the first period (2008 – 2013) are almost the same ones dropped in the extended period (2008 – 2016). Excluding almost identical and similar firms from the analyses after extending the period under examination eliminates the "randomness" or the "unusuality nature" justification as an excuse for dropping these firms. Furthermore, in a reporting environment belonging to developing countries such South Africa, there are higher possibilities of detecting outliers in any drawn sample. For example, Hearn et al. (2010) finds the return on country portfolio in South African market is determined by the high-risk premium of the constituent firms. The authors justify this finding by the dominance of volatile small firms increasing the probability of facing outliers in such settings. Likewise, similar challenges are reported by Cahan et al. (2000) studying the value relevance of comprehensive income in New Zealand and summarized in the following quote;

*"it is difficult to ascertain if extreme values are outliers since unusual observations will commonly occur in a reporting environment such as New Zealand."*(Cahan et al., 2000, p. 1296)

In other words, there is an impact on the findings of the previous studies originating from the size of the examined firms. To elaborate, while BR (2016) eliminate some large firms

for being a source of leverage, Hearn et al (2010) interpret the findings of high risk-premium for the South African portfolio as a result of including volatile small firms. This comparison shows how pooling different classifications of firms may produce class-specific outliers. Therefore, following this strand of logic, it becomes more reasonable to view the dropped large firms as observations coming from a different population rather than resulting from sampling errors. Consequently, sub-sampling JSE's population according to firm classification is rationally justified from a methodological perspective.

Despite the rationality of the sub-sampling suggestion, backing this proposal with instances from previous literature provides further support and informs this research on the possible limitation related to similar applications. However, the idea of approaching the value relevance of accounting summary under an Integrated Reporting framework for firms according to their size has not been researched yet.

Therefore, to provide an intertwined methodological and theoretical basis to study the value relevance of Integrated Reporting (IR) from a size perspective, I revisit the literature related to non-financial reporting. I first provide the necessary justifications to compare IR with Corporate Social Responsibility reporting (CSR), then I study the relationship between CSR reporting, size, and the value relevance of accounting summary. Afterwards, I generate the hypothesis for the value relevance of IR under different size categories guided by my conclusions on the impact of size and CSR on the value relevance of accounting summary.

## 5.3    Literature Review

The scarcity of literature on the impact of IR on the value relevance of accounting summary for different size of firms necessitates the need to borrow from other literature in the context of sustainability reporting. Because IR is based on integrating non-financial information with financial information, the literature on non-financial information and more specifically CSR reporting may provide a valid basis to build a case on IR. Therefore, I first show the similarities and differences between IR and CSR reporting to validate borrowing from the literature on the latter. Second, after providing enough justifications on the similarity between IR and CSR, I review the literature to understand the dynamics among CSR, value relevance, and the size of firms to generate the research hypotheses and to interpret the results.

### 5.3.1    IR and CSR

This section compares Integrated Reporting (IR) with forms of Corporate Social Responsibility (CSR) reporting by studying how they resemble and impact each other. This comparison is conducted to validate borrowing methodological perspectives applied in CSR framework and adopting them in an IR context. As it is mentioned in the background, I review the literature to examine whether the size matters in terms of CSR reporting performance, financial performance and value relevance and apply this perspective to generate hypotheses about IR's impact on value relevance.

ESG pillars constitute the subject of both CSR reporting guided by GRI's framework and Integrated Report. While IR combines ESG information with financial information to explain how value is created, transformed, and changed from the perspective of capital providers, CSR reporting provides the necessary information on ESG for all stakeholders

including providers of financial capital (Flower, 2015). Furthermore, the International Integrated Reporting Committee (IIRC) claims that the information provided in sustainability reports can be extended to IR if it is material in the context of value creation over time (IIRC, 2021). Accordingly, given the extant evidence in some research on the variation in implementing CSR by firm size as will be discussed later, it is likely that reporting under IR might be similarly impacted by firms' size.

It is found that when CSR reporting practices exist in a firm in addition to their assurance, IR adoption becomes more beneficial and influential. For example, CSR reporting is found to have a moderating effect in the European context on the relationship between Integrated Reporting Quality (IRQ) and some governance characteristics (Chouaibi et al., 2021). Similarly in a case study of a Danish carpet manufacturer, Lueg et al. (2016) show that the shift from fragmented technical and CSR reports to one report strategy have improved the adoption of IR. Likewise, a set of board of directors' characteristics such as board size and CEO duality besides the adoption of GRI and external CSR assurance are found to impact the quality of integration in Chinese context (Sun et al., 2022). Similarly, Sierra-García et al. (2015) find from studying international organizations between 2009-2011 (73.4% of which is large size) that a firm issuing an assured CSR report are more empowered to issue an Integrated Report.

There is also some evidence in the literature suggesting an influence of IR on CSR reporting. In a context where IR is understood as an integrative framework of financial and non-financial information for capital providers, integrating CSR with financial information is favourably perceived by investors in comparison with stand-alone CSR reports (Arnold et al., 2018). Furthermore, by examining a sample of international firms

between 2012-2017, Grassmann (2021) finds that IR increases the firm value for firms with low and high levels of environmental expenses while producing a negative impact on firm value for companies with expenditure in between.

However, there is another strand of empirical research that does not support the important role of IR in CSR reporting. For example, in some industries like the mining sector in South Africa, Integrated reporting seems to have a mixed influence on CSR reporting (Ackers & Grobbelaar, 2021). Furthermore, in an experimental setting Bucaro et al. (2020) finds CSR disclosure in a separate report is more influential than presenting CSR information in an integrated report as far as investors' judgement is concerned.

In summary, both of IR and CSR reporting are concerned with ESG reporting. Furthermore, there are more evidence in the literature that supports the positive impact of each report on the other providing enough justification to inform the research in IR from the literature of CSR. However, as mentioned previously, handling the sample according to size subsamples needs to be informed by previous literature regarding CSR reporting as such procedure has not been fully examined in an IR context. Next, I revisit the literature to examine the research on CSR reporting, value relevance of accounting summary, and the size of a firm.

### 5.3.2   CSR reporting, Value Relevance, and Size

In the previous section, I compared CSR reporting with IR to justify borrowing from the literature on the former to apply it on the latter. In this section, however, I review the literature to understand the dynamics between CSR reporting, value relevance and the size of firms. Therefore, I examine the literature on the relationship between value

relevance and size, the relation between CSR reporting and size, then finally the relationship between CSR reporting and value relevance of accounting summary.

### 5.3.2.1 *Value relevance of accounting summary and firm size*

A firm's size is documented to have several impacts on its financial performance and consequently the value relevance of accounting summary. The larger the firm, the more information is processed by traders and financial analysts leading to more informative stock prices. Therefore, changes in price are more associated to changes in earnings for large firms in comparison to small firms (Collins et al., 1987). By contrast, because start-up firms are generally small and the probability of firms incurring loss increases among small-size firms, the importance of earnings diminishes for these firms (Hayn, 1995). As a result, future earnings may be more relevant to investors than current earnings because of growth potential, leading to a shift in value relevance from current earnings to equity book value in small firms using Ohlson model (Collins et al., 1997). This shift was evident in the findings of Chen et al.(2001), comparing the value relevance of earnings and equity book value in emerging Chinese stock market. Applying Ohlson model to the variables of listed firms on mainland China and Taiwan for years 1991-1998, the authors find that while the value relevance of equity book value is higher for small firm in contrast to large firms, the value relevance of earnings is higher for the latter in comparison to the former.

A similar emphasis on the distinct importance of earnings in the context of large firms is placed in a study by Fasan et al. (2014) on European listed firms between 2005-2010. The authors show that the increase in the value relevance of Other Comprehensive Income (OCI) is more evident among large firms in contrast to small firms. A possible

reason for differences in relevance as far as the earnings are concerned is the percentage of transitory components in earnings that are higher for smaller firms in comparison to larger firms (Hodgson & Stevenson-Clarke, 2000). In summary, the value relevance of accounting summary is affected by the size of its reporting firm. Therefore, it is likely that dividing the South African sample into different size categories would provide better framework to investigate the effect of Integrated Reporting on the value relevance of both equity book value and earnings.

### 5.3.2.2 *CSR reporting and the size of the firm*

There is evidence in the literature on different CSR reporting performance among small and large size firms not to mention the gap between them in affording such reporting activities.

Regarding the difference in reporting practices between large firms with small and medium firms Baumann-Pauly et al. (2013) and Wirth et al. (2016) report contradicting findings that may have originated from geographical particularities of their samples. Acknowledging the limitation regarding the generalizability of findings in terms of the small sample drawn by Baumann-Pauly et al. (2013), Multi-National Corpora (MNC) were found to implement CSR in unsystematic ways which makes them vulnerable to crises and being trapped in the saying "all talk and no action". However, Small and Medium Enterprises (SMEs), in the same Swiss context, are found to have more serious implementation policies of CSR and strong engagement with external stakeholders but poorly communicating their commitments.

Contrary to the previous proposition, Wirth et al. (2016) analyse firms that are vulnerable to the consequences of their activities on their surrounding environment. They compare

the performance of top MNC operating in the copper industry around the world to SMEs that produces less than a specific amount of copper on a local level from different parts of the globe. The study finds that while MNC firms have well established polices regarding CSR allowing them to produce wide spectrum of CSR reporting suitable to their surroundings, SME are found to be improvising when dealing with CSR issues and lacking a strategic integration of CSR in their businesses. Despite the discrepancy in the findings of the mentioned two studies, one can conclude that large firms are different from small firms in the way CSR reporting is managed.

Firms of different size categories are likely to prepare distinctive CSR reports as far as the quality is concerned due to their awareness of the benefits of CSR and the abundance of financial resources. Extending the previous point but in the context of "cost and benefit" framework Brammer et al. (2012) finds in the UK context that despite that small-size firms acknowledge the cost saving associated with environmental management, they don't perceive the related benefits in terms of product/quality improvements, expansion in current markets or penetrating future ones. However, medium-sized firms recognize these advantages which is reflected through environmental management and reporting. On the other hand, the assurance associated with CSR reporting requires internal and external assurance bodies, skilled and specialized teams which is likely leads to cost outweighing the benefits (Camilleri, 2018; Simnett & Huggins, 2015).

Another factor that is likely to contribute to the difference in the mentioned reporting practices by small, medium, and large firms could be the associated cost with the assurance process. Such increase in cost accompanied by scarcity in financial resources the smaller the firm is, in contrast to the abundance in financial resources the larger the

firms is. In other words, it is likely that the benefit of attracting cheaper capital does not outweigh the cost of well-prepared CSR reports for small firms whilst it does for large firms. Therefore, implementation by small firms may be superficial, just covering the baseline. For example, in the context of Corporate Social Responsibility reporting, Schreck and Raithel (2018) find a non-linear relationship between the size of a firm and its performance in terms of sustainability reporting. They suggest increasing benefits over costs for sustainability reporting to a certain size after which firms are characterized to be rich in resources and lose the motive to increase their sustainability reporting.

To summarize, even though there are mixed results regarding the effect of firm size on its CSR reporting performance, the research in this area highlights distinct reporting patterns among firms of different size as far as CSR reporting is concerned. It is possible that the abundance of financial resources as a firm becomes larger contribute to better CSR reporting until it reaches a specific size when extra resources are no longer factored into the reporting quality. This can be reflected in the IR context too; small firms may struggle financially to set aside funds to develop IR. On the other hand, medium and large firms may enjoy greater investment in enhancing the quality of their IRs. However, the question becomes whether the abundance in resources, as Schreck and Raithel (2018) find, contributes to the efficacy of IR.

### 5.3.2.3   CSR and value relevance

There is empirical evidence on the impact of CSR reporting on the market price of equity through direct and indirect channels. Other than the direct impact, CSR reporting or its score may influence the market behaviour of investors, or the inputs used in their valuation models. De Klerk et al. (2015), for instance, report an association between

share price and the level of CSR reporting for large U.K. listed companies. Furthermore, the study finds that the relationship between CSR reporting and the market value of a firm becomes stronger for environmental sensitive industries in comparison to other sectors. Such a relationship between CSR reporting and the market price of equity suggests its relevance to investors' decision which in turn may impact the performance of IR. García-Sánchez et al. (2019) also uncover that not only the disclosure extension of CSR is value relevant to investors but also the quality of its reporting in addition to its credibility as manifested through assurance by audit firms. However, CSR reporting does not seem to have similar impact in all settings. In Germany, for example, Verbeeten et al. (2016) finds marginal impact of standalone CSR reporting on share prices.

On the other hand, CSR may influence the behaviour of market participants such as going short on shares or the inputs of valuation models such as the cost of equity, analyst forecast errors, earnings, and other variables. In respect to the investor's behaviour, Jain et al. (2016) report that firms with lower ESG scores are considered as a target for short sellers, implying the importance of ESG reporting on investors' attitudes in the market. CSR is also found to impact the financial performance of firms. For example, in a Japanese settings Kumarasinghe et al. (2018) find that firms using CSR reporting to disclose on human rights, labour and health, and product and safety improve the financial performance of a firm. In the same vein Clarkson et al. (2013) finds that the value delivered through voluntary environmental reporting is transmitted to market price of equity through enhancing the prediction on future financial performance.

CSR is found to influence the ethical conduct of a firm by mitigating the earnings management of such firms. For example, Kim et al. (2012) and Gao and Zhang (2015)

find from examining a large set of firms that CSR companies avoid smoothing through discretionary earnings. Kim et al. (2012) conclude that CSR firms are likely to deter themselves from managing their earnings through discretionary accruals or manipulating the cash flow from their operating activities. Similarly, Gao and Zhang (2015) explore whether firms that are socially responsible behave differently from other firms as far as earnings management is concerned. The study finds that firms with higher CSR reporting scores are associated with better financial performance and smoothing is value relevant only if accompanied with higher CSR performance.

Other indirect channels by which CSR reporting may impact the market price of equity is through its influence on financial analysts' forecast errors in addition to the cost of capital. El Ghoul et al. (2011), for instance, find that firms with higher CSR scores in U.S. settings have lower cost of equity capital in comparison to other firms. Similarly, firms with environmental reputation in addition to firms with higher scores on community and environmental responsibility ranking are likely to reduce their systematic risk and consequently its cost of capital (Toms, 2002; Salama et al., 2011). Furthermore, firms with environmental complications such as tobacco and nuclear sectors are penalized with higher cost of capital. It is possible, however, that such an improvement in decreasing the cost of capital is stemmed from reductions in the analysts' forecast errors. To elaborate on the previous point, Dhaliwal et al. (2012) find that the earnings of firms issuing stand-alone CSR reports are negatively associated with forecast errors. Furthermore, the findings of its global sample show that the previous association increase in countries that are stakeholder oriented.

CSR is also found to affect the value relevance of accounting summary in some settings. For example, Reverte (2016) explores the value relevance of accounting summary for a specific index firms listed on Spanish stock market. The study finds that CSR disclosure is value relevant by itself and it adds layers of value relevance for both equity book value and earnings. Furthermore, the study finds that CSR of firms operating in environmentally sensitive industries is associated with higher market values.

Taking in consideration that the main function of IR is to integrate financial and non-financial information and given that CSR reporting involve the disclosure on ESG matters not to mention its influence on financial information, it is apparent how comparable are the two reporting methods. In other words, what was discussed before, provides the necessary grounds to approach IR acknowledging the similarities shared with CSR reporting without omitting the uniqueness of each of reporting styles or the possible interaction between them and the consequent influence on the value relevance of accounting summary.

### 5.3.2.4 *CSR, size, and financial performance*

There are mixed findings regarding the relationship between CSR and financial performance that varies with the size of a firm. While some studies show that this relationship is positively affected the larger the firm is, others don't find enough evidence to support this postulation. In a study by Sánchez-Infante Hernández et al. (2020) on a Spanish Micro, Small and Medium firms (MSME), it finds that the relationship between CSR and Economic Performance (EP) of a firm is moderated by its size. In other words, the larger the size of a firm, the stronger is the relationship between CSR and EP. Furthermore, the study finds that the differences are more evident between micro and

medium firms in terms of CSR and EP. In a similar vein, Youn et (2015) finds in a study on the relationship between CSR and Corporate Financial Performance in the restaurant sector, that the size moderates the relationship between CSR and CFP for firms with positive CSR ratings.

In their investigation on the reasons behind issuing a standalone CSR report in the Canadian context, Thorne et al. (2014) finds that while most of the firms that issued standalone CSR report were large size, firms that did not issue a standalone CSR report were small size. Furthermore, the study finds no significant difference between standalone CSR reporter and other reporters as far as ROA, ROI or CSR are concerned. These findings suggest, from the authors perspective, an impression strategy for the reporting as large firms are under continuous pressure and scrutiny from stakeholders to be socially responsible.

Accordingly, despite the mixed results regarding the effect of size on the relationship between CSR and financial performance, it is possible that the effect of size on financial performance may affect the value relevance of accounting summary under IR. For example, Collins et al. (1997) suggest that small firms in comparison to large firms are more likely to suffer from financial distress and are driven by the potential growth of their earnings. Consequently, more importance is placed on book value rather than current earnings using Ohlson valuation framework (Collins et al., 1997). Furthermore, Chen et al. (2001) find that the value relevance of accounting information changes in regards to firm classification in the Chinese market, though the study finds earnings to be more value relevant in small firms in contrary to the proposition of Collins et al. (1997).

In summary, the literature provides examples on the impact of CSR reporting on the financial performance of a firm. In some instances, this impact is significant and varies between firms according to their size. In other occasions, the influence of CSR reporting is not evident on the financial performance of a firm under legitimacy pressure from stakeholders. However, considering the shift of investors' focus between equity book value and earnings according to the size of the firm, it is possible for the value relevance of accounting summary under IR to change according to the size of the firm.

### 5.3.3 Hypotheses generation

Two theoretical frameworks are elaborated together to provide a foundation for predicting the value relevance of accounting summary for JSE firms under IR according to their size. The first framework focuses on who are the stakeholders and how they are informed, and it adopts Perrini's (2006) suggestions regarding different lenses for different sizes. The second framework is the cost-benefit perspective in which firms are likely to diverse from each other on how they report CSR or IR activities as a function to their financial abundance, mature understanding of sustainability reporting, and their size.

#### 5.3.3.1 Theoretical perspectives

Discrepancy in the performance of CSR reporting is not the only aspect that differentiates large-size firms from medium and small size firms, but also extends to include different theoretical frameworks that governs each class. For instance, Perrini (2006) demonstrates in his work that even the theoretical framework used to analyse large firms can deviate from the one applied to medium and small enterprise (SMEs). While stakeholder theory

appears to be more appropriate to explain the behaviour of large firms in the context of CSR, the social capital theory can be a more relevant framework to explain the behaviour of SME firms. In other words, both frameworks seem to work in CSR reporting contexts but differ in terms of formalities. While large firms use more formal communication channels such as financial reporting and its related quality standards, small firms use ad-hoc polices and deals directly with stakeholders.

In parallel, if Perrini's theory is applied in the IR context, smaller firms which have utilized and invested in informal mediums of communications to inform their stakeholders and local community investors would lack the experience to compete with larger firms in IR. In other words, as far as sustainability information is concerned on stock exchange markets, because investors rely on formal mediums of reporting, smaller firms might be disadvantaged in comparison to larger firms in terms of using IR as a formal medium of communication.

### 5.3.3.2  IR, CSR reporting and the cost-benefit framework

Regarding the cost-benefit framework, reviewing the literature highlights the possible challenges faced in IR and CSR reporting. First, IR reporters are faced with application challenges stemmed from complexity of IR adoption and its associated costs. Second, CSR reporter share similar perceptions to IR applicants and some studies show that the reporting performance varies by the size of the firm.

There is some evidence of a consent about the high cost associated with preparing an Integrated Report among directors in South Africa and around the world. For instance, In a semi-structured interview exploring materiality of IR in 14 firms from the top 40

JSE-listed companies between 2015-2016, Cerbone and Maroun (2019) sheds the light on the costly process of preparing IR. Despite prepares had had at least 10 years of sustainability reporting experience before the interview, they complained about the difficulty of preparing IR. Furthermore, the study detects evidence on the high associated costs and the length of time needed to report IR. In a similar study using the same methodology on 15 senior management members of FTSE 100 companies, the participants also criticized IR for the demand of time and effort needed to prepare it in addition to the financial costs associated with the process (Chaidali & Jones, 2017).

Executives in JSE listed firms expressed challenges faced in adopting IR in Steyn (2014) who surveyed 50 CEOs and CFOs and other senior executives of firms listed on JSE as December 2014. Most of the firms were large and yet the surveyed officers had expressed difficulties in choosing appropriate contents for forward-looking information in addition to complaints related to incompetent information systems. On the other hand, some of the executives expressed that IR's costs exceed its benefits in addition to facing difficulties in adopting IR due to lack of reporting guidance. This might be obsolete after the introduction of IIRC's framework, yet the previous challenges identified in this sample dominated by large firms highlight the possible complexities that small and medium firms encounter.

Similar trends are found in CSR reporting in the context of a firm size and the cost-benefit framework. For example, Schreck and Raithel (2018) find a non-linear relationship between the size of a firm and its performance in terms of sustainability reporting. The study suggests increasing benefits over costs for sustainability reporting

to a certain size after which firms are characterized to be rich in resources and lose the motive to increase their sustainability reporting.

Small and medium firms experience some hinders when it comes to the application of CSR. Using a structured questionnaire about SME's involvement in governance and CSR practices in a South African township between 2013-2014, Chiloane-Tsoka and Rasivhetshele (2014) find that the business owners are facing difficulties in comprehending the importance of CSR reporting. Despite that the sample firms are not necessarily listed on JSE, and their findings may only be relevant in a specific location in South Africa, the findings of the study provide an indicator on the possible challenges faced by SME owners. Particularly, in understanding the long-term benefit of CSR and perceiving it only as a burden to the firm.

Using the previous frameworks, it is contended that small size firms, which use informal mediums of communicating with stakeholders will be disadvantaged on two levels; First, in a stock exchange context; small firms are not ready to the shift from ad-hoc policies to formal channels of communication. Second, these firms may have tight budgets in addition to little awareness of the benefits from quality reporting in IR. Moreover, the probability of defaulting for firms increases among small firms which were found as far as environmental reporting is concerned to be less inclined to invest in reporting especially when they have high financial leverage (Collins et al., 1997; Andrikopoulos & Kriklani, 2013). Consequently, the integration of financial with non-financial information will be poor resulting in insignificant change in the value relevance of accounting summary. In other words:

**H1-0: The value relevance of accounting summary has not significantly changed after the application of IR for small-size firms.**

On the other hand, it is possible that the IIRC's new framework has helped small firms to achieve a level of formality and understanding of the importance of integrating non-financial with financial information in their IRs. Consequently, investors are more capable to utilize the information reported by small firms leading to more value relevant accounting summary.

**H1-1: The value relevance of accounting summary has significantly changed after the application of IR for small-size firms.**

Similar to small-size firms, medium-size firms are possibly dependent on non-formal communications with stakeholders leading to difficulties in adopting IR (Perrini, 2006; Chaidali & Jones, 2017; Cerbone & Maroun, 2019). Consequently, the integration level between financial and non-financial information is weak and not captured by the accounting summary figures leading to the second null hypothesis:

**H2-0: The value relevance of accounting summary has not significantly changed after the application of IR for medium-size firms.**

However, Medium-size firms are likely to be in a stage where the benefit of investing in sustainability reporting is recognized in addition to experiencing a surplus that helps in enhancing the quality of information reported. These factors will lead to a better integrating of financial and non-financial information that is captured by the accounting summary figures.

**H2-1: The value relevance of accounting summary has significantly increased after the application of IR for medium-size firms**

In respect to large-size firms, it is possible that these firms reached a point where extra financial resources are no longer invested in sustainability reporting and are under legitimacy pressure resulting in tick-the-box reporting (Ahmed Haji & Anifowose, 2016; Schreck & Raithel, 2018). Therefore, a symbolic reporting may lead to a low-quality of integrating financial and non-financial reporting which may not be captured by both equity book value and earnings.

**H3-0: The value relevance of accounting summary has not significantly changed after the application of IR for large-size.**

Large-size firms, however, may have been assumably enjoying surplus in financial resources and are more familiar in using formal mediums of reporting to communicate information to their stakeholders. Consequently, bottom line figures reflects both the financial and non-financial aspects of information.

**H3-1: The value relevance of accounting summary has significantly changed after the application of IR for large-size firms.**

## 5.4 Methodology

In this section, I discuss the model used to examine the value relevance of accounting summary under IR in addition to the utilized methods to divide the South African sample into subsamples in terms of size.

Return and price models are common when investigating the value relevance of accounting summary (As discussed in 4.3.2). Level or return models, however, introduces coefficient bias and does not accommodate equity book value as a variable in the model. I therefore adopt Ohlson's (1995) price model (Which was used in chapter 4 – Model 2) and to avoid heteroskedasticity, I follow White (1980)[36].

$$
\begin{aligned}
P6_{it} = \beta_0 &+ \beta_1 BVS_{it} + \beta_2 EPS_{it} + \beta_3 IR_{it} + \beta_4(IR_{it} \, X \, BVS_{it}) + \beta_5(IR_{it} \, X \, EPS_{it}) \\
&+ \beta_6 LOSS_{it} + \beta_7(LOSS_{it} \, X \, EPS_{it}) + \beta_8 LEV_{it} + \beta_9 ROE_{it} + \beta_{10} SIZE_{it} \\
&+ \sum_{j=1}^{j=8} \beta_{11} IND_{it} + \sum_{y=2008}^{y=2013} \beta_{12} YR_{it} + \varepsilon_{it}
\end{aligned}
$$

(Model 2)

In the following section, I introduce different perspectives from the literature on the methods used to divide the sample into subsamples according to the size of a firm, the stock market, the ranking classification, and the average methods.

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[36] In the finding section, I will refer to the Least Squared Regression (SLR) results alongside the Quantile Regressions (QR) results which is thoroughly discussed in section 6.4.4.1.

There are various ways to classify firms into categories as far as the size of a firm is concerned. The literature provides methodological treatments to divide firms in respect to their size into different sub-samples. In addition, the stock market offers technical definitions for the size of firms according to their market value. The literature categorizes firms' size based on a "ranking classification" or "average classification". In the former, firms are ranked each year in terms of their market size, while in the latter the average size is taken over the studied period. The stock exchange, however, sets ranges of market capitalization to classify listed firms into small, medium, and large, which I will call "market classification".

Presenting the two approaches of categorizing firms is important as some firms may fall in different categories following the market or the literature classifications. Despite that categorizing firms in different size classes in each approach may appear to be confusing, contrasting the results against each other provides a better understanding of the impact of size on the value relevance of IR. However, before introducing the literature methods, I present the technical classification of JSE to facilitate understanding the conflict of classification between the actual and the theoretical methods.

According to JSE, firms are classified as large-size firms if they are listed on the FTSE JSE TOP40 index. On the other hand, firms that belong to the index JSE MidCap are considered medium-size firms. Otherwise, all other JSE listed firms are considered small-size firms if they don't belong to the above-mentioned indices (JSE, 2019).

Another way that JSE classifies firms depends on the market value of a firm[37]. For example, while firms that have a market value above 10 billion Rands are classified as large firms, other firms are considered small when their market values fall below 1 billion Rands. Next, besides presenting the three methods used by both the market and literature, I discuss the possible contradiction between them.

### 5.4.1 The market classification

In this method, firms are attributed to classes following JSE's criteria. As mentioned earlier, the market has two distinct ways to classify firms into different size samples, the index method, and the market capital method. One advantage of classifying firms according to the first arrangement is the high possibility of capturing all the aspects of size as perceived by investors. For example, investors may be biased to trade some stocks just for being part of the Top40 index. Another advantage of using the index method is its easy application and the needless to adjust firm categorization because of inflation. To elaborate further, one disadvantage of classifying firms according to their market value is the possible increase that results from inflation which in turn may move some firms from medium to large size class in the light of the moderate inflation that South Africa has been through during the time of the study. On the other hand, following the index categorizing method, leave the task of constantly adjusting the constituents of an index to JSE.

However, it worth noting that following BR (2016), financial and telecom services were dropped from the analysis as these firms are governed by rules and regulations that differ

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[37] The JSE explains the market value of a firm as the number of shares multiplied by market value of its share (JSE, 2019).

from the rest of other firms. Therefore, firms are categorized as small, medium, and large firms because they belong to the related JSE indices but that does not mean that these firms represent the whole South African population listed on JSE.

Regarding the market capital method, one of its main advantages is its simple application as the act of classification requires a comparison of the firm's market value to pre-determined numbers by the stock exchange.

### 5.4.2 Ranking classification

In this method, firms are ranked in each year according to their size proxy from the largest to the smallest and then are divided into percentiles (Freeman, 1987; Chan & Chen, 1991; Demirgüç-Kunt & Maksimovic, 1999; Amato & Amato, 2007). After being ranked in percentiles the firms are split into three classes in relative to the 33.3 and 66.6 percentiles. If the market value of a firm is above the 66.6 percentile, it is classified as large firm. On the other hand, when its market value is below the 33.3 percentile it is categorized as a small-size firm. Otherwise, firms that are in between the two previous categories are classified as medium size firms (Farshadfar et al., 2008).

Adopting this method has some advantages and disadvantages. One of its points of strength is that the firm's size category is reassessed every year in line with inflation like the market classification. Each year firms are pooled together and classified according to their relative rank for that specific year which indirectly takes the inflation into perspective. Another positive side of such classification is the equal presentation given to each class which help in giving deeper insights of the effect of size on the interested phenomenon.

However, the main drawback of this method in comparison to the market classification method is the relative size assigned to the firm that may not match the market classification. The problem with such a method is it informs us about the relative importance of the size in each year rather than the market effect of the size. I will use this method in a way that aids in forming better understanding about the effect of size on the value relevance of accounting summary.

### 5.4.3    The average classification

In this methodology the average size of a firm is calculated over the studied period and then contrasted against the market categorization of a firm. The advantage of this methodology is that the firm is assigned one size over a period of study and consequently when subsamples are compared in terms of the size, it would be more homogenous in nature. The main drawback of this method is its insensitivity to annual inflation and the scarcity of its application in the accounting literature; accordingly, it will not be taken into consideration

### 5.5    Findings

### 5.5.1    Descriptive Statistics – Ranking method

Table 16 and Table 17 list the summary statistics for the dependent, independent, and controlling variables for the periods 2008-2013 and 2008-2016 respectively. As can be noticed, the mean is larger than the median the smaller the category of a firm is for the price, equity book value and earnings variables. Furthermore, the values of skewness are more than +1 for the mentioned variables suggesting positively skewed distributions. Yet, the distribution of the variables related to the size of a firm in addition to the leverage appear to follow the normal distribution qualities.

Table 18 and Table 19 list the correlation matrix for small, medium, and large firms over for the periods 2008 – 2013 and 2008 – 2016 respectively. Above the diagonal are the correlation coefficients as per Spearman's method while the ones bellow it follows Pearson's. Panel A and B of the mentioned tables exhibit high correlation factors between some independent variables of small and medium-size firms which may indicate a collinearity problem. On the top of that, calculating the Variance Inflation Factor (VIF) raises the doubts of possible multicollinearity issues with high VIF factors that reach 34.31 and 37.5 for the book value of equity for small and medium firms as panel A of Table 21 shows. Nonetheless, if a multicollinearity problem is detected between two independent variables that are not the focal interest of the research thesis, the issue can be ignored (Wooldridge, 2013). Given that the interaction terms between IR and each of equity book value and earnings (the focal interest of this thesis) are relatively high, I use an alternative method (Seemingly Unrelated Regressions – SUR) to check whether the possible existence of multicollinearity impacts the regression results. The results in Appendix B - 10.2 suggest the robustness of the regression findings reported in Table 28 to the possible existence of a multicollinearity problem among some independent variables.

Table 16 Summary statistics of firms (Ranking method – 2008:2013)

Panel A – Small-size firms

|       | Mean  | Median | S.D.  | Min   | Max    | Skew  | Kurt  |
|-------|-------|--------|-------|-------|--------|-------|-------|
| P6    | 3.11  | 1.01   | 5.79  | 0.09  | 49.5   | 4.5   | 29.6  |
| BVS   | 6.84  | 1.04   | 19.24 | 0.03  | 123.5  | 4.32  | 21.8  |
| EPS   | 1.2   | 0.19   | 4.86  | -6.87 | 41.23  | 5.75  | 39.9  |
| LOSS  | 0.2   | 0      | 0.4   | 0     | 1      | 1.53  | 3.33  |
| LEV   | 0.43  | 0.42   | 0.21  | 0.07  | 0.89   | 0.33  | 2.52  |
| ROE   | 0.15  | 0.18   | 0.32  | -0.77 | 1.66   | 0.23  | 8.44  |
| SIZE  | 12.5  | 12.6   | 1.14  | 10.5  | 14.88  | -0.27 | 2.15  |
| N     | 300   |        |       |       |        |       |       |

Panel B – Medium-size firms

|       | Mean  | Median | S.D.  | Min   | Max    | Skew  | Kurt  |
|-------|-------|--------|-------|-------|--------|-------|-------|
| P6    | 21.6  | 9.37   | 28.94 | 0.42  | 155    | 2.29  | 8.18  |
| BVS   | 11    | 6.2    | 12.13 | 0.42  | 59.88  | 1.77  | 5.54  |
| EPS   | 3.28  | 1.41   | 4.44  | -5.64 | 19.53  | 1.94  | 6.28  |
| LOSS  | 0.04  | 0      | 0.2   | 0     | 1      | 4.6   | 22.2  |
| LEV   | 0.48  | 0.47   | 0.17  | 0.07  | 0.86   | 0.1   | 2.26  |
| ROE   | 0.29  | 0.28   | 0.22  | -0.53 | 1.66   | 1.59  | 11.1  |
| SIZE  | 14.7  | 14.6   | 0.89  | 12.8  | 16.62  | 0.06  | 2.27  |
| N     | 314   |        |       |       |        |       |       |

Panel C – Large-size firms

|       | Mean  | Median | S.D.  | Min   | Max    | Skew  | Kurt  |
|-------|-------|--------|-------|-------|--------|-------|-------|
| P6    | 104   | 69.77  | 104.2 | 3.59  | 460.6  | 1.88  | 6.3   |
| BVS   | 42.3  | 26.55  | 44.26 | 1.12  | 206.1  | 1.94  | 6.94  |
| EPS   | 10.4  | 6.52   | 12.98 | -6.87 | 59.41  | 2.27  | 8.27  |
| LOSS  | 0.05  | 0      | 0.22  | 0     | 1      | 4.16  | 18.3  |
| LEV   | 0.5   | 0.51   | 0.18  | 0.07  | 0.89   | -0.08 | 2.46  |
| ROE   | 0.37  | 0.29   | 0.37  | -0.77 | 1.66   | 1.47  | 7.29  |
| SIZE  | 16.8  | 16.8   | 1.04  | 14.5  | 19.01  | 0.14  | 2.13  |
| N     | 304   |        |       |       |        |       |       |

Table 17 Summary statistics of firms (Ranking method – 2008:2016)

|  | Mean | Median | S.D. | Min | Max | Skew | Kurt |
|---|---|---|---|---|---|---|---|
| Panel A – Small-size firms | | | | | | | |
| P6 | 3.27 | 1.15 | 6.17 | 0.09 | 62 | 4.79 | 34.6 |
| BVS | 7.37 | 1.15 | 20.04 | 0.03 | 123.5 | 4.12 | 19.8 |
| EPS | 0.99 | 0.18 | 4.34 | -6.87 | 41.23 | 5.93 | 45.3 |
| LOSS | 0.23 | 0 | 0.42 | 0 | 1 | 1.27 | 2.61 |
| LEV | 0.43 | 0.42 | 0.2 | 0.07 | 0.89 | 0.38 | 2.54 |
| ROE | 0.12 | 0.16 | 0.32 | -0.77 | 1.66 | 0.2 | 8.23 |
| SIZE | 12.63 | 12.73 | 1.21 | 10.5 | 16.47 | -0.12 | 2.55 |
| N | 452 | | | | | | |
| Panel B – Medium-size firms | | | | | | | |
| P6 | 24.49 | 10.77 | 37.22 | 0.25 | 344 | 3.65 | 22.5 |
| BVS | 13.43 | 7.32 | 15.46 | 0.24 | 95.65 | 1.91 | 6.59 |
| EPS | 3.37 | 1.55 | 4.81 | -6.87 | 26.03 | 1.95 | 6.9 |
| LOSS | 0.05 | 0 | 0.22 | 0 | 1 | 3.98 | 16.9 |
| LEV | 0.48 | 0.46 | 0.17 | 0.07 | 0.86 | 0.09 | 2.29 |
| ROE | 0.26 | 0.25 | 0.21 | -0.53 | 1.66 | 1.28 | 10.5 |
| SIZE | 14.82 | 14.73 | 0.99 | 12.6 | 18.07 | 0.28 | 2.75 |
| N | 470 | | | | | | |
| Panel C – Large-size firms | | | | | | | |
| P6 | 112.3 | 75.83 | 106.3 | 3.59 | 460.6 | 1.67 | 5.42 |
| BVS | 46.61 | 29.3 | 47.61 | 1.12 | 206.1 | 1.74 | 5.84 |
| EPS | 10.4 | 6.69 | 12.94 | -6.87 | 59.41 | 2.3 | 8.61 |
| LOSS | 0.05 | 0 | 0.22 | 0 | 1 | 4 | 17 |
| LEV | 0.5 | 0.51 | 0.18 | 0.07 | 0.89 | -0.09 | 2.53 |
| ROE | 0.33 | 0.27 | 0.33 | -0.77 | 1.66 | 1.53 | 8.54 |
| SIZE | 16.93 | 16.9 | 1.05 | 14.4 | 19.01 | 0.05 | 2.22 |
| N | 455 | | | | | | |

Table 18 Correlation matrix for Ranking-Size firms (2008-2013)

**Panel A – Small Firms**

|      | PR6       | IR        | BVS       | EPS       | LOSS      | LEV       | ROE       | SIZE      |
|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| PR6  | 1         | 0.078     | 0.874***  | 0.798***  | -0.128*   | -0.137*   | 0.125*    | 0.425***  |
| IR   | 0.0958    | 1         | 0.0562    | -0.0673   | 0.130*    | -0.0572   | -0.201*** | 0.104     |
| BVS  | 0.564***  | 0.0412    | 1         | 0.801***  | -0.115*   | -0.201*** | -0.0422   | 0.539***  |
| EPS  | 0.435***  | -0.0274   | 0.782***  | 1         | -0.308*** | -0.126*   | 0.370***  | 0.329***  |
| LOSS | -0.153**  | 0.0587    | -0.0462   | -0.185**  | 1         | 0.0842    | -0.394*** | -0.00403  |
| LEV  | -0.156**  | -0.0485   | -0.278*** | -0.216*** | 0.0461    | 1         | 0.121*    | 0.252***  |
| ROE  | 0.0622    | -0.0563   | 0.0266    | 0.142*    | -0.700*** | 0.0488    | 1         | -0.109    |
| SIZE | 0.278***  | 0.0823    | 0.156**   | 0.0639    | -0.167**  | 0.260***  | 0.0658    | 1         |

**Panel B – Medium Size firms**

|      | PR6       | IR        | BVS       | EPS       | LOSS      | LEV       | ROE       | SIZE      |
|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| PR6  | 1         | 0.126*    | 0.808***  | 0.877***  | -0.0741   | 0.288***  | 0.425***  | 0.218***  |
| IR   | 0.122*    | 1         | 0.0885    | -0.0365   | 0.0217    | -0.0822   | -0.207*** | 0.171**   |
| BVS  | 0.705***  | 0.0652    | 1         | 0.799***  | -0.0614   | 0.245***  | 0.0391    | 0.510***  |
| EPS  | 0.793***  | -0.026    | 0.855***  | 1         | -0.177**  | 0.364***  | 0.577***  | 0.285***  |
| LOSS | -0.126*   | 0.0493    | -0.0939   | -0.199*** | 1         | 0.00103   | -0.134*   | 0.018     |
| LEV  | 0.223***  | -0.0729   | 0.174**   | 0.303***  | -0.107    | 1         | 0.374***  | 0.379***  |
| ROE  | 0.363***  | -0.164**  | 0.0185    | 0.372***  | -0.401*** | 0.444***  | 1         | -0.190*** |
| SIZE | 0.148**   | 0.144*    | 0.461***  | 0.336***  | 0.056     | 0.371***  | -0.202*** | 1         |

**Panel C – Large Size firms**

|      | PR6       | IR        | BVS       | EPS       | LOSS      | LEV       | ROE       | SIZE      |
|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| PR6  | 1         | 0.217***  | 0.697***  | 0.532***  | 0.0614    | -0.264*** | -0.00909  | 0.372***  |
| IR   | 0.137*    | 1         | 0.173**   | -0.0459   | 0.111     | -0.0482   | -0.195*** | 0.166**   |
| BVS  | 0.650***  | 0.131*    | 1         | 0.342***  | 0.109     | -0.419*** | -0.513*** | 0.655***  |
| EPS  | 0.634***  | 0.0265    | 0.556***  | 1         | -0.273*** | -0.0439   | 0.450***  | 0.119*    |
| LOSS | -0.00688  | 0.0744    | 0.061     | -0.248*** | 1         | -0.0596   | -0.203*** | 0.119*    |
| LEV  | -0.210*** | -0.0396   | -0.313*** | -0.105    | 0.0379    | 1         | 0.349***  | 0.0306    |
| ROE  | 0.0181    | -0.151**  | -0.321*** | 0.319***  | -0.367*** | 0.324***  | 1         | -0.439*** |
| SIZE | 0.488***  | 0.138*    | 0.671***  | 0.394***  | 0.176**   | -0.0307   | -0.326*** | 1         |

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Table 19 Correlation matrix for Ranking-Size firms (2008-2016)

**Panel A – Small Firms**

|      | PR6 | IR | BVS | EPS | LOSS | LEV | ROE | SIZE |
|------|-----|-----|-----|-----|------|-----|-----|------|
| PR6  | 1 | 0.0601 | 0.865*** | 0.758*** | -0.188*** | -0.150** | 0.114* | 0.377*** |
| IR   | 0.0816 | 1 | 0.0949* | -0.0657 | 0.0796 | -0.0233 | -0.236*** | 0.240*** |
| BVS  | 0.569*** | 0.0463 | 1 | 0.748*** | -0.127** | -0.195*** | -0.0759 | 0.513*** |
| EPS  | 0.390*** | -0.055 | 0.701*** | 1 | -0.366*** | -0.122** | 0.383*** | 0.279*** |
| LOSS | -0.146** | 0.0984* | -0.0492 | -0.225*** | 1 | 0.0583 | -0.425*** | -0.0457 |
| LEV  | -0.158*** | -0.0306 | -0.270*** | -0.198*** | 0.00447 | 1 | 0.139** | 0.281*** |
| ROE  | 0.0473 | -0.102* | 0.0125 | 0.171*** | -0.707*** | 0.0383 | 1 | -0.134** |
| SIZE | 0.257*** | 0.154** | 0.159*** | 0.0449 | -0.121* | 0.293*** | -0.00338 | 1 |

**Panel B – Medium Size firms**

|      | PR6 | IR | BVS | EPS | LOSS | LEV | ROE | SIZE |
|------|-----|-----|-----|-----|------|-----|-----|------|
| PR6  | 1 | 0.121** | 0.785*** | 0.823*** | -0.021 | 0.240*** | 0.382*** | 0.191*** |
| IR   | 0.122** | 1 | 0.176*** | -0.0218 | 0.0415 | -0.0538 | -0.268*** | 0.266*** |
| BVS  | 0.627*** | 0.146** | 1 | 0.724*** | 0.0196 | 0.218*** | -0.0154 | 0.546*** |
| EPS  | 0.783*** | -0.00355 | 0.719*** | 1 | -0.153*** | 0.324*** | 0.574*** | 0.212*** |
| LOSS | -0.0984* | 0.0683 | 0.0112 | -0.250*** | 1 | 0.0609 | -0.178*** | 0.0957* |
| LEV  | 0.180*** | -0.0641 | 0.115* | 0.272*** | -0.0705 | 1 | 0.330*** | 0.382*** |
| ROE  | 0.303*** | -0.224*** | -0.0539 | 0.395*** | -0.467*** | 0.390*** | 1 | -0.241*** |
| SIZE | 0.109* | 0.213*** | 0.490*** | 0.234*** | 0.162*** | 0.372*** | -0.249*** | 1 |

**Panel C – Large Size firms**

|      | PR6 | IR | BVS | EPS | LOSS | LEV | ROE | SIZE |
|------|-----|-----|-----|-----|------|-----|-----|------|
| PR6  | 1 | 0.201*** | 0.699*** | 0.561*** | 0.0148 | -0.174*** | 0.0171 | 0.362*** |
| IR   | 0.150** | 1 | 0.185*** | -0.0161 | 0.130** | -0.00067 | -0.195*** | 0.209*** |
| BVS  | 0.687*** | 0.151** | 1 | 0.343*** | 0.0897 | -0.346*** | -0.505*** | 0.663*** |
| EPS  | 0.601*** | 0.0216 | 0.553*** | 1 | -0.240*** | 0.0541 | 0.461*** | 0.111* |
| LOSS | -0.0435 | 0.0619 | 0.0753 | -0.262*** | 1 | 0.0151 | -0.173*** | 0.114* |
| LEV  | -0.164*** | -0.0197 | -0.285*** | -0.0543 | -0.0372 | 1 | 0.339*** | 0.0846 |
| ROE  | -0.0185 | -0.193*** | -0.339*** | 0.291*** | -0.381*** | 0.317*** | 1 | -0.458*** |
| SIZE | 0.477*** | 0.172*** | 0.670*** | 0.376*** | 0.153** | 0.0216 | -0.355*** | 1 |

* p<0.05,  ** p<0.01,  *** p<0.001

Table 20 VIF of the regression variables – Ranking method (2008-2013)

**Panel A – with the interaction term**

|  | Small | Medium | Large |
|---|---|---|---|
| BVS | 25.28 | 17.16 | 6.06 |
| EPS | 16.07 | 14.17 | 4.66 |
| IR | 3.29 | 4.32 | 4.31 |
| IRxBVS | 14.02 | 15.17 | 5.67 |
| IRxEPS | 7.54 | 10.55 | 4.58 |
| LOSS | 2.49 | 1.64 | 3.14 |
| LOSSxEPS | 2.53 | 1.51 | 3.22 |
| LEV | 1.42 | 2.13 | 1.55 |
| ROE | 2.18 | 3.18 | 2.55 |
| SIZE | 1.56 | 2.21 | 2.8 |

**Panel B – without the interaction term**

|  | Small | Medium | Large |
|---|---|---|---|
| BVS | 6.29 | 6.99 | 3.5 |
| EPS | 5.15 | 7.55 | 2.78 |
| LOSS | 2.48 | 1.64 | 3.12 |
| LOSSxEPS | 2.48 | 1.49 | 3.12 |
| LEV | 1.41 | 2.13 | 1.54 |
| ROE | 2.17 | 3.1 | 2.51 |
| SIZE | 1.49 | 2.17 | 2.77 |

Table 21 VIF of the regression variables – Ranking method (2008-2016)

**Panel A – with the interaction term**

|  | Small | Medium | Large |
|---|---|---|---|
| BVS | 34.31 | 37.5 | 9.37 |
| EPS | 16.07 | 22.33 | 6.54 |
| IR | 4.37 | 5.55 | 5.42 |
| IRxBVS | 24.57 | 36.4 | 8.71 |
| IRxEPS | 9.34 | 17.92 | 6.29 |
| LOSS | 2.44 | 1.93 | 3.26 |
| LOSSxEPS | 2.45 | 2.02 | 3.25 |
| LEV | 1.38 | 1.99 | 1.55 |
| ROE | 2.17 | 2.85 | 2.57 |
| SIZE | 1.63 | 2.4 | 2.79 |

**Panel B – without the interaction term**

|  | Small | Medium | Large |
|---|---|---|---|
| BVS | 4.54 | 4.32 | 3.53 |
| EPS | 3.62 | 4.21 | 2.64 |
| LOSS | 2.43 | 1.91 | 3.26 |
| LOSSxEPS | 2.32 | 1.98 | 3.17 |
| LEV | 1.37 | 1.99 | 1.52 |
| ROE | 2.16 | 2.59 | 2.44 |
| SIZE | 1.58 | 2.34 | 2.74 |

### 5.5.2 Descriptive Statistics – JSE Method

Similar to the descriptive statistics in the previous section, Table 22 and Table 23 list the summary statistics for the dependent, independent, and controlling variables for the periods 2008-2013 and 2008-2016 respectively using JSE method. The mean is also larger than the median the smaller the category of a firm is for the price, equity book value and earnings variables. Furthermore, the values of skewness are more than +1 for the mentioned variables suggesting positively skewed distributions. Yet, the distribution of the variables related to the size of a firm in addition to the leverage appear to follow the normal distribution qualities.

Table 24 and Table 25 list the correlation matrix for small, medium, and large firms over for the periods 2008 – 2013 and 2008 – 2016 respectively. Above the diagonal are the correlation coefficients as per Spearman's method while the ones bellow it follows Pearson's. Panel A and B of the mentioned tables exhibit high correlation factors between some independent variables of small firms which may indicate a collinearity problem. On the top of that, calculating the Variance Inflation Factor (VIF) raises the doubts of possible multicollinearity issues with high VIF factors that reach 17.75 and 30.3 for the book value of equity for small over firms over the examined periods as panel A of

Table 26 and Table 27 show. Similar to the procedure followed in section 5.5.1, I use Seemingly Unrelated Regressions to check whether the possible existence of multicollinearity impacts the regression results. The results in Appendix B - 10.2 also suggest the robustness of the regression findings reported in Table 29 to the possible existence of a multicollinearity problem among some independent variables.

Table 22 Summary statistics of firms as per JSE indices for the period 2008-2013

| Panel A – Small-size firms | | | | | | |
|---|---|---|---|---|---|---|
| | Mean | Median | S.D. | Min | Max | Skew | Kurt |
| P6 | 11.28 | 3.5 | 21.59 | 0.09 | 155 | 3.56 | 17.4 |
| BVS | 8.56 | 2.59 | 16.2 | 0.03 | 123.5 | 3.97 | 21.9 |
| EPS | 2.11 | 0.54 | 4.75 | -6.87 | 41.23 | 3.96 | 23.7 |
| LOSS | 0.13 | 0 | 0.33 | 0 | 1 | 2.26 | 6.13 |
| LEV | 0.45 | 0.44 | 0.19 | 0.07 | 0.89 | 0.17 | 2.44 |
| ROE | 0.22 | 0.22 | 0.29 | -0.77 | 1.66 | 0.33 | 9.25 |
| SIZE | 13.45 | 13.53 | 1.45 | 10.5 | 16.41 | -0.3 | 2.51 |
| N | 575 | | | | | | |

| Panel B – Medium-size firms | | | | | | |
|---|---|---|---|---|---|---|
| | Mean | Median | S.D. | Min | Max | Skew | Kurt |
| P6 | 49.07 | 37.42 | 37.25 | 3.05 | 202 | 1.35 | 4.72 |
| BVS | 22.49 | 16.57 | 22.85 | 1.12 | 173.4 | 3.12 | 18.4 |
| EPS | 5.58 | 4.26 | 5.3 | -6.87 | 32.59 | 1.32 | 6.52 |
| LOSS | 0.04 | 0 | 0.2 | 0 | 1 | 4.59 | 22 |
| LEV | 0.52 | 0.52 | 0.18 | 0.11 | 0.89 | -0.1 | 2.27 |
| ROE | 0.35 | 0.3 | 0.3 | -0.77 | 1.66 | 1.32 | 8.96 |
| SIZE | 16.16 | 16.11 | 0.84 | 14.3 | 18.13 | 0.22 | 2.48 |
| N | 216 | | | | | | |

| Panel C – Large-size firms | | | | | | |
|---|---|---|---|---|---|---|
| | Mean | Median | S.D. | Min | Max | Skew | Kurt |
| P6 | 175.7 | 145.58 | 123.9 | 12.6 | 460.6 | 0.97 | 3.12 |
| BVS | 67.6 | 60.41 | 52.75 | 1.46 | 206.1 | 1.15 | 3.91 |
| EPS | 16.64 | 10.17 | 17.17 | -6.87 | 59.41 | 1.29 | 3.69 |
| LOSS | 0.05 | 0 | 0.21 | 0 | 1 | 4.27 | 19.2 |
| LEV | 0.45 | 0.45 | 0.18 | 0.07 | 0.86 | 0.02 | 2.78 |
| ROE | 0.38 | 0.27 | 0.43 | -0.71 | 1.66 | 1.54 | 6.12 |
| SIZE | 17.53 | 17.69 | 0.91 | 15.3 | 19.01 | -0.5 | 2.68 |
| N | 127 | | | | | | |

Table 23 Summary statistics of firms as per JSE indices for the period 2008-2016

<div align="center">Panel A – Small-size firms</div>

|      | Mean  | Median | S.D.  | Min   | Max    | Skew  | Kurt  |
|------|-------|--------|-------|-------|--------|-------|-------|
| P6   | 13.28 | 3.9    | 28.68 | 0.09  | 344    | 5.16  | 41.25 |
| BVS  | 10.14 | 3.07   | 18.21 | 0.03  | 123.47 | 3.32  | 15.59 |
| EPS  | 2.12  | 0.53   | 4.74  | -6.87 | 41.23  | 3.48  | 19.42 |
| LOSS | 0.14  | 0      | 0.35  | 0     | 1      | 2.02  | 5.08  |
| LEV  | 0.45  | 0.44   | 0.19  | 0.07  | 0.89   | 0.2   | 2.47  |
| ROE  | 0.19  | 0.2    | 0.28  | -0.77 | 1.66   | 0.15  | 9.21  |
| SIZE | 13.65 | 13.74  | 1.53  | 10.45 | 18.07  | -0.2  | 2.65  |
| N    | 878   |        |       |       |        |       |       |

<div align="center">Panel B – Medium-size firms</div>

|      | Mean  | Median | S.D.  | Min   | Max    | Skew  | Kurt  |
|------|-------|--------|-------|-------|--------|-------|-------|
| P6   | 59.66 | 44.38  | 46.95 | 3.05  | 267.59 | 1.25  | 4.41  |
| BVS  | 27.6  | 19.38  | 27.17 | 1.12  | 173.38 | 2.02  | 8.28  |
| EPS  | 6.06  | 4.64   | 6.2   | -6.87 | 47.89  | 1.73  | 10.21 |
| LOSS | 0.06  | 0      | 0.24  | 0     | 1      | 3.65  | 14.32 |
| LEV  | 0.52  | 0.52   | 0.18  | 0.11  | 0.89   | -0.11 | 2.27  |
| ROE  | 0.32  | 0.28   | 0.27  | -0.77 | 1.66   | 1.26  | 8.95  |
| SIZE | 16.37 | 16.31  | 0.89  | 14.26 | 18.54  | 0.08  | 2.43  |
| N    | 325   |        |       |       |        |       |       |

<div align="center">Panel C – Large-size firms</div>

|      | Mean   | Median | S.D.   | Min   | Max    | Skew  | Kurt  |
|------|--------|--------|--------|-------|--------|-------|-------|
| P6   | 190    | 165.67 | 127.14 | 12.55 | 460.6  | 0.74  | 2.57  |
| BVS  | 74.59  | 64.69  | 58.11  | 1.46  | 206.09 | 0.98  | 3.11  |
| EPS  | 16.86  | 10.35  | 17.47  | -6.87 | 59.41  | 1.33  | 3.76  |
| LOSS | 0.04   | 0      | 0.2    | 0     | 1      | 4.68  | 22.9  |
| LEV  | 0.46   | 0.46   | 0.16   | 0.07  | 0.86   | -0.14 | 2.93  |
| ROE  | 0.34   | 0.25   | 0.38   | -0.71 | 1.66   | 1.74  | 7.45  |
| SIZE | 17.66  | 17.84  | 0.93   | 15.26 | 19.01  | -0.58 | 2.74  |
| N    | 174    |        |        |       |        |       |       |

Table 24 Correlation matrix for JSE-Size firms (2008-2013)

**Panel A – Small Firms**

|      | PR6 | IR | BVS | EPS | LOSS | LEV | ROE | SIZE |
|------|-----|-----|-----|-----|------|-----|-----|------|
| PR6  | 1 | 0.127** | 0.856*** | 0.874*** | -0.227*** | 0.148*** | 0.381*** | 0.606*** |
| IR   | 0.121** | 1 | 0.0674 | 0.0231 | 0.0113 | -0.0372 | -0.0706 | 0.0907* |
| BVS  | 0.443*** | 0.066 | 1 | 0.831*** | -0.163*** | 0.0433 | 0.115** | 0.647*** |
| EPS  | 0.590*** | -0.00436 | 0.793*** | 1 | -0.306*** | 0.161*** | 0.533*** | 0.523*** |
| LOSS | -0.166*** | 0.0479 | -0.0799 | -0.222*** | 1 | 0.00882 | -0.305*** | -0.133** |
| LEV  | 0.163*** | -0.043 | -0.114** | 0.0292 | -0.0329 | 1 | 0.265*** | 0.316*** |
| ROE  | 0.297*** | -0.0873* | 0.0521 | 0.267*** | -0.641*** | 0.216*** | 1 | 0.0865* |
| SIZE | 0.360*** | 0.0996* | 0.250*** | 0.261*** | -0.227*** | 0.312*** | 0.150*** | 1 |

**Panel B – Medium Size firms**

|      | PR6 | IR | BVS | EPS | LOSS | LEV | ROE | SIZE |
|------|-----|-----|-----|-----|------|-----|-----|------|
| PR6  | 1 | 0.198** | 0.688*** | 0.671*** | -0.0194 | 0.0789 | 0.140* | 0.153* |
| IR   | 0.214** | 1 | 0.156* | -0.0707 | 0.0794 | -0.0937 | -0.209** | 0.168* |
| BVS  | 0.499*** | 0.112 | 1 | 0.443*** | -0.0196 | -0.129 | -0.422*** | 0.455*** |
| EPS  | 0.742*** | -0.0706 | 0.590*** | 1 | -0.229*** | 0.147* | 0.477*** | -0.00353 |
| LOSS | -0.117 | 0.164* | 0.108 | -0.359*** | 1 | 0.0137 | -0.0767 | 0.0355 |
| LEV  | 0.0271 | -0.055 | -0.109 | 0.122 | 0.0253 | 1 | 0.317*** | 0.430*** |
| ROE  | 0.0326 | -0.178** | -0.341*** | 0.177** | -0.389*** | 0.403*** | 1 | -0.385*** |
| SIZE | 0.0711 | 0.226*** | 0.500*** | 0.11 | 0.312*** | 0.389*** | -0.285*** | 1 |

**Panel C – Large Size firms**

|      | PR6 | IR | BVS | EPS | LOSS | LEV | ROE | SIZE |
|------|-----|-----|-----|-----|------|-----|-----|------|
| PR6  | 1 | 0.204* | 0.626*** | 0.268** | -0.157 | -0.306*** | -0.125 | 0.326*** |
| IR   | 0.221* | 1 | 0.142 | 0.117 | -0.184* | -0.0596 | -0.044 | 0.0976 |
| BVS  | 0.537*** | 0.220* | 1 | 0.180* | -0.118 | -0.453*** | -0.584*** | 0.795*** |
| EPS  | 0.508*** | 0.0988 | 0.430*** | 1 | -0.392*** | -0.0326 | 0.467*** | 0.119 |
| LOSS | 0.0623 | -0.0655 | 0.0688 | -0.270** | 1 | 0.101 | -0.00781 | -0.0468 |
| LEV  | -0.133 | -0.0917 | -0.301*** | -0.0507 | 0.0751 | 1 | 0.373*** | -0.0743 |
| ROE  | 0.00656 | -0.122 | -0.400*** | 0.430*** | -0.333*** | 0.278** | 1 | -0.522*** |
| SIZE | 0.357*** | 0.154 | 0.612*** | 0.296*** | 0.0981 | -0.0977 | -0.464*** | 1 |

* p<0.05,  ** p<0.01,  *** p<0.001

Table 25 Correlation matrix for JSE-Size firms (2008-2016)

**Panel A – Small Firms**

|      | PR6       | IR        | BVS       | EPS       | LOSS      | LEV      | ROE      | SIZE     |
|------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|
| PR6  | 1         | 0.0947**  | 0.850***  | 0.854***  | -0.192*** | 0.122*** | 0.360*** | 0.586*** |
| IR   | 0.112***  | 1         | 0.0825*   | -0.0169   | 0.0332    | -0.0445  | -0.140***| 0.111*** |
| BVS  | 0.472***  | 0.101**   | 1         | 0.801***  | -0.143*** | 0.0458   | 0.0856*  | 0.657*** |
| EPS  | 0.641***  | -0.00236  | 0.717***  | 1         | -0.306*** | 0.144*** | 0.528*** | 0.502*** |
| LOSS | -0.155*** | 0.0698*   | -0.0871** | -0.265*** | 1         | -0.0111  | -0.332***| -0.109** |
| LEV  | 0.133***  | -0.0356   | -0.0965** | 0.0509    | -0.0455   | 1        | 0.246*** | 0.325*** |
| ROE  | 0.245***  | -0.134*** | 0.0357    | 0.300***  | -0.666*** | 0.176*** | 1        | 0.0469   |
| SIZE | 0.319***  | 0.157***  | 0.309***  | 0.266***  | -0.210*** | 0.321*** | 0.0956** | 1        |

**Panel B – Medium Size firms**

|      | PR6       | IR        | BVS       | EPS       | LOSS      | LEV      | ROE      | SIZE      |
|------|-----------|-----------|-----------|-----------|-----------|----------|----------|-----------|
| PR6  | 1         | 0.207***  | 0.669***  | 0.643***  | 0.0451    | 0.065    | 0.131*   | 0.170**   |
| IR   | 0.280***  | 1         | 0.145**   | -0.0187   | 0.1       | -0.0582  | -0.138*  | 0.202***  |
| BVS  | 0.491***  | 0.200***  | 1         | 0.359***  | 0.212***  | -0.165** | -0.460***| 0.515***  |
| EPS  | 0.689***  | 0.013     | 0.516***  | 1         | -0.226*** | 0.197*** | 0.495*** | -0.0126   |
| LOSS | -0.139*   | 0.155**   | 0.198***  | -0.391*** | 1         | -0.059   | -0.233***| 0.219***  |
| LEV  | 0.0514    | -0.0446   | -0.176**  | 0.134*    | -0.104    | 1        | 0.337*** | 0.355***  |
| ROE  | 0.0387    | -0.204*** | -0.383*** | 0.186***  | -0.428*** | 0.409*** | 1        | -0.426*** |
| SIZE | 0.133*    | 0.310***  | 0.554***  | 0.161**   | 0.290***  | 0.314*** | -0.335***| 1         |

**Panel C – Large Size firms**

|      | PR6       | IR        | BVS       | EPS       | LOSS      | LEV      | ROE      | SIZE      |
|------|-----------|-----------|-----------|-----------|-----------|----------|----------|-----------|
| PR6  | 1         | 0.287***  | 0.655***  | 0.298***  | 0.0572    | -0.265***| -0.146   | 0.321***  |
| IR   | 0.249***  | 1         | 0.210**   | 0.162*    | 0.0792    | 0.0351   | -0.0774  | 0.173*    |
| BVS  | 0.616***  | 0.244**   | 1         | 0.189*    | 0.0609    | -0.394***| -0.583***| 0.767***  |
| EPS  | 0.459***  | 0.0824    | 0.443***  | 1         | -0.212**  | 0.036    | 0.481*** | 0.0941    |
| LOSS | 0.0689    | -0.0811   | 0.066     | -0.251*** | 1         | 0.0449   | -0.141   | 0.0402    |
| LEV  | -0.139    | -0.0261   | -0.273*** | -0.0255   | 0.0525    | 1        | 0.344*** | -0.00621  |
| ROE  | -0.0729   | -0.174*   | -0.410*** | 0.391***  | -0.325*** | 0.248*** | 1        | -0.535*** |
| SIZE | 0.365***  | 0.228**   | 0.620***  | 0.278***  | 0.0649    | -0.0389  | -0.486***| 1         |

* p<0.05, ** p<0.01, *** p<0.001

Table 26 VIF of the regression variables – JSE method (2008-2013)

**Panel A – with the interaction term**

|         | Small | Medium | Large |
|---------|-------|--------|-------|
| BVS     | 17.8  | 5.35   | 6.74  |
| EPS     | 13.2  | 5.39   | 5.64  |
| IR      | 3.46  | 4.78   | 6.48  |
| IRxBVS  | 12.5  | 6.33   | 7.09  |
| IRxEPS  | 7.97  | 6.93   | 4.45  |
| LOSS    | 2.23  | 3.24   | 3.45  |
| LOSSxEPS| 1.97  | 3.56   | 3.51  |
| LEV     | 1.37  | 2.52   | 1.52  |
| ROE     | 2.13  | 2.31   | 4.43  |
| SIZE    | 1.45  | 3.11   | 3.64  |

**Panel B – without the interaction term**

|         | Small | Medium | Large |
|---------|-------|--------|-------|
| BVS     | 5     | 4.44   | 3.33  |
| EPS     | 4.82  | 3.31   | 3.67  |
| LOSS    | 2.21  | 3.21   | 3.35  |
| LOSSxEPS| 1.96  | 3.29   | 3.32  |
| LEV     | 1.36  | 2.35   | 1.42  |
| ROE     | 2.07  | 2.27   | 4.26  |
| SIZE    | 1.45  | 3      | 3.58  |

Table 27 VIF of the regression variables – JSE method (2008-2016)

**Panel A – with the interaction term**

|          | Small | Medium | Large |
|----------|-------|--------|-------|
| BVS      | 30.3  | 9.7    | 10.6  |
| EPS      | 17.7  | 10.28  | 7.3   |
| IR       | 4.52  | 6.25   | 8.1   |
| IRxBVS   | 26.1  | 10.65  | 10.5  |
| IRxEPS   | 13.2  | 12.07  | 5.93  |
| LOSS     | 2.32  | 3.17   | 4.01  |
| LOSSxEPS | 1.99  | 3.22   | 4.06  |
| LEV      | 1.36  | 2.35   | 1.5   |
| ROE      | 2.19  | 2.33   | 4.1   |
| SIZE     | 1.58  | 3.1    | 3.51  |

**Panel B – without the interaction term**

|          | Small | Medium | Large |
|----------|-------|--------|-------|
| BVS      | 3.71  | 4.22   | 3.53  |
| EPS      | 3.57  | 2.86   | 3.3   |
| LOSS     | 2.3   | 3.15   | 3.88  |
| LOSSxEPS | 1.96  | 3.11   | 3.84  |
| LEV      | 1.35  | 2.29   | 1.39  |
| ROE      | 2.14  | 2.27   | 3.64  |
| SIZE     | 1.58  | 3.09   | 3.39  |

### 5.5.3   Regression results – Ranking Method

#### 5.5.3.1   Period 2008-2013

Table 28 exhibits the results of regressing accounting summary and its interaction with IR in addition to other control variables on the market price of equity according to firm size. The first four columns of Table 28 present the results for all, small, medium, and large firms respectively for the period 2008-2013. On the other hand, the last four columns replicate the categories in the first four columns but for the period 2008-2016. Regarding the outcomes for small firms over 2008-2013, book value seems to be value relevant – as the joint test for the coefficients BVS and IRxBVS confirms (F= 18.72; P<0.000). However, the effect of IR on the value relevance of book value is not significant as demonstrated in Table 28.

On the other hand, earnings appear not to be relevant to investors' decision when it is related to small size firms. The joint test of EPS and IRxEPS coefficients is not significant (F= 1.81; P>0.05) and there is no significant effect of IR on the value relevance of earnings as can be noticed from the coefficient and its t-test.

With respect to medium-size firms for the period 2008-2013, the book value is value relevant with a positive sum of coefficients ($\beta_1$+ $\beta_4$=0.41) and (F= 4.28; P<0.017). Nonetheless, IR seems to have a negative impact on the value relevance of equity book value ($\beta_4$= -0.68) for medium size firms at 5% (This finding cannot be supported using Quantile Regression (QR) as Table 45 shows). On the other hand, earnings are generally value relevant as the joint test confirms (F= 11.1; P<0.000) and IR does have a positive and significant effect on the value relevance of earnings ($\beta_5$= 3.37) at 1% (Similar findings are reported using QR showing ($\beta_5$= 3.25) at 1% as listed in Table 45).

Relating to the large size firms for the period 2008-2013, the book value seems not to be value relevant as the joint test exhibits (F= 0.54; P>0.05), nor does IR have a significant effect on the value relevance of equity book value. On the other hand, earnings seem to be value relevant as the joint test demonstrate (F= 8.6; P<0.000) but IR seems not to significantly affect the value relevance of earnings for large firms (The QR results do not show any significant effect of IR on accounting summary as demonstrated in Table 45).

Table 28 Regression analysis (SML firms – Ranking method)

| VARIABLES | 08-13 All | 08-13 Small | 08-13 Medium | 08-13 Large | 08-16 All | 08-16 Small | 08-16 Medium | 08-16 Large |
|---|---|---|---|---|---|---|---|---|
| BVS | 0.78 | 0.24*** | 1.09*** | 0.78 | 0.9 | 0.21** | 0.99** | 1.11 |
|  | (1.38) | (2.82) | (2.71) | (0.97) | (1.6) | (2.53) | (2.55) | (1.4) |
| EPS | 2.41* | -0.41* | 1.79 | 3.22*** | 2.27* | -0.28 | 2.33* | 3.10*** |
|  | (1.94) | (-1.80) | (1.52) | (3.28) | (1.77) | (-1.20) | (1.93) | (2.88) |
| IR | 13.78*** | 0.14 | 13.73*** | 35.10*** | 7.07 | -0.52 | 12.52*** | 24.71* |
|  | (3.57) | (0.28) | (3.8) | (3.04) | (1.4) | (-1.03) | (2.9) | (1.8) |
| **IRxBVS** (+/-) | **0.01** | **-0.07** | **-0.68**** | **-0.04** | **0.12** | **-0.05** | **-0.78**** | **0.08** |
|  | **(0.02)** | **(-1.18)** | **(-2.44)** | **(-0.10)** | **(0.28)** | **(-1.02)** | **(-2.14)** | **(0.17)** |
| **IRxEPS** (+/-) | **0.76** | **0.53** | **3.37**** | **0.05** | **0.37** | **0.41*** | **4.33**** | **-0.78** |
|  | **(0.49)** | **(1.53)** | **(3.52)** | **(0.03)** | **(0.23)** | **(1.72)** | **(2.89)** | **(-0.47)** |
| LOSS | 19.04*** | -0.68 | 6.84* | 3.84 | 16.55** | -1.30*** | 5.89 | -7.07 |
|  | (2.76) | (-1.30) | (1.69) | (0.17) | (2.46) | (-2.69) | (1.42) | (-0.35) |
| LOSSxEPS | -3.46 | 0.67 | -6.09*** | -13.16 | -0.03 | -0.23 | -11.50*** | -9.31* |
|  | (-0.47) | (1.12) | (-3.66) | (-1.59) | (-0.01) | (-0.33) | (-3.94) | (-1.67) |
| LEV | -10.97 | -2.45 | 18.78 | -72.41 | 0.31 | -2.76 | 19.31 | -46.78 |
|  | (-0.54) | (-1.30) | (1.65) | (-1.08) | (0.02) | (-1.56) | (1.47) | (-0.81) |
| ROE | 26.94** | 0.64 | 20.64 | 36.59 | 27.35** | 0.31 | 12.84 | 36.99 |
|  | (2.32) | (0.55) | (1.31) | (1.6) | (2.38) | (0.35) | (0.8) | (1.24) |
| SIZE | 8.28** | 1.14** | -6.46*** | 24.74 | 7.36** | 0.97** | -7.95*** | 17.48 |
|  | (2.38) | (2.46) | (-2.98) | (1.39) | (2.31) | (2.2) | (-3.09) | (1.13) |
| Constant | -117.90*** | -12.21** | 78.83*** | -392.34 | -109.97*** | -10.15* | 92.67*** | -309.26 |
|  | (-2.79) | (-2.25) | (2.7) | (-1.49) | (-2.72) | (-1.95) | (2.87) | (-1.35) |
| Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N firm/year | 918 | 300 | 314 | 304 | 1,377 | 452 | 470 | 455 |
| Adj. R^2 | 0.646 | 0.492 | 0.78 | 0.583 | 0.66 | 0.474 | 0.743 | 0.603 |

The signs next to the interaction terms suggests non-directional prediction for the impact of IR on value relevance of accounting summary. Firms are divided into small, medium, and large firms based on each year ranking in terms of the market value of a firm. Afterwards, firms are categorized into their size class according to their position regarding the 33.33 and 66.67 percentiles. Columns (1) and (5) represent pooling all the firms together (All) regardless of any size consideration for the periods 2008-2013 and 2008-2016 respectively. While columns (2), (3), (4) list the regression results during 2008-2013 for small, medium and large firms, columns (6), (7), (8) for small, medium and large firms during the period 2008-2016. Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0$.

### 5.5.3.2 Period 2008-2016

Similar to the previous period 2008-2013, the value relevance of equity book value is positive and significant for small firms – join test (F= 10.55; P<0.000) and IR does not significantly affect the value relevance of equity book value as coefficient is not significant at 5% ($\beta_4$= -0.05; P>0.05). Similarly, earnings are not value relevant – (F= 1.51; P>0.05) yet there is little evidence on the effect of IR on the value relevance of earnings as presented in Table 28 ($\beta_5$ = 0.41; 0.10>P>0.05).

In respect to medium size firms for the period 2008-2016, the book value of equity is value relevant with a positive sum of coefficient – ($\beta_1$+ $\beta_4$=0.21) and (F= 3.27; P<0.043). However, the introduction of IR has significantly and negatively affected the value relevance of equity book value ($\beta_4$= -0.78; P<0.035) which is also supported using QR Table 46). On the other hand, earnings are value relevant with a positive and significant sum of coefficients – ($\beta_2$+ $\beta_5$=6.66) and (F= 7.94; P<0.000). Moreover, IR appears to have significantly impacted the value relevance of earnings with a coefficient of ($\beta_5$ = 4.33) significant at 1% level which is also supported by QR in Table 46.

In relation to the large-size firms, despite that the individual coefficients of book value ($\beta_1$) and its interaction term with IR ($\beta_4$) are not value relevant even at 10%, their mutual effect is relevant – ($\beta_1$+ $\beta_4$=1.19) and (F= 3.71; P<0.030). However, the effect of IR on the value relevance of equity book value is not significant. On the other hand, earnings are relevant to investors decisions with a positive sum of coefficients at a significant level – ($\beta_2$+ $\beta_5$=2.33) and (F= 9.56; P<0.000). However, IR seems to have a negative but not significant effect on the value relevance of earnings (The QR results do not show any

significant effect of IR on accounting summary for large-size firms as demonstrated in Table 46).

As has been shown, IR seems to significantly affect the value relevance of accounting summary only for medium size firms in the two examined periods (2008-2013) and (2008-2016). While the equity book value is negatively and significantly affected by the introduction of IR over two periods at 5% level, earnings are positively and significantly affected by IR at 1% level for medium size firms. The value relevance of accounting summary for small and large firms, on the other hand, is not affected by the introduction of IR for these firms.

### 5.5.4 Regression results – JSE Method

#### 5.5.4.1 Period 2008-2013

Table 29 exhibits the results of regressing bottom-line numbers, its interaction with IR, and other control variables on the market price of equity. The table also shows the regression findings in respect to each size category following JSE classification. The first four columns of Table 29 present the results for all, small, medium, and large firms respectively for the period 2008-2013. On the other hand, the last four columns replicate the categories in the first four columns but for the period 2008-2016.

For the small-size firms, equity book value shows little evidence on its relevance to capital providers' investing decision. The sum of the coefficients on book value and its interaction term is negative ($\beta_1 + \beta_4 = -0.37$) and is insignificant on 5% level (F= 2.95; P>0.05). Furthermore, IR seems not to affect the value relevance of equity book value in small firms according to JSE classification. On the other hand, earnings show evidence

to be value relevant as the joint test confirms – ($\beta_2$+ $\beta_5$=6.66) and (F= 4.30; P<0.039). Moreover, IR appears to influence the value relevance of earnings significantly at 5% level (The QR results do not show any significant effect of IR on accounting summary for small-size firms as demonstrated in Table 48).

In respect to the medium-size firms, the book value of equity seems to be value relevant for JSE investors as the joint test exhibits – ($\beta_1$+ $\beta_4$=0.55) and (F= 10.96; P<0.000). The interaction term shows that IR has a significant and positive impact on the value relevance of equity book value for medium-size firms at 1% level which is also supported using QR as shown in Table 48. The earnings are also value relevant for medium-size investors as the joint test shows – ($\beta_2$+ $\beta_5$=5.89) and (F= 30.59; P<0.000). Nonetheless, IR seems not to significantly affect the value relevance of earnings for medium-size firms which is also confirmed using QR.

Regarding large-size firms, the results show that both of equity book value and earnings are not value relevant as the joint test confirm respectively – (F= 1.35; P>0.05) and (F= 2.7; P>0.05). Furthermore, IR seems not to significantly impact the value relevance of equity book value and earnings using either LSR or QR.

Table 29 Regression analysis (SML firms – JSE method)

| VARIABLES | 08-13 All | 08-13 Small | 08-13 Medium | 08-13 Large | 08-16 All | 08-16 Small | 08-16 Medium | 08-16 Large |
|---|---|---|---|---|---|---|---|---|
| BVS | 0.78 | -0.49** | -0.29** | 1.12 | 0.9 | -0.60** | -0.14 | 1.45* |
| | (1.38) | (-2.10) | (-2.53) | (1.33) | (1.6) | (-2.17) | (-0.83) | (1.75) |
| EPS | 2.41* | 2.58** | 5.76*** | 2.50* | 2.27* | 2.96** | 5.55*** | 2.52* |
| | (1.94) | (2.4) | (6.73) | (2.05) | (1.77) | (2.34) | (7.1) | (1.89) |
| IR | 13.78*** | 5.43*** | 17.80** | 103.96*** | 7.07 | 2.92 | 27.42*** | 79.25* |
| | (3.57) | (2.64) | (2.66) | (2.85) | (1.4) | (1.48) | (2.88) | (1.77) |
| **IRxBVS** (+/-) | **0.01** | **0.12** | **0.85***** | **-0.48** | **0.12** | **0.22** | **0.75***** | **-0.26** |
| | **(0.02)** | **(0.84)** | **(4.09)** | **(-1.41)** | **(0.28)** | **(1.25)** | **(3.1)** | **(-0.65)** |
| **IRxEPS** (+/-) | **0.76** | **1.72**** | **0.13** | **-0.37** | **0.37** | **2.95***** | **-0.81** | **-1.09** |
| | **(0.49)** | **(2.21)** | **(0.12)** | **(-0.22)** | **(0.23)** | **(3.1)** | **(-0.68)** | **(-0.66)** |
| LOSS | 19.04*** | 5.72 | 13.2 | 65.18 | 16.55** | 5.06 | -5.83 | 83.77 |
| | (2.76) | (1.65) | (1.49) | (1.2) | (2.46) | (1.54) | (-0.48) | (1.45) |
| LOSSxEPS | -3.46 | -6.19*** | -3.26 | -17.31 | -0.03 | -8.81*** | -5.43* | -14.59 |
| | (-0.47) | (-2.94) | (-1.49) | (-1.30) | (-0.01) | (-3.20) | (-1.98) | (-1.19) |
| LEV | -10.97 | 1.45 | 27.30* | -58.68 | 0.31 | 0.21 | 50.71** | -62.54 |
| | (-0.54) | (0.27) | (1.79) | (-0.57) | (0.02) | (0.04) | (2.45) | (-0.58) |
| ROE | 26.94** | 14.71* | -9.52 | 83.12 | 27.35** | 13.53* | -14.49* | 83.25 |
| | (2.32) | (1.89) | (-1.37) | (1.52) | (2.38) | (1.72) | (-1.69) | (1.2) |
| SIZE | 8.28** | 3.30*** | -8.67** | 43.92 | 7.36** | 2.56* | -12.80*** | 27.39 |
| | (2.38) | (2.85) | (-2.52) | (1.07) | (2.31) | (1.86) | (-3.58) | (0.67) |
| Constant | -117.90*** | -44.49*** | 134.35** | -774.98 | -109.97*** | -35.23* | 183.11*** | -517.55 |
| | (-2.79) | (-2.95) | (2.56) | (-1.13) | (-2.72) | (-1.85) | (3.34) | (-0.76) |
| Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N firm/year | 918 | 575 | 216 | 127 | 1,377 | 878 | 325 | 174 |
| Adj. R^2 | 0.646 | 0.532 | 0.753 | 0.451 | 0.66 | 0.57 | 0.672 | 0.486 |

The signs next to the interaction terms suggests non-directional prediction for the impact of IR on value relevance of accounting summary. Firms are allocated to small, medium, and large size categories following their listing on JSE indices. Firms that fall in the JSE Top40 are classified as large-size firms. On the other hand, firms that belong to JSE MidCap are categorized in the medium size class. All what is left after classifying firms into large and medium size companies are small-size firms. Columns (1) and (5) represent pooling all the firms together (All) regardless of any size consideration for the periods 2008-2013 and 2008-2016 respectively. While columns (2), (3), (4) list the regression results during 2008-2013 for small, medium, and large firms, columns (6), (7), (8) for small, medium and large firms during the period 2008-2016. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.

### 5.5.4.2  Period 2008-2016

For the small-size firms according to JSE classification, the book value seems not to be value relevant for JSE investors as the joint test confirm – (F= 2.48; P<0.05). Furthermore, there is no significant effect of introducing IR on the value relevance of equity book value for small-size firms at 5% level (No significant effect using QR). On the other hand, earnings are value relevant for investors as the joint test confirms – ($\beta_2$+ $\beta_5$=5.91) and (F= 5.21; P<0.007). Moreover, IR has positively and significantly affected the value relevance of earnings at 1% level (also supported using QR as Table 49 demonstrates).

In respect to the medium size firms, the equity book value seems to be value relevant to investors with positive sum of coefficients and as the joint test confirms – ($\beta_1$+ $\beta_4$=0.61) and (F= 4.98; P<0.010). Yet, IR positively and significantly affect the value relevance of equity book value at 1%. On the other hand, earnings are value relevant to investors with a positive sum of coefficients and as the joint test exhibits – ($\beta_2$+ $\beta_5$=4.74) and (F= 28.36; P<0.000). However, IR seems to have a negative but insignificant effect on the value relevance of earnings as also shown in Table 49 using QR.

Regarding the large-size firms, both of equity book value and earnings seem not to be significant for investors as the joint tests confirm respectively – (F= 2.08; P>0.05) and (F= 2.67; P>0.05). Furthermore, IR seems not to significantly impact the value relevance of accounting summary in large-size firms as also shown in Table 49 using QR.

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The results from regressing accounting summary and its interaction with IR according to JSE classification show that; IR has positively and significantly affected the value relevance of earnings for small firms and this effect is more evident on the period 2008-2016 with larger coefficient (2.95 in comparison to 1.72) at a highly significant level (1% in comparison to 5%). Furthermore, IR seems to significantly affect the value relevance of equity book value in both periods for medium-size firms. There are discrepancies between the findings of ranking classification in contrast to JSE classification which will be further investigated in the discussion section.

### 5.5.5 Further analyses

Assuming that Integrated Reporting's main function is to integrate financial and non-financial information to explain how value is created in an organization, it is essential to understand the impact of IR on integrating financial with non-financial information. In this regard, the financial information is represented by the accounting summary figures, whereas non-financial information is proxied by CSR reporting measured by firm performance on ESG scores. However, because of data scarcity of ESG reporting before 2010 in South Africa, it is not feasible to explore IR influence before 2011.

Nonetheless, given that the IIRC issued its framework in December 2013 in addition to the availability of ESG reporting starting from 2011, I explore the impact of IIRC's reporting guidelines on the level of integration between financial and non-financial information for the period 2011-2016. First, the impact of IR on the accounting summary is explored using ( under the ranking and JSE method for the period 2011-2016. Second, the integration between CSR reporting and accounting summary is compared between

the periods (2011-2013) and (2014-2016) to check whether the interaction terms are significantly different between the two periods.

Table 30 lists the results of regressing the stock market price on the independent variables following the ranking and JSE categorizing methods for the period 2011-2016. The periods (2011-2013) and (2014-2016) are respectively the pre- and post- issuance periods of the IIRC's reporting framework. Table 30 are only consistent with what is reported in Table 29 for small size firms under JSE method, they are completely different or not significant in comparison to what are reported in both Table 28 and Table 29.

In other words, the adoption of IR in addition to the availability of the IIRC's framework have a positive and significant impact on value relevance of earnings ($\beta$=2.63, $\alpha$=0.05) for small-size firms under JSE method over the examined period. Furthermore, both the adoption of IR and its framework, have a significant but negative impact on the value relevance of equity book value ($\beta$= -0.49, $\alpha$=0.01) for medium-size firms under JSE method over the period (2011-2016). Otherwise, the findings under the ranking methods reported in Table 30 are not in consistence with what is reported for medium-size firms under the ranking method in Table 28.

In respect to the CSR aspect, to measure CSR performance for the regressed firms I follow Cheng et al. (2014) which uses ESG performance scores as a proxy for CSR. Because ESG data is limited, it is not efficient to separate the results of the firms by the size, yet most of the data available in the examined period belong to medium and large size firms. I run the regression Model 3 over the pre-framework period (2011 – 2013) and the post-framework period (2014 – 2016). Afterwards, I run an SUR model and

compare the interaction term between CSR and each of EPS and BVS before and after. If IR framework provides the necessary guidance to show firms how to integrate non-financial reporting (CSR) with financial reporting (Accounting summary), it is expected that the interaction coefficients (CSR*BVS & CSR*EPS) are significantly different in the preadoption period (2011-2013) in comparison to the postadoption period (2014-2016).

$$P6_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 BVS_{it} + \beta_3 EPS_{it} + \beta_4 CSR_{it} * BVS_{it} + \beta_5 CSR_{it} * EPS_{it}$$
$$+ \beta_6 LOSS_{it} + \beta_7 LOSS_{it} * EPS_{it} + \beta_8 Lev_{it} + \beta_9 ROE_{it} + \beta_{10} Size_{it}$$
$$+ \sum_{j=1}^{j=8} \beta_6 IND_{it} + \sum_{y=2011}^{y=2016} \beta_7 YR_{it} + \varepsilon_{it}$$

Model 3

The results of regressing Model 3 for the whole period is listed in Table 31which shows that while CSR has a significant and negative influence on the book value of equity over the examined period, there is no evidence of its impact on the earnings. Moreover, after running the regression models twice for the periods (2011-2013) and (2014-2016) using SUR, the Wald test results depicted in Figure 6 provide evidence that the adoption of IR in addition to the publication of the IIRC's framework have provided guidance for firms on integrating financial information with non-financial information.

Table 30 Regression analysis (IIRC Framework – 2011:2016)

| VARIABLES | All | Ranking Method | | | JSE Method | | |
|---|---|---|---|---|---|---|---|
| | | Small | Medium | Large | Small | Medium | Large |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| BVS | 1.04** | 0.14*** | 0.36 | 1.42** | -0.59*** | 1.22*** | 1.85** |
| | (2.08) | (3.14) | (1) | (2.32) | (-3.20) | (5.26) | (2.74) |
| EPS | 2.49 | 0.22 | 5.66*** | 2.21 | 5.10*** | 4.44*** | -0.2 |
| | (1.63) | (0.71) | (3.54) | (1.45) | (2.98) | (5.15) | (-0.11) |
| IR2 | -0.14 | -1.11 | 3.37 | 3.83 | -1.34 | 32.73*** | -24.85 |
| | (-0.04) | (-1.54) | (1.05) | (0.33) | (-1.01) | (3.86) | (-0.82) |
| **IR2*BVS (+/-)** | **0.13** | **0.04** | **-0.14** | **0.17** | **0.13** | **-0.49***** | **0.31** |
| | **(0.44)** | **(0.94)** | **(-0.46)** | **(0.45)** | **(1.1)** | **(-2.91)** | **(0.87)** |
| **IR2*EPS (+/-)** | **-0.45** | **-0.31** | **1.48** | **-1.1** | **2.63**** | **-0.43** | **-0.58** |
| | **(-0.33)** | **(-1.15)** | **(1.31)** | **(-0.83)** | **(2)** | **(-0.67)** | **(-0.56)** |
| LOSS | 20.21*** | -1.14* | 6.86 | -30.27 | 5.36 | -6.63 | 157.23** |
| | (2.67) | (-1.77) | (1.26) | (-0.98) | (1.42) | (-0.49) | (2.09) |
| LOSS*EPS | 2.87 | -0.11 | -12.41*** | -10.40* | -12.23*** | -5.63** | |
| | (0.64) | (-0.10) | (-3.63) | (-1.68) | (-3.68) | (-2.12) | |
| LEV | 5.49 | -3.99* | 17.51 | -43.58 | -2.32 | 69.36*** | -41.85 |
| | (0.32) | (-1.98) | (1.04) | (-0.76) | (-0.41) | (2.84) | (-0.33) |
| ROE | 37.30** | 0.37 | 16.67 | 66.79* | 14.45 | -7.31 | 224.74** |
| | (2.48) | (0.42) | (0.78) | (1.74) | (1.52) | (-0.71) | (2.48) |
| SIZE | 7.46** | 1.17** | -8.57*** | 14.89 | 2.36 | -17.97*** | 17.95 |
| | (2.33) | (2.25) | (-2.86) | (0.91) | (1.57) | (-4.25) | (0.38) |
| Constant | -116.17*** | -13.61** | 111.12*** | -280.6 | -34.08 | 253.17*** | -375.26 |
| | (-2.64) | (-2.04) | (2.86) | (-1.13) | (-1.56) | (3.65) | (-0.48) |
| Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N firm/year | 918 | 302 | 312 | 304 | 594 | 216 | 108 |
| Adj. R^2 | 0.683 | 0.475 | 0.744 | 0.649 | 0.628 | 0.682 | 0.492 |

The signs next to the interaction terms suggests non-directional prediction for the impact of IR on value relevance of accounting summary. The first column lists the variables regressed using Model 2 in which IR2 represents a dummy-time variable that takes 1 after the publication of the IIRC's framework in December 2013 and 0 otherwise. Column 2 (All) lists the results of regressing the data of all the firms without sub-dividing them into categories. Columns (3,4, and 5) list the results for small, medium, and large firms respectively according to the ranking method. Columns (6,7, and 8) list the results for small, medium, and large firms respectively according to the JSE method. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.01

That is, the integration term between CSR and earnings is significant on 5% level after the issuance of the IIRC's framework. However, the interaction term between CSR and equity book value is significant on 10% level.

Table 31 Regression analysis for firms reporting CSR over the period 2011-2016

| | |
|---|---|
| CSR | 0.27 |
| | (1.32) |
| BVS | 3.96*** |
| | (4.79) |
| **CSR*BVS (+)** | **-0.01**** |
| | **(-2.59)** |
| EPS | 0.76 |
| | (0.3) |
| **CSR*EPS (+)** | **0.01** |
| | **(0.66)** |
| LOSS | -0.02 |
| | (-0.00) |
| LOSS*EPS | -6.12 |
| | (-1.24) |
| Constant | -168.63 |
| | (-0.94) |
| Fixed effects | Yes |
| N firm/year | 276 |
| Adj. R^2 | 0.712 |

The signs next to the interaction terms suggests a positive impact of CSR and IR on each other. CSR is measured following Cheng et al. (2014) by adding the performance scores of Environmental, Social, and Governance (ESG) extracted from Thomson Reuters ASSET4.

**Figure 6** Wald test for coefficient differences before and after issuing the IIRC's framework

```
 test_b[IR0_mean: c.CSR#c.BVS] = _b[IR1_mean: c.CSR#c.BVS]
( 1)  [IR0_mean]c.CSR#c.BVS - [IR1_mean]c.CSR#c.BVS = 0


        Chi2(  1) =    3.73
      Prob > chi2 =    0.0533
 test_b[IR0_mean: c.CSR#c.EPS] = _b[IR1_mean: c.CSR#c.EPS]
( 1)  [IR0_mean]c.CSR#c.EPS - [IR1_mean]c.CSR#c.EPS = 0


        Chi2(  1) =    4.26
      Prob > chi2 =    0.0390
```

CSR: Corporate Social Responsibility reporting proxied by a firm's scores on ESG.
IR0: The period before the application of IIRC's framework. IR1: The period after the
application of IIRC's framework. BVS: Equity Book Value per Share. EPS: Earnings Per Share.
The significant differences between the interaction terms (CSR*BVS) & (CSR*EPS) before and
after the application of IR provide enough support to reject the null hypothesis at 10% and
5% significance levels respectively. In other words, the framework appears to provide
enough guidance to influence the integration of non-financial information with accounting
summary figures.

## 5.6  Discussion

The assessment of IR's effectiveness in enhancing the quality of information available to investors trading stocks of Small, Medium and/or Large firms (SML), exhibits discrepancy according to the adopted-size classification method. While large-size firms do not appear to benefit from the application of IR as demonstrated from Table 28 to Table 30 (Or as QR results show in Table 45, Table 46, Table 48, and Table 49), controversial results are reported for SMEs when shifting between the JSE and Ranking method. For instance, while IR seems to inform small-size investors under JSE method as evident by its significant and positive impact on earnings' relevance, this influence disappears under the ranking method (Table 28, Table 46, and Table 49). Likewise, IR turns out to positively and significantly (negatively) impacts the value relevance of earnings (book value) for medium size firms under the ranking method, but only positively influence the relevance of equity book value under JSE method (Table 29 and Table 48).

To understand how the role of IR on the value relevance of accounting summary changes with the adopted classification method, one needs to examine how each firm is categorized under the two methods. Figure 7 illustrates the shift in the size category assigned to a firm according to both methods.

**Figure 7** The distribution of firms according to classification methods
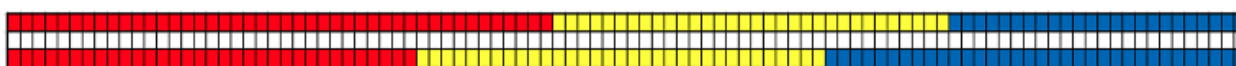


The first row shows the distribution of firms using JSE method where the red, yellow, and blue cells represent small, medium, and large size firms respectively. The third row shows the distribution of the firms using the ranking method.

Firms in Figure 7 are ordered from small size on the left to larger size on the right. One can observe that some of the firms that fell under the category of medium-size using the ranking method, have shifted to small-size firms under JSE method. In other words, small-size firms under the index method are composed of small-size firms in addition to the lower portion of medium-size firms under the ranking method. Similarly, the least-sized firms in the large-size category following the ranking method have become part of medium-size method under JSE.

The impact that IR exerts on the value relevance of earnings is dependent on the inclusion of a group of firms – which I will call the butterfly firms[38] – swaying between small and medium size categories. To elaborate, while IR positively impacts the value relevance of earnings for medium-size firms under ranking method, its positive impact on earnings shifts to small-size firms under JSE method by adding the least-sized firms from the medium size category under the ranking method (the butterfly firms).

In other words, IR does not seem to significantly impact the value relevance of accounting summary for the smallest firms. It is possible that the inefficiency of IR to impact the value relevance of accounting summary for small-size firms stems from their innate nature. That is, the capital structure theory suggests that small firms are dependent on informal means of communication with stakeholders, and they struggle to adapt with the new trend of reporting and probably resist the process of becoming more accountable (Perrini, 2006; Del Baldo, 2017). Furthermore, the competitive pressure that small size firms face upon entering a market may deter them from integrating strategic information

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[38] The term is inspired by the butterfly effect.

which is important for investors but harmful to share with competitors (Girella et al., 2019).

Similarly, the largest firms – regardless of the size classification method – appear not to benefit from the adoption of IR in enhancing the relevance of accounting figures. This conclusion contradicts the perception of large firms providing higher quality reports as reported by Barth et al. (2017) or the pioneering participation of such firms in the pilot project by the IIRC in 2011. It is likely that these firms use IR as a legitimacy strategy that led to ceremonial application as described by Baumann-Pauly et al. (2013) "all talk and no action" (Ahmed Haji & Anifowose, 2016).

Accordingly, the influence of IR on the value relevance of accounting summary seems to be concentrated on medium-size firms and the butterfly group of firms. It is likely that the butterfly firms have evolved after the application of IR in different areas. For example, it is possible that these firms developed more awareness regarding the missing elements to build a sustainable reporting system that is based on Integrated Thinking (Rossi & Luque-Vílchez, 2020). Or the informative nature of IR is influenced by the size of the firm if there are financial needs to meet. For instance, in the context of reporting informativeness, Bochkay and Levine (2019) find that young firms with high litigation and market risks have less informative Management Discussion and Analysis section. While firms with high value relevance of earnings have more informative MD& A sections. It is also possible that IR uncovers the relatedness of non-financial information with the earnings that was not available to investors of these firms. For example, Giner and Reverte (1999) find that disaggregated earnings of small-size firms provide more value relevant information to investors of these firms in comparison to large firms.

Exploring the impact of the IIRC's framework on the value relevance of accounting summary showed that only the value relevance of equity book value (earnings) for medium-size (small-size) firms is negatively (positively) influenced by the introduction of the IIRC's framework under the JSE categorization. This finding stresses the important role of the butterfly firms in shifting the value relevance of earnings (book value) for small-size (medium-size) firms from a non-significant impact to a significant impact under ranking method. It is important to highlight that caution must be exercised in obtaining insights from the studied period (2011-2016) to form a judgement onto the period 2008-2016 as it is expected that IR's influence would be more prominent in early years of adoption (2011-2013) and may decrease in the later years. Furthermore, while the impact of IR on the value relevance of equity book value is positive for medium-size firms under JSE method as reported in Table 29 and Table 48 the influence of the IIRC's framework is negative on the equity book value for the same firms as noted in Table 30.

In this sense, the period (2011-2016) is contrasted with the period (2008-2010) in Table 29 during times when firms learn and benefit the most from the introduction of IR. However, in Table 30 the period (2014-2016) is compared with the period (2011-2013) when the framework is not technically that important for reporting. The negative sign of equity book value may be interpreted following BR (2016) who suggest that providing investors with information about unbooked liabilities is likely to negatively impact the market price of stocks.

**5.7 Conclusion**

This chapter extends the previous chapter by exploring the value relevance of accounting summary according to the size of firms instead of excluding some firms from the analysis using Cook's distance following BR (2016). Following the work of Perrini (2006) and other literature on CSR reporting, the sample of Johannesburg stock exchange (JSE) is divided into small, medium and large firms following both the ranking and JSE classification methods.

Using Ohlson model and following Seemingly Unrelated Regression (SUR) techniques, the findings suggest that the largest firms on JSE did not experience a change in the value relevance of accounting summary after adopting IR regardless of the size classification followed. Nonetheless, it appears that small and medium firms under different categories have a chance of benefiting from IR in integrating financial and non-financial information in a way that impact share prices through the accounting summary channel. Specifically, IR impact becomes evident on the value relevance of accounting summary once a group of firms (butterfly firms) is included in the category under investigation. Furthermore, I also found that the adoption of IR and the publication of its reporting framework improved the integration of CSR with the earnings for medium and large-size firms.

The literature is extended by showing that the prominence of counting for the category of a firm when exploring the value relevance of IR. Furthermore, it draws the attention of regulatory authorities to provide more attention and support in adopting future frameworks for small firms. The limited data on ESG in South Africa resulted in restrictions on exploring the impact of IR on the integration of financial and non-financial

information according to the size of JSE firms. Future research can explore the mechanism by which IR influence the integration of financial and non-financial information among different size categories. Furthermore, the findings related to the poor influence of IR on the value relevance of accounting summary for large firms pose a question about the reasons why such firms do not benefit from IR. Is the exposure to international experience – through cross listing – and the transparency gained through which renders IR invaluable for large-size firms? This question is explored in the next chapter.

## 6 The value relevance of accounting summary under IR and cross-listing

## 6.1 Introduction

One of the foremost aims of Integrated Reporting is to enhance the quality of information, delivered to capital providers in the context of value creation, to efficiently and productively allocate capitals in financial markets. Similarly, Cross-listing in foreign financial markets, particularly in advanced economies such as the American and British markets, enhances the quality of information provided to investors and leads to better allocation of financial resources.

This aim of this chapter, therefore, is to investigate whether there is enough foundation in the literature to believe that Integrated Reporting and Cross Listing share similar qualities that impact accounting summary as far as the value relevance is concerned. Secondly, explore whether financial and non-financial reporting experience gained through cross-listing influence the application of IR and consequently the relevance of accounting summary in South Africa given that such experiences impact reporting performance (Vurro & Perrini, 2011).

Both of Integrated Reporting (IR) and Cross Listing (CL) are likely to influence the value relevance of accounting summary directly or indirectly. The literature provides empirical evidence on the immediate impact of the advent of IR (Baboukardos & Rimmel, 2016; Pavlopoulos et al., 2019) or the event of CL on the value relevance of earnings and equity book value (Lang et al., 2003; Fernandes, 2009; Cormier & Magnan, 2016; Emmanuel Iatridis, 2012; Kamarudin et al., 2020).

In parallel, the influence of both IR and CL might be defused via different reporting channels. First, IR may impact the value relevance of accounting summary via corporate governance (CG) reporting (Mervelskemper & Streit, 2017; Flores et al., 2019; Pavlopoulos et al., 2019; Wang et al., 2020), and similarly CL does (Leuz, 2003; Doidge, 2004; Arcay & Vázquez, 2005; Doidge et al., 2009; Luo et al., 2012; Karolyi, 2012; Cumming et al., 2017). Second, IR may affect environmental, social and governance (ESG) reporting which in turn impact the value relevance of both earnings and book value (Carels et al., 2013; Maniora, 2015; Setia et al., 2015; Mervelskemper & Streit, 2017; Bernardi & Stark, 2018; Mans-Kemp & Lugt, 2020). In the same fashion CL can lead to similar impact on the relevance of equity book value and earnings (Boubakri et al., 2016; Jain et al., 2016; Baldini et al., 2018). Third, the advent of IR may affect quantitative financial indicators such as the value of a firm (Lee & Yeo, 2016; Pavlopoulos et al., 2019) or other qualitative characteristics such as reports readability (Melloni et al., 2017; Caglio et al., 2020) which in turn impact the value relevance of bottom line numbers. CL can also affect the efficiency and the extent of investments in the related firms which in turn may impact the value relevance of accounting summary (Abdallah et al., 2011; Ammer et al., 2012; Abdallah & Abdallah, 2019). Fourth, there is some evidence that the introduction of IR has affected the information environment and disclosure quality and particularly the forecast of financial analysts (Zhou et al., 2017; Bernardi & Stark, 2018; Flores et al., 2019; Caglio et al., 2020). Likewise, cross listing is found to affect the amount and quality of information reported which may impact the value relevance of accounting summary (Cooke, 1989; Lang et al., 2003; Bae et al., 2006; Bozzolan et al., 2009; Doidge et al., 2009).

Studying the previous literature leads one to propose that investigating the value relevance of accounting summary after the adoption of IR without questioning the impact of CL and its consequent reporting experience on this relationship may result in misleading conclusions. Further, as chapter 1 demonstrates the importance of investigating the value relevance in relation to the size of firms, the current chapter examines the impact of IR on the value relevance of accounting summary taking the size of firms and their listing status into consideration. Another reason to approach the value relevance from the perspective of size is the suitability of such method to understand the behaviour of firms using the lens of cost-benefit framework. In other words, while small firms may perceive new reporting initiatives as a depletion of its resources, larger firms take the opportunity to fill the gap of information between themselves and the capital providers and may benefit by decreasing the cost of capital.

To understand the dynamics between IR, CL and the size of firms and their impact on the value relevance of firms in South Africa, I draw a sample of firms listed on Johannesburg Stock Exchange (JSE) between 2008 – 2016. Furthermore, I apply Ohlson (1995) model and quantile regression models using to the Ranking and JSE methods over 2008-2013 and 2008-2016 periods. The findings suggest that firms between upper small and lower medium-size in addition to American and British-listed large firms are the ones whose reporting enhanced the value relevance of accounting summary.

Further examinations utilising the perspective of learning hypothesis Foucault and Frésard (2012) suggest that the management of the latter mentioned firms, tends to integrate signals from the equity market price in their investment decisions. Meanwhile, the analysis reveals that the management of other firms, which either did not benefit or

had a negative impact on the value relevance of their firm earnings after the advent of IR, did not integrate the market signals in their investment decisions.

This chapter contributes to the literature in many aspects. First, it is the first study, as far as I know, that compares IR to CL and provides evidence from the literature on the similarities in their reporting functions and the consequent influence on the relevance of accounting summary. Second, the findings highlight that the IIRC's intentions to improve the quality of information through mandatory settings is not echoed by all JSE listed firms. Some of JSE firms apply IR on a ceremonial basis and probably for legitimacy reasons as evident by the insignificant findings of small and non-cross listed large firms. In contrary, medium-size firms as well as large-size cross-listed firms are found to genuinely apply the IIRC's framework. Managers of the latter firms are found to communicate and receive information via IR and integrate it in their investment decisions leading to substantial application of the IIRC's framework. Future research, therefore, can investigate whether such genuine application is motivated by the financial needs of these firms.

There are some limitations that comes with the previous conclusions; first, the findings should be interpreted in the context of South Africa and any suggestion of generalisation of the findings need more inclusive data once IR become mandatory on other foreign markets. Second, the regression analysis used a balanced sample which may introduce a survivorship bias. Third, despite using two regression methods (LSE and Quantile regressions), the difference in the findings can be attributed to the heteroscedasticity of the error term in addition to the skewness of the distribution of the investigated variables. Fourth, using the learning hypothesis as a theoretical framework for the analysis may

suffer from omitting variable problem. Particularly, previous research shows that there is a possibility that investment decisions are impacted by firms' cash flow which was not accounted for in the analysis.

This chapter has the following order: before introducing the reasons behind cross-listing on foreign exchanges, the chapter precedes with an introduction on cross-listing and its forms. Then, the common grounds that IR and Cross-listing share are examined before developing the related hypotheses. Then the methodology is presented along with the results followed by the findings and discussion sections. Lastly, the chapter is concluded in the light of findings and discussion sections.

## 6.2    Background and Literature review

Despite the fluctuation in cross-listing on foreign markets from time to time, the phenomenon is likely to significantly impact the performance of a firm on many levels (Karolyi, 2012). This chapter does not discuss or analyse the cross-listing event per se, rather it tries to disentangle the effect of cross-listing from Integrated Reporting on the value relevance of accounting summary as both share similar consequences on firm performance. Therefore, it is important to distinguish the independent effect of cross-listing, Integrated Reporting and how they interact with each other.

### 6.2.1    What is cross-listing and what forms does it take?

This section is preceded with a definition of the Cross-Listing (CL) phenomenon before discussing its forms. Then the indirect forms of cross-listing (American Depository Receipts) are investigated by their sponsored and unsponsored types before concluding on their relevance to the analyses.

The concept of Cross-listing resonates with the diversification concept related to the international Capital Asset Pricing Model (Karolyi, 2012). Firms and individuals have sought to diversify their investments to earn higher risk-adjusted returns in comparison to their home based investments (Karolyi, 1998). When the shares or other investment vehicles of a firm are traded in a foreign exchange besides its home exchange, the firm is said to be cross listed.

There are two types of cross-listing; the first one is through directly listing stocks on the destination exchange, while the second type uses a specific instrument referred to as depository receipts in addition to other private placement vehicles. In the first case, firms issue or trade their stocks on the destination market and follow its rules as stated in the listing requirements. Therefore, firms that directly cross-list must meet the requirements of the markets like other home-listed public firms listed on that exchange.

In contrary to the direct listing, Depository Receipts may be exempted to some degree from the legal and regulatory requirements of destination markets. As this chapter does not address the general form of Depository Receipts or private placements, the focus will be shifted to the American Depository Receipts (ADRs). ADRs are negotiable instruments issued in dollar values by an American depository bank after holding the original underlying foreign stocks in custody. These receipts are traded either on organized stock exchanges such New York Stock Exchange (NYSE) or Over-The-Counter markets (OTC). Furthermore, private placements are special forms of Depository Receipts that allow the company to raise capital in the destination market

through private replacement and are usually referred to as 144A rule. I don't discuss the last form as only one firm in the sample possess this form in addition to other ADRs.

ADRs can be unsponsored or sponsored; unsponsored ADRs can be initiated upon a request of an investor to a depository bank without the involvement of the company of the underlying stock. On the other hand: sponsored ADRs are issued by a depository bank requested by a foreign company which bear the cost of issuance. Only sponsored ADRs are considered in this study because firms in this situation bear responsibility over their disclosed reports as they may tailor their reports to address and attract foreign investors. In contrast, unsponsored ADRs can be issued by depository banks without the knowledge of, or seeking approval of, the issuing firm (Iliev et al., 2014). In such cases according to Iliev et al. (2014), firms suffer from a drop in their value as measured using Tobin's q. Such firms do not intend to target or address investors on the destination market and such kind of involuntary listing may cause such firms a decrease in their market value. Therefore, such an exclusion may be considered as a limitation, but there is a need to separate firms that voluntarily cross-listed compared to other compulsory forms of listing.

Sponsored ADRs are in three levels: level 1, level 2 and level 3. Level 1 ADRs are traded on U.S. OTC or what is known as pink sheets, these firms are not required to report or reconcile their reports following U.S. GAAP (Coffee, 2002) and they follow minimal SEC disclosure (Foerster & Karolyi, 1999). Level 2 ADRs are listed on main U.S. exchanges but cannot raise money. These firms are required to reconcile their financial statements with U.S. GAAP and are subject to SEC scrutiny (Coffee, 2002). On the other hand, Level 3 ADRs are similar to level 2 but can raise money from the American

exchanges through public offering (Coffee, 2002). Furthermore, the later kind of ADRs is considered to be the costliest form of American Depository Receipts (Foerster & Karolyi, 1999).

In summary, firms cross-list either by directly listing their stocks in the foreign exchange or through using Depository Receipts. While firms using the first form of listing are obliged to follow the rules and regulation of the hosting market, Depository Receipts are subject to less stringent regulations by the stock exchange compared to the direct listing. American Depository Receipts (ADRs) can take on two formats, either sponsored or unsponsored. In the former one, firms seek to cross-list, communicating with a depository bank and bear the cost of the issuance, while in the second type a depository bank can initiate the whole process without the consent of the related firm. I excluded the unsponsored form from the analysis as such firms do not intend to address foreign investors in their reports. Consequently, the sample includes South African firms that are cross-listed on American exchanges using ADRs or directly listed on London Stock Exchange. However, before contrasting CL against IR, I present the theories that governs cross-listing and later I demonstrate why firms cross list.

## 6.2.2   Why do firms cross-list?

After introducing the basic definition of cross-listing in the previous section in addition to the different types of cross-listing, this section discusses the various reasons behind cross-listing and the related theories. Furthermore, I discuss whether each of these motives interferes with the value relevance of accounting summary under IR.

Many studies have investigated the phenomena of CL in an effort to understand the reasons behind such an activity. Many motives and theories are identified and hypothesized to explain why firms seek to cross list their stocks. However, Karolyi (1998) and Karolyi (2012) were among the most universal studies to review and organize the literature in addition to summarising the main reasons behind firms cross-listing in foreign markets. The main motives for firms to cross-list over other markets revolve around five reasons: to increase the market value, to decrease the cost of capital, to enhance liquidity, to improve their corporate governance, and to use market signals in managers' decision making.

### 6.2.2.1  Market Value

One of the main possible reasons behind cross-listing could be the favourable increase in market price upon cross-listing and consequently the market value of a firm (Karolyi, 1998). The price behaviour could be interpreted as investors reaction to market integration. For instance, and Stapleton and Subrahmanyam (1977) suggest that cross-listing bypasses investment obstacles that create price inefficiency and result in segmented markets. However, despite the positive changes in stock returns around cross-listing, some literature documents a post-listing decrease in its price performance which differ depending on industrial and corporate characteristics (Foerster & Karolyi, 1993). Among the most comprehensive studies in this category according to Karolyi (2006) are Miller (1999) and Foerster and Karolyi (1999). While Miller (1999) finds evidence on abnormal returns for all the listed firms on American markets, firms that are cross-listed on the organized exchanges experienced more abnormal returns compared to firms listed Over-The-Counter (OTC). This result is attributed to the ability of firms to combat market segmentation through increasing their liquidity and investor recognition (Miller,

1999). On the other hand, Foerster and Karolyi (1999) find that the abnormal return dissipated in the post-listing period in comparison to the time when firms cross-listed. However, firms cross-listing for funding purposes, experienced less decrease in return during the post-listing period. In all these scenarios the price reaction can be attributed to an increase in liquidity or in shareholder base (Foerster & Karolyi, 1999).

In summary, whether cross-listing leads to combat market segmentation or increase investor base, it is likely that it may affect the market value of a firm. Because Integrated Reporting is expected to affect the value relevance of accounting summary, it is crucial to isolate the effect of cross listing on the market value of a firm. Cross-listing and Integrated Reporting in this sense share a possible mutual effect on shares price.

### 6.2.2.2 *Cost of capital*

There is enough evidence in the literature to support the mitigating impact of cross-listing on U.S markets on the cost of capital (Karolyi, 2006). Using mean adjusted return as a proxy for the cost of capital, Alexander et al. (1988) find a decrease in the adjusted returns on non-Canadian firms cross-listing in the U.S. that is less than their cross-listed Canadian counterparts suggesting more market segmentation for non-Canadian firms. Similarly, Foerster and Karolyi (1993) find a decrease in the cost of capital of Canadian firms listing in the U.S. after observing a drop of their home-market betas. Errunza and Miller (2000) also finds an increase in equity valuations after the cross-listing of Canadian firms on U.S. main and portal exchanges resulting from the decrease in the cost of capital. In another study on international firms cross-listing on the U.S. exchanges, Foerster and Karolyi (1999) finds a decrease in home beta of cross-listed firms inferring a decrease in their systematic risk. Similarly, Abdallah and Ioannidis

(2010) find similar results to Foerster and Karolyi (1999) by replicating their work on firm cross-listing on U.S. equity markets from 47 countries over 1976-2007 and find a decrease in the domestic market risk after cross-listing and consequently a decrease in the cost of capital. However, Urias (1996), as cited in Karolyi (1998) finds that firms from emerging markets experienced an increase in the cost of capital for firms from 4 out of 5 emerging countries. On the other hand, firms from emerging markets cross-listing using ADR3 did not experience a similar increase in its cost of capital. In a similar context, Serra (1999) finds that firms from emerging countries whose stocks are cross-listed on either New York Stock Exchange or London Stock exchange benefit from a decrease in the required rate of return by investors and leading to a decrease in the cost of capital.

To conclude, it can be inferred from the literature on the effect of cross-listing on the cost of capital, that it is likely for firms cross-listing to experience a change in their cost of capital. The question that arises in similar situation revolve about the impact of IR on the cost of capital for firms that are already cross-listed. Consequently, the rate on which investors discount their earnings will be reflected in the prices of their shares leading to a change in the relevance of accounting summary.

### 6.2.2.3 Liquidity

Another incentive that motivates firms to cross-list is the increase in liquidity. Enhancements in liquidity are likely to decrease the cost of capital leading to appreciation in equity market valuation (Amihud & Mendelson, 1986). Similarly, there is evidence of increased liquidity after cross-listing on U.S. and U.K. markets in comparison to European markets (Dodd & Louca, 2012). Furthermore, regardless of the overlap in

trading hours between home and foreign exchanges, additional trading hours in U.S. have also been associated with increased liquidity for cross-listed firms (Barclay et al., 1990; Werner & Kleidon, 1996; Karolyi, 1998)[39].

Since many of South African firms trade their stocks on U.S. and U.K. exchanges in addition to JSE and considering that some of them cross-listed during the application of IR, the impact of these events on liquidity becomes an interesting question. In other words, if liquidity influences the cost of capital and the price of equity, how would the impact of IR be on the value relevance of accounting summary for cross-listed firms?

### 6.2.2.4 Enhancement in corporate governance

In the seminal work by Stulz (1999) the cross-listing phenomenon is viewed from the perspective of cost of capital. Stulz (1999) first shows that difficulties in raising funds from capital markets stem from the higher cost of capital required by investors. This expensive financing is rooted in two problems; first, even if managers are well informed when assessing current and future projects, investors have limited access to what is reported by managers who may fail to credibly disclose information (the information asymmetry problem). Second, investors may suspect that managers poorly use the raised capital or use it for purposes other than increasing the wealth of investors (the agency problem).

Despite that firms coming from segmented markets experience a decrease in their cost of capital from cross-listing, Stulz (1999) shows that segmentation theory does not

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[39] For further details on the relationship between trading hours and liquidity refer to Appendix 11.1

explain why cross-listing benefits firms from developed and well-integrated markets. Consequently, he suggests that globalization affects the cost of capital through positive effects on a firm's corporate governance system[40].

Siegel (2005) distinguishes the generic legal bonding suggested by Stulz (1999) and Coffee (2002) and categorizes it further into two categories; legal bonding and reputational bonding. First, the legal bonding represents the means by which the Security Exchange Committee (SEC) and the legal system in the U.S. could protect the interests of minority shareholders by proper enforcement and punishment systems. The legal protection was found not to be effective in all cases and the SEC was accused of being lenient when it comes to foreign firms cross-listing in the U.S. (Licht, 2003; Siegel, 2005). Furthermore, in the UK context, Dodd and Louca (2012) finds firms cross-listing on London Stock Exchange experience positive abnormal return around the cross-listing event. This increase results from the upgrade to a better legal environment that LSE provides to the cross-listed firms.

Second, the reputational bonding needs a reporting environment which is heavily scrutinized by investment banks, financial analysts, capital market participants and auditors. The bonding is formed if the cross-listed firms adhere to the legal and reporting requirements during downturns and financial crises (Siegel, 2005; Karolyi, 2012). Consequently, the firms that don't abuse the interest of their minority shareholders during

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[40] Stultz meant by corporate governance system internal governance polices in addition to external aspects such as activist institutional investors, protection of the minority interest in a legal context and a market environment that can punish poorly functioning firms through takeovers.

difficult times under the lens of market intermediaries develop a reputational asset (Siegel, 2005).

According to Reese and Weisbach (2002) the probability of cross-listing on U.S. exchanges and more specifically on organized stock exchanges increases when home markets lack proper legal protection for investors. Furthermore, these firms are voluntarily bonding themselves to U.S. regulations to ease fundraising in both their home market and other places around the globe. Moreover, in the same context of reputational bonding, Dodd and Louca (2012) find that one of the consequences of European firms cross-listing on U.S. and U.K. exchanges is being more exposed to coverage by financial analysts.

To conclude on why firms cross-list on foreign exchanges, there is some empirical evidence that firms cross-listing on foreign markets and particularly U.S. exchanges, experience many benefits. Increase in the market value and liquidity in addition to a decrease in the cost of capital and information asymmetry between manager and investors. The main question to pose, therefore, is whether IR can provide firms that excelled in financial reporting a room to improve their reporting as captured by a change in the value relevance of accounting summary.

After understanding the main pillars behind cross-listing, the next section discusses the mutual effects that could result from either cross-listing or Integrated Reporting or the combined effects of both.

### 6.2.3   How do cross-listing and IR relate to each other in the value relevance context?

In the previous section, the possible reasons behind cross-listing were discussed. In this section, I discuss how Cross-listing (CL) and Integrated Reporting (IR) share similar impact on the value relevance of accounting summary and establish an analytical basis to distinguish between their singular effects.

The possible reasons to cross-list as discussed in the subsequent section can be described as attempts to decrease information asymmetry or improve the quality of information, Likewise, IR represents a reporting system that integrates financial and non-financial information in the context of value creation to improve the quality of information to capital providers. Accordingly, it is necessary to understand how IR may impact the value relevance of accounting summary for cross-listed firms or vice versa. The next section, therefore, highlights main points where IR and CL share similar influence on the value relevance of accounting summary suggesting the need to isolate their impact.

#### 6.2.3.1   IR, CL and the value relevance of accounting summary

The literature provides empirical evidence on the impact of each of Integrated Reporting (IR) and Cross-Listing (CL) on the value relevance of equity book value and earnings. Thus, understanding the role of IR on the value relevance of accounting summary for cross-listed firms or the impact of CL on accounting summary of firms after the adoption of IR becomes prominent.

In the context of the value relevance of accounting summary under an IR framework, IR is found to positively influence the value relevance of earnings (Baboukardos & Rimmel, 2016; Pavlopoulos et al., 2019) and negatively the value relevance of equity book value

(Baboukardos & Rimmel, 2016) albeit with sensitivity to treatment of outliers and the size of BR's findings as shown in chapters 4 and 5. In the context of cross-listing, however, the literature includes instances where the value relevance of accounting summary is influenced by the act of cross-listing or cross-listing in a destination with different regulatory standards such as the IFRS.

The value relevance of accounting summary is found to be influenced by the listing status of a firm. For instance, in a study concerned with the effects of cross-listing on accounting quality, Kamarudin et al. (2020) explore a sample of firms from 32 countries that are cross-listed on U.S. exchanges. They find that the value relevance of earnings and equity book value is higher for firms cross-listing on the U.S. markets in comparison to matches from their home countries. In a similar setting, Lang et al. (2003) studies the value relevance of earnings among other accounting qualities for firms cross-listed on U.S. stock exchanges. Their sample includes firms from 21 countries for years 1990 through 2001 which are cross-listed on both U.S. regulated exchanges and Over-The-Counter (OTC) markets. By matching CL firms with counterparts from their home countries, Lang et al. (2003) find CL firms experience higher value relevance of earnings in comparison to their non-cross-listed counterparts. Furthermore, they document higher value relevance for firms cross-listed on organized exchanges in contrast to OTC firms. Jermakowicz et al. (2007) also find that Dax 30 German firms applying IFRS, U.S. GAAP or cross listed on NYSE, experience a significant increase in the value relevance of earnings.

Another strand of research highlights the role of CL in amplifying the role of a reporting framework such as the IFRS on the value relevance of accounting summary. For example, Cormier and Magnan (2016) investigate whether the introduction of IFRS in

2011 in the Canadian markets enhanced the relevance of financial statements. Moreover, acknowledging the fact that the U.S. has a stricter legal and regulatory regime, they explore whether Canadian firms cross-listed on U.S. exchanges have different value relevance for their earnings. Their findings suggest that while there are improvements in the value relevance of earnings for all Canadian firms after the application of IFRS, different conclusion can be drawn once they counted for firms cross-listed in the United States. Specifically, while home-listed Canadian firms witnessed insignificant and negative impact of the value relevance of their earnings, Canadian firms cross-listed in the United States gained significant benefits in the value relevance of their earnings. This was interpreted as the new reporting system (IFRS) facilitated greater comparability of the earnings of Canadian cross-listed firms in the U.S. in comparison to pre-reporting levels. Furthermore, it was found that the Management discussion and financial notes become more relevant after the adoption of IFRS. In a similar context, Emmanuel Iatridis (2012) investigates the possible impact of early voluntary adoption of IFRS on the financial performance of the reporting firms in comparison to non-voluntary adopters during the ensuing mandatory period of IFRS application. Emmanuel Iatridis (2012) finds that the voluntary adopters of IFRS have the following characteristics: first, they tend to have financing needs. Second, are cross-listed. Third, have higher value relevance of accounting summary in comparison to non-voluntary adopters. These findings also establish a connection between cross-listing and the value relevance of both the book value of equity and earnings.

To summarise, IR may influence the value relevance of equity book value and earnings of cross-listed firms in a special way in comparison to other JSE listed firms. Vice versa the value relevance of accounting summary after the application of IR may be influenced

by the event of cross-listing or may be applied differently in cross-listed firms. Given the fact that some JSE listed firms are also cross-listed on U.S. and U.K. exchanges and the possible interference with the application of IR, it is crucial to understand their impact on each other in the context of value relevance of accounting figures.

### 6.2.3.2 *Considerable interplay exists among CG and both IR and CL*

The subsequent literature suggests a bilateral influence of Integrated Reporting (IR) and Cross-Listing (CL) on firms' Corporate Governance (CG). In turn, the strength of CG is found to moderate the relationship between the stock price and book value and/or earnings (Davis-Friday et al., 2006; Habib & Azim, 2008; Shan, 2015). Therefore, understanding the way IR, CL and CG interacts is essential to the analysis of the relevance of accounting summary.

Extant research suggests a circular relationship between IR and CG in which one impact the performance of the other. It is found that the impact of IR on analysts' forecasting through the corporate governance channel (Mervelskemper & Streit, 2017; Flores et al., 2019), is associated with strong governance systems (Pavlopoulos et al., 2019) and is found to be affected by the type of the governance system (Wang et al., 2020).

In a study by Flores et al. (2019), the impact of IR on analysts' forecasts was found to be stronger in North American markets in comparison to the European ones. The orientation of the governance system whether it is more shareholder centric as in the situation of North America or stakeholder oriented in the EU case, was found to be the reason behind the differing impact of IR on the forecast (Flores et al., 2019). IR is also found to affect the valuation of corporate governance performance. For example, Mervelskemper &

Streit (2017) find that publishing an Integrated Report by a firm increases the value relevance of its corporate governance index in comparison to other forms of ESG reporting [41]. Pavlopoulos et al. (2019) also find that higher performance of IR is associated with stronger governance systems. Furthermore, the governance mechanisms, whether they are traditional (audit committees, board of directors), or new (sustainability committees or non-financial performance measures in CEO's compensation), are found to enhance the quality of IR and its assurance (Wang et al., 2020).

Similarly, previous research on the relationship between CL and CG indicates an impact of the former on the latter. Firms cross-list to subject themselves to stricter regulations and legal systems which in turn may help to overcome weaknesses in their corporate governance systems (Karolyi, 2012; Luo et al., 2012). Accordingly, cross-listing in foreign markets significantly motivates firms to adopt good governance practices to assure the protection of investor interests (Arcay & Vázquez, 2005). Firms that cross list on U.S. exchanges are also found to have less private benefits compared to non-cross-listed firms[42]. In another words, managers or/and directors are less inclined to exploit the interest of minority shareholders (Leuz, 2003). However, this effect only exists for firms maintaining their listing status on main stock exchanges compared to Over-The-Counter markets as a result of stricter reporting frameworks (Doidge, 2004).

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[41] Mervelskemper & Streit (2017) interpreted their results using a sample of firms that volunteered in the pilot study of IIRC. These firms were considered by the IIRC as "the best advocates of IR" and accordingly it is highly probable that they are among the best reporters in corporate governance. As a result, their findings may be biased by the nature of the participating firms in the pilot study. In other words, the firms applying IR had had a great corporate governance system before the application of IR and not vice versa.
[42] Private benefit can be defined following Nenova (2003) as capability of a controlling shareholders or managers to extract private benefits at the expense of the firm or precisely other shareholders including minority shareholders.

Cumming et al. (2017) emphasize the need to distinguish between corporate governance from sovereign governance when dealing with bonding hypothesis. Sovereign governance is a measure that captures country risk, the credit risk of a country, government accountability, the stability of the political system, the law enforcement, the absence of corruption, and the efficacy of the political institutions. The authors find that sovereign governance is a driving force for higher market value for cross-listed firms but not the corporate governance.

To conclude, IR and CL impact the strength of firms' CG systems which in turn influence the value relevance of accounting summary. Considering that CL firms improve their CG performance upon listing on strict exchanges, their responsiveness and capacity to adopt new reporting system like IR is likely to be different from other non-listed firms leading to discrepancy in the relevance of accounting summary figures.

### 6.2.3.3 IR and CL may affect the quality of environmental, social and governance (ESG) reporting.

Research on the impact of IR or CL on the hand, and ESG reporting on the other hand, highlights their possible interreference on reporting ESG components or/and as a composite. Increased levels of ESG disclosure are achieved after the application of IR and in some cases are related to high quality of IR. However, Cross-listing is also found to significantly increase the levels of ESG reporting or Corporate Social Responsibility (CSR) reporting.

IR is found to influence the reporting on ESG pillars. For example, IR is found to positively increase the disclosure on social and environmental aspects in the mining

sector in South Africa (Carels et al., 2013). Furthermore, Setia et al. (2015) find that disclosure on social and relational capitals has increased significantly after the adoption of IR for the top 25 listed firms on JSE. Similarly Mans-Kemp and Lugt (2020) find that the quality of IR associated with high levels of ESG reporting for the top 100 listed companies on JSE. Bernardi and Stark (2018) also find that increased levels of ESG reporting have led to an increase in the accuracy of analysts' forecast which was pronounced after the adoption of IR.

The application of IR is also found to impact the valuation of ESG. For instance, IR is likely to enhance the valuation of ESG beyond other forms of reporting (Mans-Kemp & Lugt, 2020). Conversely, the application of IR in firms reporting stand-alone ESG reporting is found to negatively influence both the economic and ESG performance of a firm in comparison to stand-alone ESG reporting (Maniora, 2015).

Further, ESG reporting may be positively influenced after cross-listing (CL) events. For example, firms are found to experience higher levels of Environmental, Social and Governance disclosure (ESG) after cross listing in a foreign market (Baldini et al., 2018). Additionally, CL firms have better CSR reporting performance and are traded at a premium compared to non-cross-listed firms (Boubakri et al., 2016).

Consequently, IR and CL are found to impact ESG reporting which in turn is found to affect the market value and future financial performance of a firm (Jain et al., 2016). Therefore, both previous factors may have a common effect on the value relevance of accounting summary suggesting the need to separate their individual impacts as well as examine their interaction.

### 6.2.3.4   *IR and CL may affect corporate performance.*

Prior literature suggests that the quality or disclosure level may influence the financial and accounting performance of a firm. For instance, the market value of a firm is found to be positively associated with IR quality (Lee & Yeo, 2016; Pavlopoulos et al., 2019). In addition, the readability, conciseness, tone bias of an Integrated Report is found to influence its market valuation, liquidity, and analysts' dispersion estimates respectively (Caglio et al., 2020). Furthermore, Integrated Reports with optimistic tone and which are complex, vague and long have lower financial performance as measured by the return on equity (Melloni et al., 2017).

Firms that cross-list on U.S. exchanges experience better investment efficiency, an increase in foreign investments of its home-listed shares, as well as an enhancement in their liquidity. For example, Abdallah & Abdallah (2019) find that firms cross-listed on U.S. exchanges have better investment efficiency than non-cross-listed firms. Furthermore, they find that firms cross-listed on unregulated markets improve their investment efficiency in the post listing period more than their peers cross-listed on the regulated exchange. The last conclusion by Abdallah & Abdallah (2019) relates to the current work in the sense that a considerable portion of the South African sample is listed on unregulated U.S. exchange markets which means that enhancement in the market value of the firm is not necessarily related only to IR but also to CL. Furthermore, once a firm cross-lists on a U.S. exchange, the investment activity in its stocks increases in the home and the overseas markets in comparison to non-cross-listed firms (Ammer et al., 2012). Another important outcome of cross-listing is an increase in the level of stock trading signalling better investor protection and a mitigation of capital segmentation (Abdallah et al., 2011).

To conclude, both IR and CL are found to affect the financial or accounting performance of a firm be it its liquidity levels, market valuation, earnings-forecast accuracy, or the return on its equity. Furthermore, provided the positive impact of strong governance on a meaningful risk disclosure and consequently on the market liquidity of a firm (Elshandidy & Neri, 2015), the interplay between IR, CL and CG assumes greater importance.

### 6.2.3.5 *CL and IR may affect the firm's information environment and disclosure quality.*

Both Integrated Reporting and cross listing are found to impact information environment and disclosure quality[43]. Especially, both are found to affect the number of financial analysts following a firm as well as their accuracy in forecasting future earnings.

The application of IR as a reporting system influences the information environment and disclosure quality as evidenced by enhancements in analysts' forecast accuracy. For example, Zhou et al. (2017) demonstrate that the level of alignment with IR's early framework is associated with less analysts' forecast errors. Similarly, Bernardi and Stark (2018) find that levels of ESG disclosure is not significantly associated with one-year analysts' forecast accuracy before the introduction of IR in South Africa. The former

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[43] Information environment can be approached using three dimensions: the reporting activity, how the information is disseminated and how private information is obtained (Lang et al., 2003). Furthermore, the literature offered many proxies for information environment such as the number of financial analysts following a firm and/or the accuracy in their future forecast (Lang et al., 2003; Leuz, 2003; Bae et al., 2006), the increase in visibility such as media coverage (Baker et al., 2002) or in investor base (Peress, 2010; Dodd & Gilbert, 2016). Or through volatility of earnings (Bailey et al., 2006) or firm specific return (Fernandes & Ferreira, 2008).

relationship, however, became significant after introducing IR in 2011. Furthermore, Caglio et al. (2020) also find that an optimistic and certain tone of IR decreases the dispersion in analysts' forecast suggesting an economic impact of the textual attributes of IR in South Africa. On the other hand, using an international sample in a voluntary setting, Flores et al. (2019) show that before the adoption of IR there were no difference in analysts' forecast accuracy between treated and controlled groups in their sample. However, there is a significant increase in the accuracy of prediction for controlled groups after the adoption of IR. In contrary to what was listed in support of IR's positive effect on analysts' forecast accuracy, Barth et al. (2017) do not find enough evidence to support the notion that IR's higher quality is associated with analysts' forecast accuracy in the South African context.

Cross-listing is also associated with better disclosure quality and information environment. Lang et al. (2003), for instance, find that firms may increase their valuation by cross-listing on U.S. stock exchanges because of increased forecast accuracy and the coverage of by financial analysts. In a similar context, Bozzolan et al. (2009) explore the effect of cross-listing on New York Stock Exchange on the accuracy and dispersion of analyst forecast for a sample of European firms originated from low disclosure requirement countries. The study finds that the quantity of forward-looking information after cross-listing increases the accuracy of analysts' forecast as well as its dispersion. However, only the increase in quantity of verifiable forward-looking information improves both the accuracy and dispersion in analysts' prediction. Doidge et al. (2009) find that cross-listing on American stock markets, regardless the type of listing, increases the number of financial analysts following a firm. Voluntary disclosure quantity is found to increase after cross-listing, especially in cases where firms seek international funding

(Cooke, 1989). Likewise, Bae et al. (2006) show that the level of information environment as proxied by the number of financial analysts, forecast errors, and earnings management, have enhanced for firms seeking investments in foreign markets after cross-listing.

However, cross-listing is not always associated with better information environment. For example, Bailey et al (2006) find increased volatility and dispersion in abnormal earnings after cross-listing on regulated and unregulated American exchanges. The latter study concludes that some endogeneity factors relating to size, financial leverage and growing pace increased the chances of a firm to cross list. Moreover, difference in reporting standards alongside the expansion in reporting after cross-listing were initially found to be responsible for the volatility reaction.

In summary, IR and CL are found to affect the information environment and disclosure quality through increasing the coverage of financial analysts, decreasing their forecast errors, and impacting earnings management in certain cases. Furthermore, CL is found to influence the forward looking non-financial information which IR may also impact. These similarities shed the light on the possibility of an amplified or joint effect on value relevance between the application of IR on South African firms cross-listed on U.S. and U.K stock exchanges.

### 6.2.4   Hypotheses development

Prior to producing tenable hypotheses there are few insightful steps to take: First, a set of assumptions to define the concept of value-relevance of accounting summary. Second, how Integrated Reporting (IR) and Cross Listing (CL) may impact this relevance

following the cost-benefit and the information asymmetry frameworks. Third, conjecturing the signum of the association between the independent and dependent variables informed by previous literature.

Before delving into the concept of value relevance, some assumptions need to be re-emphasized. First, the concept of value is approached from a financial perspective which is, in this case, represented by the market value of a firm. Second, another implicit assumption, following Ohlson (1995), is the rationality of investors which posit their use of some model to reach the present value of a firm. Third, earnings and equity book value can act as complementary indicators of value (Ohlson, 1995).

The value relevance concept, accordingly, reflects the potential role of accounting summary (earnings and equity book value) in explaining or relating to the market value of a firm in a valuation model. Similar to the previous chapter, firms are empirically explored according to their size following the cost-benefit framework in addition to Perrini (2006) which suggests that large firms and small firms can be analysed from stakeholder theory and social capital theory perspectives respectively. In such circumstances, the smaller the firm is, the higher is the perception of cost, the lower is the expectation of benefits and the more important are the informal mediums of communication with a firm's stakeholders. Therefore, the relevance of accounting summary figures is expected to change according to the size category of a firm after IR and CL.

Relating to the dimension of information asymmetry both IR and CL improve the quality and quantity of reported information enhancing investors' perception of the economic

fundamentals of a business (Barth et al., 2008). Therefore, the relationship between accounting summary and the market value of a firm is expected to become stronger. In the following section, I develop the hypotheses related to the impact of each of IR and CL and their common effect on the value relevance of accounting summary.

### 6.2.4.1   IR and the value relevance of accounting summary

IR influences the value relevance of accounting summary through indirect and direct channels. As discussed in 6.2.3.2, IR is likely to influence the corporate governance system, ESG reporting, the financial and accounting performance, and the information environment and the disclosure quality of a firm. These factors that are subject to IR's influence may in turn impact the value relevance of accounting summary. On the other hand, IR is likely to directly influence the value relevance of accounting summary. IR, for instance, may positively influence the value relevance of earnings in South African, African, European, or international settings (Baboukardos & Rimmel, 2016; Pavlopoulos et al., 2019; Tlili et al., 2019; Permatasari & Narsa, 2021).

In comparison to earnings, however, it is complicated to establish the direction of the relationship between equity book value and the price after the adoption of IR. While in the international setting IR appears to positively influence the value relevance of equity book value, it negatively impacts the relationship between equity book value and the market price in South Africa (Baboukardos & Rimmel, 2016; Pavlopoulos et al., 2019; Tlili et al., 2019).

**H1: IR has an impact on the value relevance of equity book value.**

**H2: IR has a positive effect on the value relevance of earnings.**

Approaching the previous hypotheses from a cost-benefit perspective, it is expected that the smaller the firm, the more expensive is to adopt IR and the less is the value relevance of accounting summary. Furthermore, in comparison to large firms, small firms are disadvantaged to disclose their sustainable activities using formal mediums of communication.

### 6.2.4.2  CL and the value relevance of Accounting Summary

Cross-listing may also impact the value relevance of accounting summary through indirect and direct channels. As discussed in 6.2.3.1 cross-listing may influence many factors that in turn are likely to impact the value relevance of accounting summary. Furthermore, cross-listing may mitigate investment obstacles and provide an opportunity for diversification. Moreover, CL allows for stronger legal protection leading to a decrease in the cost of capital which is likely to impact the value relevance of earnings (Stapleton & Subrahmanyam, 1977; Foerster & Karolyi, 1999; Serra, 1999; Ely & Pownall, 2002; Siegel, 2005; Abdallah & Ioannidis, 2010; Karolyi, 2012).

In respect to the direct impact of CL on the value relevance of accounting summary, the literature provides empirical evidence on the positive impact of overseas listing on the relationship between the market price and both of earnings and equity book value. Davis-Friday et al. (2006) for instance, provide evidence on the impact of cross-listing on US exchanges in improving the information environment for Mexican firms leading to increased value relevance of accounting summary. Furthermore, similar studies present examples on how cross-listing on American and British markets increase the value relevance of accounting summary for Japanese, Canadian, German and International

firms (Ely & Pownall, 2002; Lang et al., 2003; Jermakowicz et al., 2007; Emmanuel Iatridis, 2012; Cormier & Magnan, 2016; Kamarudin et al., 2020).

**H3: Cross-listing has a positive effect on the value relevance of book value.**

**H4: Cross-listing has a positive effect on the value relevance of earnings.**

Like the previous hypothesis, it is expected that the relationship between the market value of a firm and its earnings to increase with the size of the firm as plenty of resources will be at the discretion of a firm to invest in reporting not to mention the advantageous position of large firms as far as the formal mediums of communication are concerned.

### 6.2.4.3   CL, IR and the value relevance of accounting summary

Expecting the combined effect of Cross-listing and Integrated Reporting on the value relevance of accounting summary may not be clear. Approaching this issue from the lens of information asymmetry both IR and CL are contended to decrease information asymmetry between a firms' management and its investors. However, since many firms in South Africa had been cross-listed before the introduction of IR, this status may mitigate the effect of IR on the value relevance of accounting summary.

Hence, if IR is supposed to provide a perspective on value creation for the providers of financial capital as the IIRC claims, it is expected that the combined effect of IR and CL to be positive on the value relevance of earnings, while influencing the value relevance of equity book value (unknown signage of the relationship between the price and the equity book value).

**H5: Cross-listed firms will experience a change in the value relevance of equity book value after the adoption of IR in comparison to domestic firms.**

**H6: Cross-listed firms will experience an increase in the value relevance of earnings after the adoption of IR in comparison to domestic firms.**

It is assumed in this context that smaller firms will have a constraint regarding the related expenses of cross-listing in addition to limited funds to excel in Integrated reporting. While, on the other hand, the larger the firm, the higher the possibility of cross-listing and the more funds available to invest on reporting activities.

Finally, it is expected that equity book value and earnings to be value relevant. In other words, the sum of the coefficients on equity book value and earnings for non-cross listed firms and before the adoption of IR in addition to the coefficients on of equity book value and earnings after the adoption of IR and Cross-listing to be significant and positive.

**H7: Equity book value is value relevant.**

**H8: Earnings are value relevant.**

## 6.3    Methodology

### 6.3.1    The sample

To test the hypotheses from the previous section, the sample was constructed by collecting data of all primary listed firms on Johannesburg Stock Exchange (JSE) in addition to gathering inputs regarding local companies cross-listed overseas. The data for JSE listed firms were collected using Thomson Reuters Datastream database over the period 2008-2016. The information related to foreign listing of JSE firms were collected from several sources to take into consideration the variety of cross-listing forms such as direct listing or using depository receipts. All the data related to JSE firms which is directly cross-listed on foreign exchanges were downloaded from Datastream. Data related to firms cross-listing using depository receipts were extracted from the websites of their issuing banks (For further details visit Appendix11.2).

The sample was drawn from a population of JSE listed firms during the period 2008-2016 but will be examined during periods 2008-2013 and 2008-2016. Exploring the research hypotheses over two periods takes the peculiarity of JSE in terms of being an emerging market populated with firms of different sizes increasing the chance of outlying observations and heteroskedastic variance. The current predicament is similar to what was articulated in Cahan et al. (2000) in which the authors acknowledge the difficulty of considering extreme observations as outliers since such readings commonly occur in environments where firms vastly vary from each other in terms of their size and the presence of skewed data. Furthermore, to validate the findings in the presence of outliers, I follow the recommendations of extending the examined period to mitigate the effect of these extreme observations and to examine the stability of the findings (Cohen et al., 2003; Kutner et al., 2005).

The obtained sample constitutes all cross-listed firms on JSE over two periods; the first one replicates the same period of Baboukardos and Rimmel (2016) (BR – hereafter) which stretches over the period 2008 – 2013 resulting in the study of 178 firms over 6 years and 918 firm/year observations. The second period of study covers a time window from 2008 to 2016 with 157 firms over a period of 9 years with 1,377 firm/year observations. To validate the comparison between the two periods, I dropped from the analysis firms that don't have data over the whole 2008-2016 period. Consequently, firms with a balanced sample over 2008-2016 are already included in the period 2008-2013[44]. Table 32 lists the selection process for the mentioned periods.

Table 32 Sample Selection

| Firm/Year obs | 2008-2013 | 2008-2016 |
|---|---|---|
| Initial number of observations for the period | 4,581 | 4,581 |
| - observation of firms with no data over the period | (1,116) | (1,116) |
| - observations from utility industry | (9) | (9) |
| - observations from financial industry | (1,170) | (1,170) |
| - observations with negative book value of equity | (35) | (35) |
| - observations to balance the data | (874) | (874) |
| - observations for the period 2014-2016 | (459) | |
| The balanced sample | 918 | 1,377 |

### 6.3.2 The model

Similar to previous studies (Berthelot et al., 2012; Baboukardos & Rimmel, 2016), I use and extend the Ohlson model (Ohlson, 1995) which studies the relationship between the market value of equity (PR), the dependant variable, and both the book value of equity

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[44] There were 20 firms during the period 2008-2013 that were delisted from JSE during the period 2014-2016 that are not included in the analysis. This is because including these firms in the first period and excluding them in the second period may interfere on investigating the impact of IR and CL.

per share (BVS) and earnings (EPS) (the independent accounting summary variables). In the context of Ohlson model, value relevance can be identified as the ability of earnings and equity book value to capture information that is reflected in the market price of their equity (Hassel et al., 2005). This model was augmented with interaction terms of Integrated Reporting with Accounting summary in addition to control variables as in Model 4 which findings act as a base to highlight the outcome differences after introducing cross-listing variables in Model 5 and Model 6. Both second and third models extend the first model by first introducing a cross-listing term in Model 5 then interacting IR and CL terms with accounting summary as in Model 6.

$$PR6_{it} = a_0 + a_1 BVS_{it} + a_2 EPS_{it} + a_3 IR_{it} + a_4(IR_{it} * BVS_{it}) + a_5(IR_{it} * EPS_{it})$$
$$+ a_6 LOSS_{it} + a_7(LOSS_{it} * EPS_{it}) + a_8 LEV_{it} + a_9 SIZE_{it}$$
$$+ \sum_{j=1}^{j=8} a_{11} IND_{it} + \sum_{y=n}^{y=t} a_{12} YR_{it} + \varepsilon_{it}$$

Model 4

$$PR6_{it} = a_0 + a_1 BVS_{it} + a_2 EPS_{it} + a_3 IR_{it} + a_4(IR_{it} * BVS_{it}) + a_5(IR_{it} * EPS_{it})$$
$$+ a_6 LOSS_{it} + a_7(LOSS_{it} * EPS_{it}) + a_8 LEV_{it} + a_9 SIZE_{it} + a_{10} ROE_{it}$$
$$+ a_{11} CL + a_{12} CL * BVS_{it} + a_{13} CL * EPS_{it}$$
$$+ \sum_{j=1}^{j=8} a_{14} IND_{it} + \sum_{y=n}^{y=t} a_{15} YR_{it} + \varepsilon_{it}$$

Model 5

$$PR6_{it} = a_0 + a_1BVS_{it} + a_2EPS_{it} + a_3IR_{it} + a_4(IR_{it} * BVS_{it}) + a_5(IR_{it} * EPS_{it})$$

$$+ a_6LOSS_{it} + a_7(LOSS_{it} * EPS_{it}) + a_8LEV_{it} + a_9SIZE_{it} + a_{10}ROE_{it}$$

$$+ a_{11}CL + a_{12}CL * BVS_{it} + a_{13}CL * EPS_{it} + a_{14}IR * CL + a_{15}IR$$

$$* CL * BVS_{it} + a_{16}IR * CL * EPS_{it} + \sum_{j=1}^{j=8} a_{17}IND_{it} + \sum_{y=n}^{y=t} a_{18}YR_{it} + \varepsilon_{it}$$

Model 6

Following Craighead et al. (2004) and Collins and Salatka (1993), If Integrated Reporting (IR) or/and Cross Listing (CL) impact the value relevance of accounting summary, I would expect their influence to be captured by the following coefficients as exhibited in Table 33:

Table 33 Regression coefficients comparison for hypothesis testing

|  |  | IR | CL | Interaction | All |
|---|---|---|---|---|---|
| **Model 5** | BVS | $\alpha_4 \neq 0$ | $\alpha_{12} > 0$ | NA | $\alpha_1 + \alpha_4 + \alpha_{12} \neq 0$ |
|  | EPS | $\alpha_5 > 0$ | $\alpha_{13} > 0$ | NA | $\alpha_2 + \alpha_5 + \alpha_{13} > 0$ |
| **Model 6** | BVS | $\alpha_4 \neq 0$ | $\alpha_{12} > 0$ | $\alpha_{15} \neq 0$ | $\alpha_1 + \alpha_4 + \alpha_{12} + \alpha_{15} \neq 0$ |
|  | EPS | $\alpha_5 > 0$ | $\alpha_{13} > 0$ | $\alpha_{16} > 0$ | $\alpha_2 + \alpha_5 + \alpha_{13} + \alpha_{16} > 0$ |

Both Model 5 and Model 6 are re-run twice, once by pooling all the observations together, then by pooling firms of similar size category together. Because categorizing firms can be done using two methods – the ranking method and JSE method – the findings of each model will be in turn reported twice. However, by categorizing firms using the ranking method, the number of small firms cross-listing overseas drops limiting the generalisability of the findings and its inference. Therefore, while the findings for all size categories using JSE method are reported, only medium and large-size firms are reported under the ranking method.

Firms were classified into small, medium, and large size using two methodological approaches from the literature besides the JSE classification standards. By reviewing the literature, I identified two ways of size classification: the first classification is adopted by ranking firms according to their size and dividing them according to specific percentiles (Ranking method). On the other hand, the second method – (the average method) – is utilised by taking the average size of each firm over the examined period and then dividing the sample into three equal sub-samples in terms of the number of firms in each size category. Nonetheless, JSE offers two standards to categorize firms into different size, the index classification or market. The findings of this study will be reported using one method from the literature and one method of JSE's classification. In some cases, other methods will be used for robustness checks.

### 6.3.3    The variables

**Integrated Reporting (IR) variables**: Following BR (2016) I introduce a dummy variable (IR) that takes the value of 1 during the period of the mandatory application of IR on JSE (from 2011 and onwards) and null otherwise. IR is interacted with both equity book value (IRxBVS) and earnings (IRxEPS) to examine the effects of applying IR on both variables.

**Cross-listing variables**: (CL) is a dummy variable which takes the value of 1 if a JSE firm is secondary listed on any American stock exchange or on London Stock Exchange, or null otherwise. It is interacted with both equity book value (CLxBVS) and earnings (CLxEPS) to control the effects of cross-listing on the value relevance of accounting summary.

**Control variables**: a set of variables that were found in the literature to have a probable effect on the value relevance of accounting summary. The first control variable is a dummy variable (LOSS) that takes the value of one when firms incur loss and is interacted with earnings per share (EPSxLOSS) to control for investors reaction to bad news. To elaborate, Hayn (1995) shows that the coefficient on earnings for loss-making firms in a value relevance context are different when contrasted to profitable firms. Furthermore, Basu (1997) suggests the need to account for distinct slopes of good news versus bad news firms to enhance the possibility of explaining the firm's returns. However, the market price of firms facing financial distress, as reported by Barth et al. (1998) and Burgstahler and Dichev (1997), have stronger relationship with equity book value in comparison to earnings. That is because investors evaluate these "lose-making firms" as possible bankrupt firms which might be liquated soon.

The second control variable, the leverage ("LEV" computed as total liabilities to total assets) is introduced into the regression equation to control for the effect of capital structure on the value of a firm via the cost of debt financing which in turn affects the quality of reporting (Sengupta, 1998). Furthermore, the leverage was found to be negatively associated with Corporate Social Responsibility (CSR) reporting and to increase the risk of defaulting (Dhaliwal et al., 2011; Boubakri et al., 2016).

The third control variable, Return on Equity ("ROE" computed as Earnings Before Interest and Tax to total assets) is augmented to Model 5 & Model 6 only. This variable is not included in the first regression model because using it as a control variable decreases the explanatory power of the model ($R^2$) and increase the Mean Squared Error

(MSE). However, in Model 5 & Model 6  the equations were augmented with ROE as its influence is well-documented in cross-listing settings.

The fourth control variable, the firm size ("SIZE"; which is the natural logarithm of total assets) was introduced to the model following previous literature to control for the effect of a firm size on its market value. For example, Collins et al. (1997) shows that the size of a firm plays a role in the relative importance between the value relevance of equity book value and earnings.

## 6.4    Findings

In this section, the outcomes of Model 4 to Model 6 are reported in two stages: first by pooling all firms together and then according to their size. Furthermore, because firm size can be classified using two methods: the ranking in addition to JSE classifications for two periods 2008-2013 and 2008-2016, the regression coefficients will be listed into four tables.

### 6.4.1    Complete sample outcomes

In this section, the findings of the full sample of listed firms on JSE is presented. Because the outcomes of Model 4 were reported and discussed in a previous chapter, the interest shifts to the outcomes of Model 5 and Model 6 which investigate the impact CL and IR on the value relevance of accounting summary. Furthermore, accepting or rejecting the postulated hypotheses will be reported for both models unless a discrepancy is detected. The outcomes of both models are first reported for the equity book value followed by earnings.

Table 34 lists the results of regressing both Model 5 and Model 6 for periods (2008-2013) and periods (2008-2016) by pooling all firms together without any respect to their size category. Equity book value (line 1) appears to have insignificant relationship with the market value of equity. Furthermore, IR (line 4) seems not to influence the value relevance of equity. Consequently, there is not sufficient evidence to support H1 ($\alpha_4=0$).

Examining the coefficients on the interaction between cross-listing and equity book value, a significant and positive effect is evident of cross-listing affecting the value relevance of equity book value (line 7) for both periods. Therefore, there is enough

evidence to support H3 ($\alpha_{12}>0$). However, when examining the interaction term of IR and CL with equity book value (line 10), the results do not provide enough evidence to support H5 ($\alpha_{15}=0$).

To address the question of whether equity book value is relevant ($\alpha_1+\alpha_4+\alpha_{12}>0$), the evidence provides enough support for H7, with a positive value of 1.47 (F= 4.89, P<0.0028) for the period 2008-2013 and a positive value of 1.5 (F=7.05, P<0.0002) for the period 2008-2016. In respect to the results of Model 6 (column M3), they replicate the outcomes of Model 5 which is consistent with hypothesis H7 resulting to a sum ($\alpha_1+\alpha_4+\alpha_{12}+\alpha_{15}$) of (1.44) which is significant at 1% level (F=3.62, P<0.0076) for the period 2008-2013 and with sum of 1.46 (F=5.69, P<0.0003) for the period 2008-2016.

Table 34 Regression analyses: (2008-2013 & 2008-2016 / All pooled firms)

|  | VARS | 2008-2013 | | | 2008-2016 | | |
|---|---|---|---|---|---|---|---|
|  |  | M4 | M5 | M6 | M4 | M5 | M6 |
| 1 | BVS | 0.78 | 0.47 | 0.38 | 0.9 | 0.64 | 0.45 |
|  |  | (1.38) | (1.18) | (1.02) | (1.6) | (1.42) | (1.19) |
| 2 | EPS | 2.41* | 1.79 | 2.08 | 2.27* | 1.8 | 1.86 |
|  |  | (1.94) | (1.38) | (1.57) | (1.77) | (1.29) | (1.39) |
| 3 | IR | 13.78*** | 18.02*** | 17.96*** | 7.07 | 11.09** | 9.94* |
|  |  | (3.57) | (3.5) | (3.43) | (1.4) | (2) | (1.81) |
| 4 | IRxBVS (+/-) | 0.01 | -0.44 | -0.2 | 0.12 | -0.25 | 0.03 |
|  |  | (0.02) | (-1.38) | (-0.72) | (0.28) | (-0.67) | (0.09) |
| 5 | IRxEPS  (+) | 0.76 | 1.49 | 0.72 | 0.37 | 1.06 | 0.91 |
|  |  | (0.49) | (1.54) | (0.54) | (0.23) | (0.84) | (0.63) |
| 6 | CL |  | -7.58 | -9.27 |  | -2.21 | -7.48 |
|  |  |  | (-0.67) | (-0.74) |  | (-0.22) | (-0.56) |
| 7 | CLxBVS (+) |  | 1.44*** | 1.69*** |  | 1.11** | 1.69*** |
|  |  |  | (2.77) | (2.76) |  | (2.28) | (2.69) |
| 8 | CLxEPS (+) |  | 0.06 | -0.49 |  | 0.1 | -0.34 |
|  |  |  | (0.03) | (-0.23) |  | (0.07) | (-0.16) |
| 9 | IRxCL |  |  | 1.8 |  |  | 5.04 |
|  |  |  |  | (0.21) |  |  | (0.48) |
| 10 | IRxCLxBVS (+/-) |  |  | -0.43 |  |  | -0.71 |
|  |  |  |  | (-0.91) |  |  | (-1.21) |
| 11 | IRxCLxEPS (+) |  |  | 1.13 |  |  | 0.49 |
|  |  |  |  | (0.68) |  |  | (0.23) |
| 12 | Constant | -117.90*** | -79.36*** | -78.67*** | -109.97*** | -76.00*** | -73.67*** |
|  |  | (-2.79) | (-3.16) | (-3.10) | (-2.72) | (-2.76) | (-2.69) |
|  | Ctrl variables | Yes | Yes | Yes | Yes | Yes | Yes |
|  | Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
|  | N firm/year | 918 | 918 | 918 | 1,377 | 1,377 | 1,377 |
|  | Adj. R^2 | 0.646 | 0.75 | 0.75 | 0.66 | 0.733 | 0.736 |

The signs next to the interaction terms suggests the predicted direction of the impact of IR on the value relevance of accounting summary. M4, M5, and M6 represent the model in use to regress the market value of equity on the independent variables for the periods (2008-2013) and (2008-2016) respectively. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

In respect to results of earnings using Model 5 and Model 6, line 2 of Table 34 for both periods show that earnings are not value relevant. Furthermore, IR shows no significant impact on the value relevance of earnings as presented in line 5 for both periods resulting in insufficient evidence to support H2. Similarly, examining line 8 shows that cross-listing does not significantly impact the value relevance of earnings which does not provide enough evidence to support H4. Investigating the impact of the interaction term of IR and CL on earnings (line 11), the outcomes do not provide enough evidence to support H6.

Turning now to address the question on whether earnings are value relevant, the sum of the coefficients $\alpha_2+\alpha_5+\alpha_{13}$ using Model 5 for period 2008-2013 is positive (3.34) and significant (F=3.49, P<0.017) at 5%. Similarly, the sum of the coefficients for Model 5 over the period 2008-2016 is positive (3.96) and significant (F=4.17, P<0.0072). In relation to Model 6, however, exploring the status of the same hypothesis H8, results in a positive sum of coefficients ($\alpha_2+\alpha_5+\alpha_{13}+\alpha_{16}$) with a significant value of (3.44) for the period (2008-2013) at 5% (F=3.03, P<0.019) and a value of (2.92) significant at 5% level (F=3.11, P<0.017). Therefore, it is possible to conclude that the results support the H8 at 5% using model (2) and (3).

Next, I report the regression results using two types of size categorization: while the first method is suggested by the literature, the second one is technical and is used by JSE to classify its listed firms into different size groups. The ranking classification is the main method to report the findings as it is an accepted practice in the literature. On the other hand, I use JSE index approach to classify firms into different size categories as it reflects the reality rather than approaching it. Therefore, the findings will be reported for two periods; 2008 – 2013 and 2008 – 2016 and under each period the outcomes are reported according to the ranking and JSE categorizations.

### 6.4.2 Size outcomes for 2008-2013

In this section the results of regressing Model 5 and Model 6 will be presented for the period 2008-2013 that demonstrate the effect of Cross-Listing (CL) alongside Integrated Reporting (IR) on the value relevance of accounting summary for different size categories. The findings will be discussed using two categorization techniques, the ranking and JSE methods.

### 6.4.2.1 The ranking classification

The findings of regressing Model 5 and Model 6 are listed in Table 35 according to the size category of pooled firms. Columns (1) to (3) represent the results of regressing the independent variables on the market price using Model 4 to contrast and compare its outcomes with both Model 5 and Model 6. Columns (4) & (5) exhibit the results of regressing Model 5 for medium and large firms respectively. Columns (6) & (7) represent the results of regressing Model 6 for medium and large firms respectively.

By observing the results related to medium-size firms using Model 5 and Model 6 as far as the value relevance of equity is concerned – as respectively demonstrated in columns (4) & (6) of Table 35 – it is found that equity book value before the adoption of IR and for non-cross-listed (NCL) firms is relevant for investors regarding their assessment to the firm's value at a 5% significant interval (line 1). However, when examining the impact of IR on the value relevance of equity book value, a negative impact can be detected at 5% level (line 4) providing sufficient evidence to support H1 for both Model 5 & Model 6. On the other hand, CL seems to affect the value relevance positively using model (2) at 5% level (line7), but this effect disappears using model (3). Therefore, there is enough evidence to support H3 using model (2) but not model (3). Regarding the common effect of IR and CL on the value relevance of equity book value, the coefficient on the interaction term (line 10) is positive but does not provide enough evidence to support H5.

Shifting the focus to address whether equity book value is relevant, the sum of the coefficients $(\alpha_1+\alpha_4+\alpha_{12})$ using Model 5 is positive with a value of (2.13) that is significant at a 1% significant level (F=4.31, P<0.0077) providing enough evidence to

support H7. In contrast, using Model 6 produces insignificant results (F=2.19, P>0.079) leading to limited support of H7.

Table 35 Regression results SML firms using Ranking method (2008-2013)

| | VARS | 1 M4-S | 2 M4-M | 3 M4-L | 4 M5-M | 5 M5-L | 6 M6-M | 7 M6-L |
|---|---|---|---|---|---|---|---|---|
| 1 | BVS | 0.24*** | 1.09*** | 0.78 | 1.07** | 0.62 | 1.08** | 0.49 |
| | | (2.82) | (2.71) | (0.97) | (2.6) | (1.15) | (2.6) | (1.06) |
| 2 | EPS | -0.41* | 1.79 | 3.22*** | 1.79 | 3.16** | 1.78 | 4.76*** |
| | | (-1.80) | (1.52) | (3.28) | (1.5) | (2.62) | (1.48) | (3.91) |
| 3 | IR | 0.14 | 13.73*** | 35.10*** | 13.55*** | 46.92*** | 14.11*** | 62.64*** |
| | | (0.28) | (3.8) | (3.04) | (3.7) | (3.19) | (3.57) | (4.21) |
| 4 | IRxBVS (+/-) | -0.07 | -0.68** | -0.04 | -0.70** | -0.6 | -0.71** | 0.22 |
| | | (-1.18) | (-2.44) | (-0.10) | (-2.54) | (-1.64) | (-2.53) | (1.22) |
| 5 | IRxEPS (+) | 0.53 | 3.37*** | 0.05 | 3.26*** | 0.92 | 3.23*** | -3.98** |
| | | (1.53) | (3.52) | (0.03) | (3.6) | (0.81) | (3.55) | (-2.39) |
| 6 | CL | | | | -6.99*** | -4.33 | 1.86 | 10.35 |
| | | | | | (-2.92) | (-0.21) | (0.44) | (0.47) |
| 7 | CLxBVS (+/-) | | | | 1.76** | 1.41** | 0.24 | 1.68** |
| | | | | | (2.15) | (2.1) | (0.27) | (2.36) |
| 8 | CLxEPS (+) | | | | -1.42 | -0.86 | -1.29 | -3.05 |
| | | | | | (-0.57) | (-0.45) | (-0.80) | (-1.52) |
| 9 | IRxCL | | | | | | -10.40* | -24.28 |
| | | | | | | | (-1.85) | (-1.54) |
| 10 | IRxCLxBVS (+/-) | | | | | | 1.07 | -0.95* |
| | | | | | | | (0.66) | (-1.80) |
| 11 | IRxCLxEPS (+) | | | | | | 1.46 | 5.82*** |
| | | | | | | | (0.44) | (3.06) |
| 12 | Constant | -12.21** | 78.83*** | -392.34 | 76.11** | -155.14 | 75.35** | -115.8 |
| | | (-2.25) | (2.7) | (-1.49) | (2.62) | (-0.92) | (2.57) | (-0.69) |
| | Ctrl Var | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | N firm/year | 300 | 314 | 304 | 314 | 304 | 314 | 304 |
| | Adj. R^2 | 0.492 | 0.78 | 0.583 | 0.788 | 0.674 | 0.786 | 0.682 |

Firms are divided into small, medium, and large firms based on each year ranking in terms of the market value of a firm. Afterwards, firms are categorized into their size class according to their position regarding the 33.33 and 66.67 percentiles. Columns (1) to (3) represents the regression results using Model 4 (M4) before introducing both cross-listing and its interaction with IR. Columns (1), (2), (3) list the regression results after categorically pooling each class of small (S), medium (M), and large (L) firms respectively and independently. Columns (4), (5) exhibit the results of pooling medium, and large firms respectively after controlling for cross-listing using Model 5 (M5). Columns (6), (7) list the outcome of regressing medium and large firms after controlling for cross-listing and its interaction with both the accounting summary variables and IR using Model 6 (M6). It worth noting that small firms were excluded from the last two sections of Table 35 because of the limited number of small firms cross-listing. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Regarding the findings related to earnings of medium-size firms, examining Table 35 (line 2) columns (4) & (6) shows that earnings before IR adoption for NCL firms is not

value relevant for the investors trading medium-size stocks. On the other hand, IR demonstrates a positive and significant impact on the value relevance of earnings (line 5) at 1% significant level when both Model 5 & Model 6 are run leading to enough evidence to support H2. On contrary, cross-listing appears to have a negative but insignificant effect on the value relevance of earnings as the previous columns show (Columns 4 & 6 - line 8) leading to a lack of evidence to support H4. Similarly, the interaction term of IR, CL, and earnings is positive (column 6 – line 11) but not significant or sufficient to accept H6.

However, to address whether earnings are value relevant, a significant and positive impact can be observed using Model 5 with a value of (3.63) resulting from adding up the following coefficients $\alpha_2+\alpha_5+\alpha_{13}$ (F=8.64, P<0.0001). Furthermore, a similar effect can be detected using Model 6 with a value of (5.18) resulting from the sum of $\alpha_2+\alpha_5+\alpha_{13}+\alpha_{16}$ that is significant at a 1% significant level (F=7.08, P<0.0001). Thereby, by using models (2) and (3), there are enough evidence to support H8 which demonstrates that earnings are value relevant.

Regarding the results of large-size firms as far as the equity book value is concerned, it is noticeable that equity book value before the adoption of IR and for NCL firms is not relevant in assessing the market value of large firms from the perspective of investors as Table 35 exhibits (line 1 & columns (5) & (7)). Similarly, there is no significant impact of IR on the value relevance of equity book value as line 4 of Table 35 shows (columns (5) & (7)) leading to reject H1 for large-size firms. However, CL appears to significantly influence the value relevance of equity book value at a 5% level (line 7) providing a sufficient support for H3.

In respect to the impact of the interaction term of IR and CL on equity value relevance, column (7) line (10) provide weak evidence to support H05. Turning to address the question whether equity book value is value relevant, the sum of the related coefficients $(\alpha_1 + \alpha_4 + \alpha_{12})$ is (1.43) which is significant at 5% (F=3.48, P<0.022). Similarly, using Model 6 yields similar results of Model 5 with a sum of coefficients $(\alpha_1 + \alpha_4 + \alpha_{12} + \alpha_{15})$ equal to (1.44) significant at 5% level (F=2.93, P<0.029). Thereby, the previous results provide sufficient evidence at a 5% level in favour of H7.

In contrasts to the insignificance role of equity book value in assessing the market value of equity for NCL firms before the adoption of IR, Table 35 demonstrates that earnings are value relevant as line 2 exhibits at 5% and 1% levels using Model 5 & Model 6 respectively. On the other hand, there is a controversy regarding the impact of IR on the value relevance of earnings for large size firms. Interestingly, while there is insignificant but positive impact of IR on the value relevance of earnings using Model 5, IR turns to influence earnings relevance using Model 6 negatively and significantly at 5% level. The last finding contradicts H2 that postulates a positive impact of IR on the value relevance of earnings.

Turning now to the impact of CL on the value relevance of earnings, line 8 of Table 35 for large-size firms shows that CL has a negative and insignificant effect on the value relevance of earnings leading to insufficient evidence to support H4. However, the interaction term between IR and CL appears to impact the value relevance of earnings significantly at a 1% level as line (11) column (7) demonstrates leading to accept H6.

In terms of addressing the question of whether earnings are value relevant, the sum of the coefficients ($\alpha_2+\alpha_5+\alpha_{13}$) is positive (3.22) and significant at 1% level (F=5.23, P<0.003) using Model 5. Furthermore, using Model 6 shows a sum of coefficients ($\alpha_2+\alpha_5+\alpha_{13}+\alpha_{16}$) that equals to (3.55) which is significant at 1% level (F=8.5, P<0.0000) providing enough evidence to support H8. I summarise the outcomes of this section in Table 36 which lists the results for medium and large firms using Model 5 & Model 6.

Table 36 Results summary for the period 2008-2013 using the ranking method

| Panel A: Hypotheses | | | | |
|---|---|---|---|---|
| | **IR** | **CL** | **Interaction** | **Accounting Summary** |
| BVS | H1 | H3 | H5 | H7 |
| EPS | H2 | H4 | H6 | H8 |
| **Panel B: Medium-Size Firms** | | | | |
| Model 5 | **IR** | **CL** | | **Accounting Summary** |
| BVS | N** | P** | | P*** |
| EPS | P*** | - | | P*** |
| Model 6 | | | | |
| BVS | N** | - | - | P* |
| EPS | P*** | - | - | P*** |
| **Panel C: Large-Size Firms** | | | | |
| Model 5 | **IR** | **CL** | | **Accounting Summary** |
| BVS | - | P** | | P** |
| EPS | - | - | | P*** |
| Model 6 | | | | |
| BVS | - | P** | N* | P** |
| EPS | N** | - | P*** | P*** |

Panel A: Lists the examined hypotheses in this chapter. Panel B; lists the outcomes of testing the hypotheses in panel A. While (N) stands for negative coefficients, (P) stands for positive coefficients. When a hypothesis is not supported, It's location is replaced "-". Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

### 6.4.2.2 *The market classification*

The findings of regressing Model 5 & Model 6 are listed in Table 37 according to the size category of pooled firms. Columns (1) to (3) represent the results of regressing the independent variables on the market price using Model 4 to contrast and compare its

outcomes with both Model 5 & Model 6. Columns (4), (5) and (6) exhibit the results of regressing Model 5 for small, medium, and large firms respectively. Columns (7), (8), and (9) represent the results of regressing Model 6 for small, medium, and large firms respectively.

By observing the results related to small-size firms using Model 5 & Model 6 as far as the value relevance of equity is concerned – as respectively demonstrated in columns (4) & (7) of Table 37 – it is found that equity book value negatively affects an investor's assessment of firms that are not cross-listed (NCL) and before the adoption of IR at a 5% level as line (1) of the mentioned columns shows. On the other hand, IR appears to have no significant impact on the value relevance of equity book value as line (4) of columns (4) & (7) shows in Table 37 rejecting H1.

In Model 5 CL appears to have a positive and significant effect on the value relevance of equity book value at a 1% level providing sufficient support to H3. However, using Model 6 does not provide consistent evidence of the effect of CL on the value relevance of equity book value as line (7) and column (7) demonstrate. Regarding the common effect of IR and CL on the value relevance of equity book value, the coefficient on the interaction term is positive and significant as line (10) and column (7) show providing sufficient evidence at a 5% level for H5.

Shifting the focus to address whether equity book value is relevant, the sum of the coefficients ($\alpha_1 + \alpha_4 + \alpha_{12}$) using Model 5 is positive with a value of (3.92) that is significant at 1% (F=6.65, P<0.0004) providing enough evidence to support H7.

Similarly, using Model 6 produces a positive sum (3.28) that is significant at a 1% level (F=5.41, P>0.0006) leading to further support of H7.

Regarding the findings related to earnings of NCL small-size firms and before IR adoption, examining Table 37 (line 2) columns (4) & (7) shows that earnings is value relevant for the investors trading small-size stocks at 5% level. Similarly, IR demonstrates a positive and significant impact on the value relevance of earnings (line 5) at 5% level when both Model 5 & Model 6 are run leading to enough evidence to support H2. Unexpectedly, CL appears to have a limited negative effect (at 10%) on the value relevance of earnings for small firms using Model 5 while negatively affecting the earnings relevance on 1% level using Model 6 leading to a contradicting prediction H4. In respect to the common effect of both IR and CL on the value relevance of earnings, line (11) and column (7) do not provide enough evidence to support H6.

However, to address whether earnings are value relevant for small-firm investors, the sum of the coefficients $\alpha_2+\alpha_5+\alpha_{13}$ is negative (-1.84) and significant at 5% level (F=3.49, P<0.0187). However, a positive sum of $\alpha_2+\alpha_5+\alpha_{13}+\alpha_{16}$ is found (0.27) that is significant at 5% level (F=3.46, P<0.0108). Thereby, by using Model 5 & Model 6 there is some evidence to support H8 which demonstrates that earnings are value relevant.

Moving to the results of medium-size firms using Model 5 & Model 6 as far as the value relevance of equity is concerned – as respectively demonstrated in columns (5) & (8) of Table 37 – it is found that equity book value before the adoption of IR and for NCL firms is adversely relevant to investors regarding their assessment to the firm's value at a 1% level. Likewise, when examining the impact of IR on the value relevance of equity book

value, a positive impact can be detected at 5% level (line 4 & columns (5), (8)) providing sufficient evidence to support H1 for both Model 5 & Model 6. On the other hand, a discrepancy of the results is observed when using Model 5 & Model 6 as far as the cross listing is concerned. While CL seems to have no effect on the value relevance of equity book value using Model 5 for medium-size firms, this effect is positive and significant using Model 6 at a 1% level. Therefore, there is enough evidence to support H3 using Model 6 but not Model 5. Regarding the common effect of IR and CL on the value relevance of equity book value, the coefficient on the interaction term (line 10) is negative (-0.99) and shows little support to H5 at 10%.

Shifting the focus to address whether equity book value is relevant, the sum of the coefficients ($\alpha_1 + \alpha_4 + \alpha_{12}$) using Model 5 is positive (0.57) and significant at a 1% level (F=9.57, P<0.0000) Furthermore. Using Model 6 produces similar results (Value=0.48 and F=11.59, P>0.0000) leading to sufficient evidence to support H7.

Table 37 Regression analyses: (2008:2013 – JSE Method)

| | VARS | 1 M4-S | 2 M4-M | 3 M4-L | 4 M5-S | 5 M5-M | 6 M5-L | 7 M6-S | 8 M6-M | 9 M6-L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BVS | -0.49** | -0.29** | 1.12 | -0.49** | -0.30*** | 1.16* | -0.49** | -0.32*** | 1.14** |
| | | (-2.10) | (-2.53) | (1.33) | (-2.13) | (-2.86) | (1.87) | (-2.13) | (-3.11) | (2.16) |
| 2 | EPS | 2.58** | 5.76*** | 2.50* | 2.55** | 5.75*** | 2.69* | 2.56** | 5.63*** | 5.28*** |
| | | (2.4) | (6.73) | (2.05) | (2.42) | (6.28) | (1.97) | (2.42) | (5.41) | (3.07) |
| 3 | IR | 5.43*** | 17.80** | 103.96*** | 5.12** | 19.06*** | 88.31** | 5.32** | 16.06** | 119.59** |
| | | (2.64) | (2.66) | (2.85) | (2.45) | (2.93) | (2.07) | (2.46) | (2.46) | (2.48) |
| 4 | IRxBVS | 0.12 | 0.85*** | -0.48 | 0.12 | 0.62** | -1.05** | 0.12 | 0.93** | -0.15 |
| | | (0.84) | (4.09) | (-1.41) | (0.82) | (2.04) | (-2.13) | (0.82) | (2.53) | (-0.51) |
| 5 | IRxEPS | 1.72** | 0.13 | -0.37 | 1.56** | 0.73 | 0.84 | 1.53** | 0.3 | -6.52*** |
| | | (2.21) | (0.12) | (-0.22) | (2.1) | (0.47) | (0.67) | (2.07) | (0.16) | (-4.24) |
| 6 | CL | | | | -17.47*** | 5.89 | 48.31 | -1.16 | -2.58 | 85.35* |
| | | | | | (-3.34) | (0.98) | (1.21) | (-0.34) | (-0.27) | (1.96) |
| 7 | CLxBVS | | | | 4.29*** | 0.25 | 1.34* | 0.09 | 0.86*** | 1.29 |
| | | | | | (3.61) | (0.74) | (1.92) | (0.11) | (4.16) | (1.59) |
| 8 | CLxEPS | | | | -5.95* | -0.36 | -2.19 | -4.73*** | -0.91 | -5.27** |
| | | | | | (-1.77) | (-0.24) | (-1.00) | (-2.67) | (-0.51) | (-2.21) |
| 9 | IRxCL | | | | | | | -17.00** | 15.49 | -57.79 |
| | | | | | | | | (-2.44) | (1.24) | (-1.32) |
| 10 | IRxCLxBVS | | | | | | | 3.56** | -0.99* | -0.75 |
| | | | | | | | | (2.19) | (-1.97) | (-1.05) |
| 11 | IRxCLxEPS | | | | | | | 0.91 | 0.75 | 8.37*** |
| | | | | | | | | (0.28) | (0.27) | (4.18) |
| 12 | Constant | -44.49*** | 134.35** | -774.98 | -46.49*** | 168.51*** | -662.62 | -47.02*** | 168.51*** | -627.91 |
| | | (-2.95) | (2.56) | (-1.13) | (-3.07) | (2.73) | (-1.53) | (-3.08) | (2.72) | (-1.40) |
| | CTRL variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | N firm/year | 575 | 216 | 127 | 575 | 216 | 127 | 575 | 216 | 127 |
| | Adj. R^2 | 0.532 | 0.753 | 0.451 | 0.563 | 0.759 | 0.601 | 0.562 | 0.764 | 0.624 |

The signs next to the interaction terms suggests non-directional prediction for the impact of IR on value relevance of accounting summary. Firms are allocated to small, medium, and large size categories following their listing on JSE indices. Firms that fall in the JSE Top40 are classified as large-size firms. On the other hand, firms that belong to JSE MidCap are categorized in the medium size class. All what is left after classifying firms into large and medium size companies are small-size firms. Column 1 to 3 list the regression results using Model 4 for small, medium, and large firms respectively. Column 4 to 6 list the regression results using Model 5 for small, medium, and large firms respectively. Column 7 to 9 list the regression results using Model 6 for small, medium, and large firms respectively Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.

Regarding the findings related to earnings of medium-size firms, examining Table 37 (line 2) columns (5) & (8) shows that earnings before the application of IR for NCL firms is value relevant for the investors trading medium-size stocks at a 1% level. On the other hand, IR appears to have no significant impact on the value relevance of earnings (line 5) using both Model 5 & Model 6 thereby not providing sufficient evidence to support H2. Similarly, cross-listing appears to have a negative but insignificant effect on the value relevance of earnings as the previous columns show (Columns 5 & 8 - line 8) leading to a lack of evidence to support H4. Similarly, the interaction term of IR and CL with earnings is positive (column 8 – line 11) but not significant or sufficient to accept H6.

However, to address whether earnings are value relevant, a significant impact can be observed using Model 5 with a sum of coefficients $\alpha_2+\alpha_5+\alpha_{13}$ that is positive (6.12) and significant at a 1% level (F=29.2, P<0.0000). Furthermore, a similar effect can be detected using Model 6 with a value of (5.77) resulting from the sum of $\alpha_2+\alpha_5+\alpha_{13}+\alpha_{16}$ that is significant at 1% level (F=24.64, P<0.0000). Accordingly, by using Model 5 & Model 6 there are enough evidence to support H8 which demonstrates that earnings are value relevant.

Regarding the results of large-size firms as far as the equity book value is concerned, it is noticeable that equity book value before IR adoption for NCL firms shows little evidence on its relevance in investors' assessment of the market value of large firms (at 10% and 5% levels) as Table 37 exhibits in line (1) columns (6) & (9) respectively show. However, the impact of IR on the value relevance of large firms' equity appears to be

negative and significant using Model 5 at 5% level but not significant using Model 6. Thereby, leading to a support for the H1 using Model 5 and rejecting it using Model 6.

CL appears to not significantly affect the value relevance of equity for large firms as line (7) columns (6) & (9) show not providing sufficient evidence to support the alternative hypothesis H3. In respect to the impact of the interaction term of IR and CL on equity value relevance, column (9) line (10) provide no evidence to support H5. Turning now to address the question whether equity book value is value relevant, the sum of the related coefficients $(\alpha_1+\alpha_4+\alpha_{12})$ is (1.45) which is significant at a 5% level (F=4.02, P<0.0173). Similarly, using Model 6 yields similar results of Model 5 with a sum of coefficients $(\alpha_1+\alpha_4+\alpha_{12}+\alpha_{15})$ equal to (1.53) significant at 5% level (F=3.68, P<0.0162). Thereby, the previous results provide sufficient evidence at a 5% level in favour of H7.

Turning to the value relevance of earnings before the adoption of IR for large NCL firms, Table 37 demonstrates that earnings show little relevance to investors at 10% level using Model 5 but significant role using Model 6 at 1% level.

On the other hand, there is a controversy regarding the impact of IR on the value relevance of earnings for large size firms. Interestingly, while there is insignificant but positive impact of IR on the value relevance of earnings using Model 5, IR turns to influence earnings relevance using Model 6 negatively and significantly at 1% level. The last finding contradicts H2 that postulates a positive impact of IR on the value relevance of earnings for large firms.

Turning now to the impact of CL on the value relevance of earnings, line 8 of Table 37 for large-size firms shows that CL has a negative and insignificant effect on the value relevance of earnings using Model 5 but also a negative and significant impact on earnings at 5% level leading to unexpected adverse support to H4 using Model 6. On the other hand, the interaction term between IR and CL appears to impact the value relevance of earnings significantly at 1% level as line (11) column (9) demonstrate leading to accepting the alternative hypothesis H6.

In terms of addressing the question of whether earnings are value relevant, the sum of the coefficients ($\alpha_2 + \alpha_5 + \alpha_{13}$) is positive (1.34) but in significant (F=2, P<0.1377) using Model 5. Furthermore, using Model 6 shows a sum of coefficients ($\alpha_2 + \alpha_5 + \alpha_{13} + \alpha_{16}$) that equals to (1.86) which is significant at 1% level (F=5.67, P<0.0019) providing enough evidence to support H8 using Model 6. I summarise the outcomes related to JSE method in Table 38 which lists the results for medium and large firms using Model 5 & Model 6.

Table 38 Summary results for the period 2008-2013 following JSE classification

| Panel A: Alternative hypotheses | | | | |
|---|---|---|---|---|
| | **IR** | **CL** | **Interaction** | **Accounting Summary** |
| BVS | H1 | H3 | H5 | H7 |
| EPS | H2 | H4 | H6 | H8 |
| **Panel B: Small-Size Firms** | | | | |
| Model 5 | **IR** | **CL** | **Interaction** | **Accounting Summary** |
| BVS | - | P*** | | P*** |
| EPS | P** | N* | | N** |
| Model 6 | | | | |
| BVS | - | - | P** | P*** |
| EPS | P** | N*** | - | P** |
| **Panel C: Medium-Size Firms** | | | | |
| Model 5 | **IR** | **CL** | **Interaction** | **Accounting Summary** |
| BVS | P** | - | | P*** |
| EPS | - | - | | P*** |
| Model 6 | | | | |
| BVS | P** | P*** | N* | P*** |
| EPS | - | - | - | P*** |
| **Panel D: Large-Size Firms** | | | | |
| Model 5 | **IR** | **CL** | **Interaction** | **Accounting Summary** |
| BVS | N** | P* | | P** |
| EPS | - | - | | - |
| Model 6 | IR | CL | Interaction | Accounting Summary |
| BVS | - | - | - | P** |
| EPS | N*** | N** | P*** | P*** |

Panel A: Lists the examined hypotheses in this chapter. Other panels B, C, and D list the outcomes of testing these hypotheses for small, medium, and large firms respectively. While (N) stands for negative coefficients, (P) stands for positive coefficients. When an alternative hypothesis is not supported, It's relative location in panels B, C, or D is replaced with "-". Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

### 6.4.3 Size outcomes for 2008-2016

In this section the results of regressing Model 5 & Model 6 will be presented for the period 2008-2016 that demonstrate the effect of Cross-Listing (CL) alongside Integrated Reporting (IR) on the value relevance of accounting summary for different size categories. The findings will be discussed using two categorization techniques, the ranking and JSE methods.

### 6.4.3.1 The ranking classification

The findings of regressing Model 5 & Model 6 are listed in Table 39 according to the size category of pooled firms. Columns (1) to (3) represent the results of regressing the independent variables on the market price using Model 4 to contrast and compare its outcomes with both Model 5 & Model 6. Columns (4) & (5) exhibit the results of regressing Model 5 for medium and large firms respectively. Columns (6) & (7) represent the results of regressing Model 6 for medium and large firms respectively.

By observing the results related to medium-size firms using Model 5 & Model 6 as far as the value relevance of equity is concerned – as respectively demonstrated in columns (4) & (6) of Table 39 – it is found that equity book value before the adoption of IR and for non-cross-listed (NCL) firms is relevant for investors regarding their assessment to the firm's value at a 5% level as line (1) of the mentioned columns shows. However, when examining the impact of IR on the value relevance of equity book value, a negative impact can be detected at 5% level (line 4) providing sufficient evidence to support H1 for both Model 5 & Model 6. On the other hand, CL seems have no significant effect on the value relevance of equity book value providing not enough evidence to support H3 using both models. Regarding the common effect of IR and CL on the value relevance of equity book value, the relationship is not significant leading to reject H5.

Shifting the focus to address whether equity book value is relevant, the sum of the coefficients $(\alpha_1+\alpha_4+\alpha_{12})$ using Model 5 is positive with a value of (0.24) that is insignificant at 5% level (F=2.46, P>0.0682) providing no evidence to support H7. Similarly, using Model 6 produces insignificant results (F=1.99, P<0.1036).

Regarding the findings related to earnings of medium-size firms, examining Table 39 (line 2) columns (4) & (6) shows that earnings before IR adoption for NCL firms is not value relevant for the investors trading medium-size stocks at 5% level. On the other hand, IR demonstrates a positive and significant impact on the value relevance of earnings (line 5) at 1% level when both Model 5 & Model 6 are used providing enough support to H2. Similarly, cross-listing appears to have a positive and significant effect on the value relevance of earnings using Model 5 (Columns 4 - line 8). However, this effect does not hold when using Model 6 leading to enough evidence to support H4 using the former model while providing insufficient evidence to support H4 using the latter model.

In respect to the interaction term of IR, CL, with the earnings, Table 39 shows a significant and positive impact of both events on the value relevance of earnings at a 1% level providing enough evidence to support H6.

However, to address whether earnings are value relevant, a significant and positive impact can be observed using Model 5 with a value of (10.96) resulting from adding up the following coefficients $\alpha_2 + \alpha_5 + \alpha_{13}$ (F=23.75, P<0.0000). Furthermore, a similar effect can be detected using Model 6 with a value of (11.06) resulting from the sum of $\alpha_2 + \alpha_5 + \alpha_{13} + \alpha_{16}$ that is significant at 1% level (F=19.14, P<0.0000). Thereby, by using Model 5 & Model 6 there are enough evidence is detected to support H8.

Table 39 Regression analyses SML firms using the Ranking method (2008-2016)

| | VARS | 1 M4-S | 2 M4-M | 3 M4-L | 4 M5-M | 5 M5-L | 6 M6-M | 7 M6-L |
|---|---|---|---|---|---|---|---|---|
| 1 | BVS | 0.21** | 0.99** | 1.11 | 1.06** | 1.05 | 1.05** | 0.71 |
| | | (2.53) | (2.55) | (1.4) | (2.6) | (1.53) | (2.52) | (1.41) |
| 2 | EPS | -0.28 | 2.33* | 3.10*** | 1.95* | 2.72** | 1.98* | 4.61*** |
| | | (-1.20) | (1.93) | (2.88) | (1.73) | (2.02) | (1.71) | (3.7) |
| 3 | IR | -0.52 | 12.52*** | 24.71* | 14.28*** | 29.67** | 14.31*** | 40.55*** |
| | | (-1.03) | (2.9) | (1.8) | (3.3) | (2.04) | (3.27) | (2.79) |
| 4 | IRxBVS (+/-) | -0.05 | -0.78** | 0.08 | -0.84** | -0.27 | -0.82** | 0.59*** |
| | | (-1.02) | (-2.14) | (0.17) | (-2.16) | (-0.67) | (-2.08) | (2.82) |
| 5 | IRxEPS (+) | 0.41* | 4.33*** | -0.78 | 3.43*** | -0.13 | 3.33*** | -4.00*** |
| | | (1.72) | (2.89) | (-0.47) | (2.84) | (-0.11) | (2.74) | (-2.87) |
| 6 | CL | | | | -7.05* | 10.72 | 0.22 | 17.27 |
| | | | | | (-1.89) | (0.61) | (0.05) | (0.71) |
| 7 | CLxBVS (+/-) | | | | 0.02 | 0.81 | 0.87 | 1.76** |
| | | | | | (0.07) | (1.35) | (0.88) | (2.34) |
| 8 | CLxEPS (+) | | | | 5.58*** | -0.12 | -1.54 | -3.15 |
| | | | | | (4.46) | (-0.07) | (-1.01) | (-1.54) |
| 9 | IRxCL | | | | | | -7.92 | -10.59 |
| | | | | | | | (-1.31) | (-0.55) |
| 10 | IRxCLxBVS (+/-) | | | | | | -0.87 | -1.48** |
| | | | | | | | (-0.82) | (-2.45) |
| 11 | IRxCLxEPS | | | | | | 7.29*** | 5.23** |
| | | | | | | | (4.29) | (2.61) |
| 12 | Constant | -10.15* | 92.67*** | -309.26 | 78.06*** | -127.45 | 73.96*** | -86.3 |
| | | (-1.95) | (2.87) | (-1.35) | (3.47) | (-0.78) | (3.31) | (-0.55) |
| | Ctrl variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | N firm/year | 452 | 470 | 455 | 470 | 455 | 470 | 455 |
| | Adj. R^2 | 0.474 | 0.743 | 0.603 | 0.812 | 0.662 | 0.813 | 0.674 |

Firms are divided into small, medium, and large firms based on each year ranking in terms of the market value of a firm. Afterwards, firms are categorized into their size class according to their position regarding the 33.33 and 66.67 percentiles. Columns (1) to (3) represents the regression results using Model 4 (M4) before introducing both cross-listing and its interaction with IR. Columns (1), (2), (3) list the regression results after categorically pooling each class of small (S), medium (M), and large (L) firms respectively and independently. Columns (4), (5) exhibit the results of pooling medium, and large firms respectively after controlling for cross-listing using Model 5 (M5). Columns (6), (7) list the outcome of regressing medium and large firms after controlling for cross-listing and its interaction with both the accounting summary variables and IR using Model 6 (M6). It worth noting that small firms were excluded from the last two sections of Table 35 because of the limited number of small firms cross-listing. Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Regarding the results of large-size firms as far as the equity book value is concerned, it is noticeable that equity book value before the adoption of IR and for NCL firms is not relevant in assessing the market value of large firms from the perspective of investors as Table 39 exhibits (line 1 & columns (5) & (7)). Similarly, there is no significant impact of IR on the value relevance of equity book value as line (4) of column (5) of Table 39

shows. However, IR appears to positively affect the value relevance of equity book value for large firms at 1% level providing sufficient evidence in favour of H1 using Model 6 but not Model 5. Likewise, CL does not appear to have a positive effect on the value relevance of equity book value for large firms using Model 5. Nonetheless, CL positively and significantly impact the value relevance of equity book value on a 5% level leading to enough evidence to H3 using Model 6 but not Model 5. In respect to the impact of the interaction term of IR and CL on equity value relevance, column (7) line (10) provide a negative and significant evidence on the impact of both variables on the equity book value at a 5% level leading to sufficient evidence in support of H5.

Turning now to address the question whether equity book value is value relevant, the sum of the related coefficients ($\alpha_1+\alpha_4+\alpha_{12}$) is (1.59) which is significant at a 1% level (F=7.53, P<0.0002). Similarly, using Model 6 yields similar results of Model 5 with a sum of coefficients ($\alpha_1+\alpha_4+\alpha_{12}+\alpha_{15}$) equal to (1.58) significant at 1% level (F=12.73, P<0.0000). Thereby, the previous results provide sufficient evidence at 1% level in favour H7.

In contrary to the insignificance role of equity book value in assessing the market value of equity for NCL firms before the adoption of IR, Table 39 demonstrates that earnings are value relevant as line 2 exhibits at 5% and 1% levels using Model 5 & Model 6 respectively. On the other hand, there is a controversy regarding the impact of IR on the value relevance of earnings for large size firms. Interestingly, while there is insignificant impact of IR on the value relevance of earnings using Model 5, IR turns to influence earnings relevance using Model 6 negatively and significantly at 1% level. The last

finding contradicts hypothesis H2 that postulates a positive impact of IR on the value relevance of earnings.

Turning now to the impact of CL on the value relevance of earnings, line 8 of Table 39 for large-size firms shows that CL has a negative and insignificant effect on the value relevance of earnings leading to insufficient evidence to support H4. However, the interaction term between IR and CL appears to impact the value relevance of earnings significantly at a 1% level as line (11) column (7) providing enough evidence to support H6.

In terms of addressing the question of whether earnings are value relevant, the sum of the coefficients $(\alpha_2+\alpha_5+\alpha_{13})$ is positive (2.47) and significant at 1% level (F=4.93, P<0.0039) using Model 5. Furthermore, using Model 6 shows a sum of coefficients $(\alpha_2+\alpha_5+\alpha_{13}+\alpha_{16})$ that equals to (2.69) which is significant at 1% level (F=8.5, P<0.0000) providing enough evidence to support H8.

I summarise the outcomes the ranking method for period 2008-2016 in Table 40 which lists the results for medium and large firms using Model 5 & Model 6.

Table 40 Results summary for the period 2008-2016 using the ranking method

**Panel A: Alternative hypotheses**

|  | IR | CL | Interaction | Accounting Summary |
|---|---|---|---|---|
| BVS | H1 | H3 | H5 | H7 |
| EPS | H2 | H4 | H6 | H8 |

**Panel B: Medium-Size Firms**

| Model 5 | IR | CL | Interaction | Accounting Summary |
|---|---|---|---|---|
| BVS | N** | - |  | P* |
| EPS | P*** | P*** |  | P*** |
| Model 6 |  |  |  |  |
| BVS | N** | - | - | - |
| EPS | P*** | H04 | P*** | P*** |

**Panel C: Large-Size Firms**

| Model 5 | IR | CL | Interaction | Accounting Summary |
|---|---|---|---|---|
| BVS | - | - |  | P*** |
| EPS | - | - |  | P*** |
| Model 6 |  |  |  |  |
| BVS | P*** | P** | N** | P*** |
| EPS | N*** | - | P** | P*** |

Panel A: Lists the examined hypotheses in this chapter. Both panels B and C list the outcomes of testing these hypotheses for medium, and large firms respectively. While (N) stands for negative coefficients, (P) stands for positive coefficients. When an alternative hypothesis is not supported, it's relative location in panels B and C is replaced with "-". Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

### 6.4.3.2 *The market classification*

The findings of regressing Model 5 & Model 6 are listed in Table 41 according to the size category of pooled firms. Columns (1) to (3) represent the results of regressing the independent variables on the market price using Model 4 to contrast and compare its outcomes with both Model 5 & Model 6. Columns (4), (5) and (6) exhibit the results of regressing Model 5 for small, medium, and large firms respectively. Columns (7), (8), and (9) represent the results of regressing Model 6 for small, medium, and large firms respectively.

By observing the results related to small-size firms using Model 5 & Model 6 as far as the value relevance of equity is concerned – as respectively demonstrated in columns (4)

& (7) of Table 41 – it is found that equity book value negatively affects an investor's assessment of firms that are not cross-listed (NCL) and before the adoption of IR at 1% level as line (1) of the mentioned columns shows. On the other hand, IR appears to have no significant impact on the value relevance of equity book value as line (4) of columns (4) & (7) shows in Table 41 resulting in rejecting H1.

CL appears to have no significant effect on the value relevance of equity book value for small firms using either model leading to the rejection of H3. Regarding the common effect of IR and CL on the value relevance of equity book value, the coefficient on the interaction term is negative and insignificant as line (10) and column (7) providing no evidence to support H5.

Shifting the focus to address whether equity book value is relevant, the sum of the coefficients ($\alpha_1+\alpha_4+\alpha_{12}$) using Model 5 is negative with a value of (-0.07) that is significant at a 5% level (F=3.54, P<0.0172) providing some evidence to support H7. Similarly, using Model 6 produces a negative sum (-0.07) that is significant at a 5% level (F=2.71, P>0.0336).

Regarding the findings related to earnings of NCL small-size firms and before IR adoption, examining Table 41 (line 2) columns (4) & (7) shows that earnings is value relevant to the investors trading small-size stocks at a 1% level. Similarly, IR demonstrates a positive and significant impact on the value relevance of earnings (line 5) at a 1% level when both Model 5 & Model 6 are run leading to enough evidence to support H2. Furthermore, CL appears to have a positive and significant effect on the value relevance of earnings for small firms at 1% using Model 5 while negatively

affecting the earnings relevance on a 1% level using Model 6 leading to a contradicting prediction of H4. In respect to the common effect of both IR and CL on the value relevance of earnings, line (11) and column (7) provides a significant and positive coefficient at a 1% level supporting H6.

To address whether earnings are value relevant for small-firm investors, the sum of the coefficients $\alpha_2+\alpha_5+\alpha_{13}$ is positive (11.45) and significant at 1% level (F=14.93, P<0.0000). Likewise, a positive sum of $\alpha_2+\alpha_5+\alpha_{13}+\alpha_{16}$ is found (11.54) to be significant at 1% level (F=12.26, P<0.0000). Thereby, by using Model 5 & Model 6 there is enough evidence to support H8 which demonstrates that earnings are value relevant.

Moving to the results of medium-size firms using Model 5 & Model 6 as far as the value relevance of equity is concerned – as respectively demonstrated in columns (5) & (8) of Table 41 – it is found that equity book value before the adoption of IR and for NCL firms is adversely relevant to investors regarding their assessment to the firm's value using Model 5 and is significant using Model 6 at a 5% level. However, when examining the impact of IR on the value relevance of equity neither Model 5 nor Model 6 provide a significant impact of IR on equity book value leading to the rejection of H1.

However, when exploring the impact of CL on the value relevance of equity book value, Model 5 provides no significant evidence on this impact while Model 6 shows a positive and significant impact of CL on the book value of medium-size firms leading to a support of hypothesis H3 using Model 6 but not Model 5. Regarding the common effect of IR and CL on the value relevance of equity book value, the coefficient on the interaction term (line 10) is negative but insignificant and shows no support to H5.

Regarding whether equity book value is relevant, the sum of the coefficients $(\alpha_1+\alpha_4+\alpha_{12})$ using Model 5 is positive (0.55) and significant at a 5% level (F=3.47, P<0.0221) Furthermore. using Model 6 produces similar results (Value=0.52 and F=6.61, P>0.0002) that is significant at a 1% level leading to sufficient evidence to support the alternative hypothesis H7.

Table 41 Regression analyses using JSE size classification (2008-2016)

| | VARS | 1 M4-S | 2 M4-M | 3 M4-L | 4 M5-S | 5 M5-M | 6 M5-L | 7 M6-S | 8 M6-M | 9 M6-L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BVS | -0.60** | -0.14 | 1.45* | -0.67*** | -0.19 | 1.52** | -0.67*** | -0.22** | 1.30** |
| | | (-2.17) | (-0.83) | (1.75) | (-2.69) | (-1.45) | (2.12) | (-2.70) | (-2.09) | (2.62) |
| 2 | EPS | 2.96** | 5.55*** | 2.52* | 3.12*** | 6.01*** | 2.29 | 3.15*** | 5.55*** | 5.45*** |
| | | (2.34) | (7.1) | (1.89) | (2.72) | (6.78) | (1.43) | (2.75) | (5.8) | (3.57) |
| 3 | IR | 2.92 | 27.42*** | 79.25* | 2.06 | 24.64** | 50.61 | 2.26 | 21.29** | 60.82 |
| | | (1.48) | (2.88) | (1.77) | (1.07) | (2.64) | (1.18) | (1.13) | (2.42) | (1.19) |
| 4 | IRxBVS | 0.22 | 0.75*** | -0.26 | 0.27 | 0.25 | -0.67 | 0.28 | 0.36 | 0.16 |
| | | (1.25) | (3.1) | (-0.65) | (1.45) | (0.84) | (-1.37) | (1.49) | (1.07) | (0.57) |
| 5 | IRxEPS | 2.95*** | -0.81 | -1.09 | 1.80*** | 1.69 | 0.24 | 1.75*** | 2.23 | -5.36*** |
| | | (3.1) | (-0.68) | (-0.66) | (3.01) | (1.05) | (0.19) | (2.91) | (1.23) | (-4.85) |
| 6 | CL | | | | -12.13** | 22.27** | 72.97* | -2.11 | -2.29 | 98.07* |
| | | | | | (-2.22) | (2.55) | (1.73) | (-0.70) | (-0.21) | (2.01) |
| 7 | CLxBVS | | | | 0.33 | 0.49 | 0.9 | 0.58 | 0.94*** | 1.53* |
| | | | | | (0.78) | (1.46) | (1.42) | (0.76) | (4.21) | (1.96) |
| 8 | CLxEPS | | | | 6.53*** | -3.79** | -1.67 | -4.76*** | -1.08 | -6.04** |
| | | | | | (3.39) | (-2.35) | (-0.81) | (-2.94) | (-0.59) | (-2.66) |
| 9 | IRxCL | | | | | | | -10.25 | 28.50** | -22.1 |
| | | | | | | | | (-1.54) | (2.01) | (-0.43) |
| 10 | IRxCLxBVS | | | | | | | -0.26 | -0.56 | -1.19 |
| | | | | | | | | (-0.28) | (-1.33) | (-1.64) |
| 11 | IRxCLxEPS | | | | | | | 11.40*** | -3 | 7.02*** |
| | | | | | | | | (4.56) | (-1.17) | (3.93) |
| 12 | Constant | -35.23* | 183.11*** | -517.55 | -40.63** | 195.27*** | -556.03 | -41.33** | 199.76*** | -566.05 |
| | | (-1.85) | (-3.34) | (-0.76) | (-2.37) | (3.13) | (-1.32) | (-2.40) | (3.17) | (-1.36) |
| | Ctrl V & fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | N firm/year | 878 | 325 | 174 | 878 | 325 | 174 | 878 | 325 | 174 |
| | Adj. R^2 | 0.57 | 0.672 | 0.486 | 0.694 | 0.699 | 0.632 | 0.695 | 0.707 | 0.649 |

Firms are divided into small, medium, and large firms based on JSE's indices. While firms that belong to JSE Top40 index are considered large firms, firms that belong to JSE MedCap index are classified medium size. Otherwise, firms that do not belong to either of the previous indices are considered small firms. Columns (1) to (3) represents the regression results using Model 4 (M4) before introducing both cross-listing and its interaction with IR for Small, Medium, and Large firms. Columns (4 to 6) list the regression results of Model 5 after introducing the CL and its interaction with the accounting summary figures for small, medium, and large firms. Columns (7 to 9) list the results of Model 6 after interacting IR, CL and the accounting summary for Small, Medium, and Large firms. Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.01$.

Regarding the findings related to earnings of medium-size firms, examining Table 41 (line 2) columns (5) & (8) shows that earnings before the application of IR for NCL firms is value relevant for the investors trading medium-size stocks at a 1% level. On the other hand, IR appears to have no significant impact on the value relevance of earnings (line 5) using both Model 5 & Model 6 thereby providing no sufficient evidence to support H2.

However, CL appears to negatively affect the value relevance of earnings using model (2) at a 5% level while being insignificant using Model 6, therefore, only Model 5 provides an adverse support to H4. Similarly, the interaction term of IR and CL with earnings is negative (column 8 – line 11) but insignificant and insufficient to accept H6.

However, to address whether earnings are value relevant, a significant impact can be observed using Model 5 with a sum of coefficients $\alpha_2+\alpha_5+\alpha_{13}$ that is positive (3.91) and significant at a 1% level (F=21.7, P<0.0000). Furthermore, a similar effect can be detected using Model 6 with a value of (3.70) resulting from the sum of $\alpha_2+\alpha_5+\alpha_{13}+\alpha_{16}$ that is significant at 1% level (F=17.64, P<0.0000). Accordingly, by using Model 5 & Model 6 there are enough evidence to support H8 which demonstrates that earnings are value relevant.

Regarding the results of large-size firms as far as the equity book value is concerned, it is noticeable that equity book value before IR adoption for NCL firms is relevant to investors' assessment of the market value of large firms (at 5% level) as Table 41 exhibits in line (1) columns (6) & (9) respectively show. However, the impact of IR on the value

relevance of large firms' equity is not statistically significant and provide no evidence to support H1.

CL appears to have no significant affect the value relevance of equity for large firms as line (7) columns (6) & (9) show providing no sufficient evidence to support H3 or limited evidence at a 10% level using Model 6. In respect to the impact of the interaction term of IR and CL on equity value relevance, column (9) line (10) provide no evidence to H5.

Turning now to address the question whether equity book value is value relevant, the sum of the related coefficients ($\alpha_1+\alpha_4+\alpha_{12}$) is (0.52) which is significant at a 1% level (F=15.81, P<0.0000). Similarly, using Model 6 yields similar results of Model 5 with a sum of coefficients ($\alpha_1+\alpha_4+\alpha_{12}+\alpha_{15}$) equal to (1.80) significant at a 1% level (F=14.51, P<0.000). Thereby, the previous results provide sufficient evidence at a 1% level in favour of H7.

Turning to the value relevance of earnings before the adoption of IR for large NCL firms, Table 41 demonstrates that earnings show no relevance to investors using Model 5 but have significant role using Model 6 at a 1% level.

On the other hand, there is a controversy regarding the impact of IR on the value relevance of earnings for large size firms. Interestingly, while there is insignificant but positive impact of IR on the value relevance of earnings using Model 5, IR turns to influence earnings relevance using Model 6 negatively and significantly at a 1% level. The last finding contradicts hypothesis H2 that postulates a positive impact of IR on the value relevance of earnings for large firms.

Regarding the impact of CL on the value relevance of earnings for large-size firms, line 8 of Table 41 shows that CL has no significant effect on the value relevance of earnings using Model 5 but a negative and significant impact on earnings at 5% level using Model 6 leading to unexpected adverse support H4. On the other hand, the interaction term between IR and CL appears to impact the value relevance of earnings significantly at a 1% level as line (11) column (9) demonstrate leading to accepting H6.

In terms of addressing the question of whether earnings are value relevant, the sum of the coefficients ($\alpha_2+\alpha_5+\alpha_{13}$) is positive (0.86) but in significant (F=1.03, P>0.396) using Model 5. Furthermore, using Model 6 shows a sum of coefficients ($\alpha_2+\alpha_5+\alpha_{13}+\alpha_{16}$) that equals to (1.07) which is significant at a 1% level (F=6.58, P>0.0007) providing enough evidence to support H8 using Model 6.

I summarise the outcomes related to JSE method in which lists the results for medium and large firms using Model 5 & Model 6.

Table 42 Summary results for the period 2008-2016 following JSE classification

**Panel A: Alternative hypotheses**

|  | IR | CL | Interaction | Accounting Summary |
|---|---|---|---|---|
| BVS | H1 | H3 | H5 | H7 |
| EPS | H2 | H4 | H6 | H8 |

**Panel B: Small-Size Firms**

| Model 5 | IR | CL | Interaction | Accounting Summary |
|---|---|---|---|---|
| BVS | - | - |  | N** |
| EPS | P*** | P*** |  | P*** |
| Model 6 |  |  |  |  |
| BVS | - | - | - | N** |
| EPS | P*** | N*** | P*** | P*** |

**Panel C: Medium-Size Firms**

| Model 5 | IR | CL | Interaction | Accounting Summary |
|---|---|---|---|---|
| BVS | - | - |  | P** |
| EPS | - | N** |  | P*** |
| Model 6 |  |  |  |  |
| BVS | - | P*** | - | P*** |
| EPS | - | - | - | P*** |

**Panel D: Large-Size Firms**

| Model 5 | IR | CL | Interaction | Accounting Summary |
|---|---|---|---|---|
| BVS | - | - |  | P*** |
| EPS | - | - |  | - |
| Model 6 |  |  |  |  |
| BVS | - | P* | - | P*** |
| EPS | N*** | N** | P*** | P*** |

Panel A: Lists the examined hypotheses in this chapter. Other panels B, C, and D list the outcomes of testing these hypotheses for small, medium, and large firms respectively. While (N) stands for negative coefficients, (P) stands for positive coefficients. When an alternative hypothesis is not supported, it's relative location in panels B, C, or D is replaced with "-". Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

### 6.4.4 Robustness check

#### 6.4.4.1 Quantile regression

Studying the value relevance of accounting summary after the adoption of IR has demonstrated the probable sensitivity of the findings to influential observations and the heteroscedasticity of the error term. Despite this research adopted different techniques to deal with outliers and followed recommendations by Kothari and Zimmerman (1995) to overcome the problem of heteroscedasticity, applying a new regression technique that is

robust for both problems may provide better understanding of the value relevance under IR and CL[45].

The replication of the work of BR (2016) in a previous chapter has demonstrated that that the use of Cook's distance as a statistical technique to drop influential observations has eliminated key firms that are at the forefront of IR adopters. Such a procedure may introduce bias to the regression coefficients and may influence the inferences about the JSE population. Furthermore, by using other techniques to dimmish the impact of outliers or other methodologies to examine the value relevance of accounting summary, this research produced contradicting results to those of BR's. Cahan et al. (2000) express concerns related to dealing with extreme values as outliers in a reporting environment in which such unusual observations are likely to occur. Moreover, the over representation of small firms in South Africa complicates dealing with outliers (Hearn et al., 2010). In other words, outliers and influential observations are common in an emerging market such as South Africa. Consequently, using another methodology which is resistant to the existence of outliers and influential observations may improve our understanding of the value relevance of accounting summary under IR and CL.

Provided the previous context, quantile regression appears to be another reasonable methodology to explore the value relevance of accounting summary for some advantageous attributes over OLS but should not be interpreted as a robust method to the latter. One of the basic attributes of quantile regression is its insensitivity to outliers and

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[45] Kothari and Zimmerman (1995) suggest using White's (1980) standard errors as a remedy for the heteroscedasticity problem.

influential observations (Wooldridge, 2010). In fact, quantile regression is based on studying the effect of independent variables on different quantiles or in special cases on the median of the dependent variable (Wooldridge, 2013). Another important attribute of quantile regression is that it does not assume an independence between the error term and the independent variable values which makes it robust to the heteroscedasticity of error term (Wooldridge, 2010). However, because the data is skewed, and error term is not symmetric, the differences in the results between quantile regression and OLS cannot only be attributed to the existence of outliers or influential observations. As Wooldridge (2010) expresses that comparing the outcomes of quantile regression and OLS and attributing the difference to influential observations is not the correct approach if error term is not homogeneous.

From Table 59 & Table 60 in Appendix 11.3, it appears that IR does not affect the value relevance of accounting summary using either Model 4, Model 5 or Model 6 when all firms are regressed regardless of their size. These findings confirm the outcomes of regressing firms using OLS as discussed in section 6.4.1. However only CL seems to impact the value relevance of equity book value using Model 5 & Model 6 over the periods 2008-2013 and 2008-2016 which is in line with CL literature.

The findings related to the size category using either ranking or JSE methods will be provided in the discussion section to compare them with the OLS findings and provide further understanding to the impact of IR and CL on the value relevance of accounting summary.

### 6.4.4.2 Learning Hypothesis

Foucault and Frésard (2012) suggest that managers of CL firms learn from the market price of their stocks and integrate the related information in their decision process regarding future investments. The importance of the learning theory in the context of IR is that mangers may learn from the stock market price after the advent of IR through the process of (integrated thinking). Therefore, I follow Foucault and Frésard (2012) in examining whether the sensitivity of investment to the market price has increased after the adoption of IR or CL to infer that managers are learning from the market price and adjusting their investment decisions accordingly.

$$I_{i,t} = \alpha + \beta_0 Q_{i,t-1} + \beta_1 CL_{i,t-1} + \beta_2 IR_{i,t-1} + \beta_3 Q_{i,t-1} * IR_{i,t-1} + \beta_4 IR_{i,t-1} * CL_{i,t-1}$$
$$+ \beta_5 IR_{i,t-1} * Q_{i,t-1} + \beta_6 IR_{i,t-1} * Q_{i,t-1} * CL_{i,t-1} + \beta_7 Size_{i,t-1} + \varepsilon_{i,t}$$

Model 7

$I_{i,t}$ refers to the investment in a firm i for year t. It is calculated by measuring the change in fixed assets of year (i) in comparison to year (i-1). $Q_{i,t-1}$ refers to Tobin's q for firm (i) lagged one year before (i-1) and is calculated by adding the market value of an equity for firm (i) to the difference between the book value of assets and equity then dividing the outcome to the book value of assets. IR, CL are both time dummy variables that take the value of one if time falls after the adoption of IR or after cross listing respectively. $Size_{i,t-1}$ is the natural logarithm of total assets. In Model 7, I control for time and industry fixed effects following Foucault and Frésard (2012) and cluster the standard errors on the firm level. However, one limitation of Model 7 is that it does not control for the streams of cash flow which is found to be correlated with investments (Foucault & Frésard, 2012).

Table 43 and Table 44 display the outcome sensitivity of regressing investments on the market price of stock for different size of firms using ranking and JSE method respectively. What can be observed is that investments are sensitive to the market price of stocks before the adoption of IR or CL for all firms except large firms according to JSE classification. There is limited to full evidence on the positive impact of cross listing on the sensitivity of investments to the market price Table 43 and Table 44 shows (Q*CL). This suggests that cross-listing provides managers of the related firms with extra information to integrate in the decisions regarding future investments.

Table 43 Investment sensitivity to market price using Ranking method (2008-2016)

| VARIABLES | 1 All | 2 M | 3 L |
|---|---|---|---|
| Q | 0.08*** | 0.11*** | 0.04** |
|  | (4.67) | (2.86) | (2.09) |
| CL | -0.09* | -0.31 | -0.16*** |
|  | (-1.79) | (-1.60) | (-2.76) |
| IR | -0.06* | 0.03 | -0.04 |
|  | (-1.66) | (0.51) | (-0.78) |
| QxCL | 0.02 | 0.30* | 0.06** |
|  | (0.84) | (1.94) | (2.47) |
| IRxCL | 0.07 | 0.21 | 0.12* |
|  | (1.28) | (1.03) | (1.92) |
| IRxQ | -0.01 | -0.07* | 0.01 |
|  | (-0.87) | (-1.93) | (0.74) |
| IRxQxCL | -0.03 | -0.25 | -0.06** |
|  | (-0.96) | (-1.56) | (-2.10) |
| SIZE | 0 | -0.04*** | 0 |
|  | (-0.07) | (-3.37) | (0.12) |
| Constant | -0.14* | 0.25 | -0.05 |
|  | (-1.78) | (1.43) | (-0.20) |
| Ctrl variables | Yes | Yes | Yes |
| Fixed effects | Yes | Yes | Yes |
| N firm/year | 1,339 | 457 | 443 |
| Adj. R^2 | 0.148 | 0.228 | 0.192 |

Columns 1,2 and 3 list the results of regressing Model 7 for all, medium and large firms respectively.
Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 44 Investment sensitivity to market price using JSE method (2008-2016)

| VARIABLES | 1<br>All | 2<br>S | 3<br>M | 4<br>L |
|---|---|---|---|---|
| Q | 0.08*** | 0.12*** | 0.07** | 0.02 |
| | (4.67) | (5.01) | (2.61) | (0.76) |
| CL | -0.09* | -0.37 | -0.22*** | -0.14 |
| | (-1.79) | (-1.55) | (-3.25) | (-1.40) |
| IR | -0.06* | -0.05 | -0.05 | 0.02 |
| | (-1.66) | (-1.09) | (-0.96) | (0.18) |
| QxCL | 0.02 | 0.32* | 0.09** | 0.06* |
| | (0.84) | (1.69) | (2.53) | (1.96) |
| IRxCL | 0.07 | 0.18 | 0.16** | 0.01 |
| | (1.28) | (0.75) | (2.62) | (0.06) |
| IRxQ | -0.01 | -0.04* | -0.01 | -0.02 |
| | (-0.87) | (-1.72) | (-0.35) | (-0.73) |
| IRxQxCL | -0.03 | -0.21 | -0.08** | -0.01 |
| | (-0.96) | (-1.10) | (-2.55) | (-0.37) |
| SIZE | 0 | -0.01 | -0.02 | 0.03 |
| | (-0.07) | (-0.81) | (-1.05) | (1.51) |
| Constant | -0.14* | -0.11 | 0.28 | -0.56 |
| | (-1.78) | (-1.01) | (0.91) | (-1.57) |
| Ctrl variables | Yes | Yes | Yes | Yes |
| Fixed effects | Yes | Yes | Yes | Yes |
| N firm/year | 1,339 | 852 | 318 | 169 |
| Adj. R^2 | 0.148 | 0.148 | 0.212 | 0.232 |

Columns 1,2 and 3 list the results of regressing Model 7 for all, medium and large firms respectively.
Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

From another perspective, it appears that IR provides managers of medium non-cross-listed firms under the ranking method and small non-cross-listed firms under JSE categorization (IR*Q) with information to adversely adjust their investment decisions. Otherwise, managers of other size categories which are not cross listed seem not to be benefiting from the advent of IR. The interpretations related of these findings will be introduced and integrated in the discussion section.

**6.6    Discussion**

**6.6.1    Ranking method**

*6.6.1.1    Medium-Size firms*

In this section the findings of medium size firms for the periods 2008-2013 and 2008-2016 are discussed in terms of the influence of IR, CL, the common effect of both, and the sensitivity of firm investments to IR and CL.

While IR seems to have a positive influence on the value relevance of earnings, IR negatively affects the value relevance of equity book value over the periods (2008-2013) and (2008-2016). Furthermore, these findings are mostly supported using quantile regression for the value relevance of earnings and equity book value for both periods (Table 45 & Table 46). Despite that these findings are in line with those of BR (2016), they differ in terms of the addressed size. Particularly, whereas BR use a sample of all-size firms and exclude influential observations identified by Cook's distance, the current section shows that only the value relevance of accounting summary of medium-size firms was influenced by IR using Winsorized data and quantile regression. It is possible that medium size firms on JSE exchange seek financial funding and consider IR as an opportunity to decrease information asymmetry between managers and investors which in turns increases the chances of attracting new investors. As discussed in 6.4.4.2, medium-size firms' investments before IR and CL are sensitive to market prices suggesting that managers are integrating information from share prices into their investment decisions. However, there is little evidence that investment sensitivity to prices decreased after the adoption of IR for non-CL listed firms suggesting that their management teams are being more conservative in integrating information attained from stock price in their investment decisions (Table 43 and Table 44).

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Table 45 Quantile regression using Ranking size category (2008-2013)

| | VAR | 1 M4-S | 2 M4-M | 3 M4-L | 4 M5-M | 5 M5-L | 6 M6-M | 7 M6-L |
|---|---|---|---|---|---|---|---|---|
| 1 | BVS | 0.25 | 0.74 | 0.74 | 1.10** | 0.32 | 1.11** | 0.32 |
| | | (1.23) | (1.62) | (0.62) | (2) | (0.33) | (2.13) | (0.29) |
| 2 | EPS | -0.47 | 2.93* | 3.19** | 1.83 | 4.21*** | 1.82 | 5.28** |
| | | (-0.32) | (1.88) | (2.13) | (1.14) | (2.66) | (1.09) | (2.43) |
| 3 | IR | -0.06 | 13.29*** | 44.94*** | 14.09*** | 50.56*** | 14.67*** | 66.16*** |
| | | (-0.09) | (3.73) | (2.74) | (3.21) | (3.19) | (3) | (3.49) |
| 4 | IRxBVS | -0.07 | -0.58 | -0.27 | -0.72* | -0.73*** | -0.74** | 0.12 |
| | | (-0.55) | (-1.53) | (-1.02) | (-1.88) | (-2.65) | (-2.10) | (0.31) |
| 5 | IRxEPS | 0.42 | 3.25*** | 0.19 | 3.30*** | 1.35 | 3.27*** | -4.61 |
| | | (1.12) | (2.69) | (0.12) | (2.71) | (1.47) | (2.74) | (-1.50) |
| 6 | CL | | | | -7.14 | -6.24 | 2.06 | 7.21 |
| | | | | | (-1.54) | (-0.27) | (0.16) | (0.25) |
| 7 | CLxBVS | | | | 1.81* | 1.84*** | 0.29 | 1.8 |
| | | | | | (1.87) | (2.75) | (0.11) | (1.44) |
| 8 | CLxEPS | | | | -1.6 | -2.91** | -1.53 | -4.12* |
| | | | | | (-0.68) | (-2.18) | (-0.20) | (-1.74) |
| 9 | IRxCL | | | | | | -10.43 | -24.32 |
| | | | | | | | (-0.79) | (-1.02) |
| 10 | IRxCLxBVS | | | | | | 0.99 | -0.72 |
| | | | | | | | (0.32) | (-1.28) |
| 11 | IRxCLxEPS | | | | | | 1.5 | 6.22* |
| | | | | | | | (0.15) | (1.92) |
| | Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Columns (1 to 3) list the finding of Model 4 which regresses the market price of equity on accounting summary figures and their interaction with IR for Small, Medium and Large firms respectively. Columns (4 & 5) list the finding of Model 5 which replicates Model 4 but adds Cross-listing variables to the equation for Medium and Large firms respectively. Similarly, Model 6 replicates Model 5 in addition to the interaction terms between IR, CL and accounting summary for Medium and Large firms respectively. z-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

CL does not appear to provide incremental explanation for the value relevance of accounting summary after the adoption of IR for medium size firms during the period 2008 – 2013 as can be inferred from the interaction term. However, once the latter period is extended to 2008 – 2016 the value relevance of earnings for CL firms becomes relevant after the adoption of IR.

Table 46 Quantile regression using Ranking size category (2008-2016)

| | VAR | 1 M4-S | 2 M4-M | 3 M4-L | 4 M5-M | 5 M5-L | 6 M6-M | 7 M6-L |
|---|---|---|---|---|---|---|---|---|
| 1 | BVS | 0.23 | 0.72* | 1.03 | 0.98* | 1.07 | 0.96* | 0.8 |
| | | (0.62) | (1.75) | (0.6) | (1.9) | (0.86) | (1.67) | (0.32) |
| 2 | EPS | -0.23 | 2.88** | 2.68 | 1.95 | 2.93 | 1.98 | 5.59 |
| | | (-0.19) | (2.14) | (0.91) | (1.54) | (1.36) | (1.43) | (1.39) |
| 3 | IR | -0.85 | 10.65*** | 26.17 | 13.45*** | 35.29 | 13.38*** | 50.08** |
| | | (-1.26) | (3.29) | (0.91 | (3.63) | (1.58) | (4.3) | (2.44) |
| 4 | IRxBVS | -0.07 | -0.57** | 0.67 | -0.81** | -0.25 | -0.79* | 0.43 |
| | | (-0.42) | (-2.41) | (0.74) | (-2.10) | (-0.66) | (-1.84) | (0.25) |
| 5 | IRxEPS | 0.26 | 3.78*** | -4.53 | 3.39*** | -2.29 | 3.29*** | -6.56 |
| | | (0.6) | (3.03) | (-1.48) | (4.52) | (-1.15) | (3.4) | (-1.19) |
| 6 | CL | | | | -6.14 | -10.56 | -0.57 | 10.24 |
| | | | | | (-0.82) | (-0.18) | (-0.08) | (0.28) |
| 7 | CLxBVS | | | | 0.13 | 1.91 | 0.9 | 2.27 |
| | | | | | (0.15) | (1.11) | (0.61) | (0.96) |
| 8 | CLxEPS | | | | 4.84 | -1.62 | -0.95 | -4.71 |
| | | | | | (1.21) | (-0.53) | (-0.10) | (-1.24) |
| 9 | IRxCL | | | | | | -5.83 | -22.38 |
| | | | | | | | (-0.61) | (-0.33) |
| 10 | IRxCLxBVS | | | | | | -0.8 | -0.73 |
| | | | | | | | (-0.65) | (-0.33) |
| 11 | IRxCLxEPS | | | | | | 5.92 | 4.89 |
| | | | | | | | (0.51) | (0.86) |
| | Fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Columns (1 to 3) list the finding of Model 4 which regresses the market price of equity on accounting summary figures and their interaction with IR for Small, Medium and Large firms respectively. Columns (4 & 5) list the finding of Model 5 which replicates Model 4 but adds Cross-listing variables to the equation for Medium and Large firms respectively. Similarly, Model 6 replicates Model 5 in addition to the interaction terms between IR, CL and accounting summary for Medium and Large firms respectively. z-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Nonetheless, the last findings cannot be verified using the quantile regression as Table 59 & Table 60 demonstrate (Appendix 11.3). The findings related to medium CL firms are not in accordance with the contended hypotheses for the period 2008-2013. However, examining Table 47 provides deeper insights on the case of CL medium firms during the period 2011-2013.

Table 47 Cross-Listing trends over the years using two classification methods

| Classification Method | Firms CL before 2008 | | | Firms CL during 2011-2013 | | | Firms CL during 2014-2016 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Small | Medium | Large | Small | Medium | Large | Small | Medium | Large |
| JSE | 2 | 8 | 14 | 5 | 3 | 1 | 1 | 2 | - |
| Ranking | - | 2 | 22 | 1 | 4 | 4 | - | - | 3 |

To elaborate, 9 firms cross listed on American and British exchanges during 2011-2013 which may have distracted firms from focusing on either national or international markets which resulted in poor value relevance of earnings after IR for CL firms. On the other hand, after some stability in the number of CL firms, a significant and positive impact of both IR and CL on the value relevance of earnings can be observed on average. Furthermore, Table 43 and Table 44 demonstrate some evidence of an increased sensitivity of investments to the market price of CL firms, suggesting that managers are integrating price signals in their investment decision. This is likely correlated with enhancements in the value relevance of earnings for these firms in the second period. These findings, related to the impact of CL on the value relevance of earnings, are consistent with the related literature on the impact of CL on the value relevance of earnings. Furthermore, it is likely that the demand for precise information in addition to the exposure to richer disclosure environment have resulted to incremental value relevant information for local and international investors.

Nonetheless, the CL findings are not supported using quantile regression which could be attributed to the heteroscedasticity of the error term in addition to differences between the mean and median of the regressed variables (Wooldridge, 2010).

### *6.6.1.2  Large-Size firms*

In contrast to medium-size firms, IR shows different impact on the value relevance of accounting summary for non-CL large-size firms. While it appears to have no significant effect on the value relevance of equity book value over the period 2008-2013, IR significantly and positively affects the value relevance of equity over the period 2008-2016. The findings contradict those of BR (2016) but confirm those of Pavlopoulos et al (2019).  Surprisingly, IR has a negative impact on value relevance of earnings for large non-CL firms during both investigated periods which contradicts the contended direction of the hypothesised relationship. These findings cannot be verified using quantile regression.

However, there is some evidence in the literature on possible decrease in the value relevance of earnings after adopting new frameworks or economic shocks. For instance, Devalle et al. (2010) assess the value relevance of accounting summary in different European countries using similar specification to this research and finds that the value relevance of earnings decreased for Italian firms after adopting IFRS. Similar findings are extant in the work of Davis-Friday et al. (2006) on the deterioration of the value relevance of earnings in Asian countries during the Asian financial crisis. These latter studies suggest a possible shock on non-CL firms after the application of IR that led to a decrease of value relevance of earnings. Furthermore, in line with the work of Barth et al. (1998), investors trading shares of poor performing firms put more emphasis on book value figures in comparison to earnings. These findings appear to infer that the introduction of IR for non-CL large firms negatively influenced their financial performance and investors were more focused on the equity book value in their market valuations.

CL appears to positively influence the value relevance of equity book value of large firms before the adoption of IR. Meanwhile, the value relevance of equity (earnings) for large CL firms seems to be negatively (positively) influenced by the introduction of IR.

The impact of IR on the investment sensitivity to the market price of equity appears to be different between Non-CL and CL firms. While managers of non-CL large firms seem not to integrate information from the market stock prices after the adoption of IR, the directors of CL-firms behave differently. Whilst the sensitivity of investments to the equity market prices was positive before the adoption of IR for large CL firms, the same sensitivity significantly decreased after the adoption of IR. The reasons behind the controversial behaviour of large CL firms before and after the application of IR are considered an open question for further investigations.

### 6.6.2 JSE method,

#### 6.6.2.1 Small-Size firms

While IR appears to have no impact on the value relevance of equity book value, it significantly and positively influences the value relevance of earnings for small non-CL firms over the two periods under investigation which is in line with the findings of BR (2016) and Pavlopoulos et al (2019). However, quantile regression is only consistent with OLS for the period 2008-2016 confirming the significant impact of IR on the value relevance of earnings for small-size firms and a limited impact on the value relevance of equity book value. Furthermore, by exploring the sensitivity of investments to the market price of non-CL firms, there is little evidence that the application of IR has decreased the sensitivity of investments to market prices suggesting that managers take and integrate signals from the market in unfavourable way for their future investments.

Table 48 Quantile regression using JSE size category (2008-2013)

| | VAR | 1 M4-S | 2 M4-M | 3 M4-L | 4 M5-S | 5 M5-M | 6 M5-L | 7 M6-S | 8 M6-M | 9 M6-L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BVS | -0.61 | -0.26 | 0.41 | -0.58 | -0.26 | 0.77 | -0.59 | -0.3 | 1.14 |
| | | (-1.29) | (-0.55) | (0.41) | (-1.25) | (-0.39) | (0.9) | (-1.32) | (-0.45) | (0.76) |
| 2 | EPS | 2.73*** | 5.69*** | 2.52 | 2.54*** | 5.71*** | 4.23 | 2.59*** | 5.50*** | 7.51* |
| | | (3.33) | (8.76) | (1.62) | (3.14) | (5.49) | (1.1) | (3.42) | (5.34) | (1.96) |
| 3 | IR | 3.78*** | 17.73** | 73.54* | 3.44*** | 18.57*** | 93.53 | 3.62*** | 14.91* | 143.38 |
| | | (2.91) | (2.34) | (1.82) | (2.62) | (3.1) | (1.5) | (2.85) | (1.95) | (1.25) |
| 4 | IRxBVS | 0.2 | 0.79** | -0.36 | 0.2 | 0.58 | -1.12 | 0.2 | 0.93 | -0.03 |
| | | (0.78) | (2) | (-0.63) | (0.76) | (1.1) | (-1.08) | (0.81) | (1.36) | (-0.02) |
| 5 | IRxEPS | 1.11 | 0.36 | 0.27 | 0.84 | 1 | 1.39 | 0.84 | 0.43 | -9.85 |
| | | (1.03) | (0.44) | (0.09) | (0.77) | (0.63) | (0.53) | (0.79) | (0.18) | (-0.76) |
| 6 | CL | | | | -19.39** | 7.47 | 28.51 | -1.81 | -2.68 | 87.83 |
| | | | | | (-2.27) | (0.68) | (0.36) | (-0.07) | (-0.17) | (1.21) |
| 7 | CLxBVS | | | | 4.72* | 0.23 | 1.86 | -0.27 | 0.85 | 1.49 |
| | | | | | (1.81) | (0.54) | (1.49) | (-0.04) | (0.32) | (0.85) |
| 8 | CLxEPS | | | | -6.21* | -0.5 | -3.97 | -2.21 | -0.88 | -7.33* |
| | | | | | (-1.71) | (-0.24) | (-0.88) | (-0.30) | (-0.13) | (-1.77) |
| 9 | IRxCL | | | | | | | -18.76 | 18.26 | -66.98 |
| | | | | | | | | (-0.65) | (1.27) | (-0.71) |
| 10 | IRxCLxBVS | | | | | | | 4.23 | -1.01 | -0.79 |
| | | | | | | | | (0.75) | (-0.33) | (-0.45) |
| 11 | IRxCLxEPS | | | | | | | -1.49 | 0.5 | 11.39 |
| | | | | | | | | (-0.24) | (0.06) | (0.94) |
| | Fixed effects | Yes | Yes | Yes | | Yes | Yes | | Yes | Yes |

Columns (1 to 3) list the results of Model 4 which regresses the market price of equity on accounting summary figures and their interaction with IR for Small, Medium and Large firms respectively. Columns (4 to 6) list the results of Model 5 which replicates Model 4 but adds Cross-listing variables to the equation for Small, Medium and Large firms respectively. Similarly, columns (7 to 9) list the results of Model 6 replicating Model 5 in addition to the interaction terms between IR, CL and accounting summary for Small, Medium and Large firms respectively. z-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 49 Quantile regression using JSE size category (2008-2016)

| | VAR | **1** **M4-S** | **2** **M4-M** | **3** **M4-L** | **4** **M5-S** | **5** **M5-M** | **6** **M5-L** | **7** **M6-S** | **8** **M6-M** | **9** **M6-L** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BVS | -0.64 | -0.1 | 0.91 | -0.76** | -0.11 | 1.47 | -0.76** | -0.19 | 1.78 |
| | | (-1.55) | (-0.13) | (0.38) | (-2.05) | (-0.15) | (1.06) | (-2.03) | (-0.23) | (1.38) |
| 2 | EPS | 2.70** | 5.33*** | 2.93 | 3.12*** | 5.77*** | 2.48 | 3.11*** | 5.37*** | 6.56 |
| | | (2.12) | (4.73) | (1.02) | (2.65) | (5.47) | (0.7) | (2.97) | (5.5) | (1.29) |
| 3 | IR | 0.32 | 27.85** | 20.7 | -0.36 | 24.82* | -27.1 | -0.3 | 21.05* | 14.63 |
| | | (0.24) | (2.03) | (0.17) | (-0.27) | (1.77) | (-0.35) | (-0.24) | (1.67) | (0.12) |
| 4 | IRxBVS | 0.23 | 0.71 | 0.7 | 0.30* | 0.26 | -0.34 | 0.31* | 0.4 | -0.06 |
| | | (1.11) | (1.13) | (0.44) | (1.66) | (0.49) | (-0.40) | (1.79) | (0.65) | (-0.07) |
| 5 | IRxEPS | 2.02** | -0.69 | -5.29 | 1.42** | 1.73 | -1.82 | 1.34** | 2.17 | -8.14 |
| | | (2.22) | (-0.54) | (-1.21) | (2.21) | (1.2) | (-0.59) | (2.46) | (1.23) | (-0.98) |
| 6 | CL | | | | -12.57* | 23.20** | 128.06 | -1.14 | -1.87 | 184.3 |
| | | | | | (-1.88) | (2.33) | (1.35) | (-0.07) | (-0.10) | (1.61) |
| 7 | CLxBVS | | | | 0.38 | 0.43 | 1.71 | 0.37 | 0.97 | 1.36 |
| | | | | | (0.61) | (1.1) | (0.85) | (0.1) | (0.45) | (0.7) |
| 8 | CLxEPS | | | | 5.83** | -3.66** | -4.02 | -8.92* | -1.21 | -8.74 |
| | | | | | (2.03) | (-2.41) | (-0.90) | (-1.78) | (-0.27) | (-1.60) |
| 9 | IRxCL | | | | | | | -11.54 | 29.58 | -39.79 |
| | | | | | | | | (-0.73) | (1.52) | (-0.27) |
| 10 | IRxCLxBVS | | | | | | | -0.02 | -0.66 | -0.2 |
| | | | | | | | | (-0.01) | (-0.29) | (-0.12) |
| 11 | IRxCLxEPS | | | | | | | 14.86*** | -2.82 | 6.95 |
| | | | | | | | | (3.06) | (-0.54) | (0.82) |
| | Fixed effects | Yes | Yes | Yes | | Yes | Yes | | Yes | Yes |

Columns (1 to 3) list the results of Model 4 which regresses the market price of equity on accounting summary figures and their interaction with IR for Small, Medium and Large firms respectively. Columns (4 to 6) list the results of Model 5 which replicates Model 4 but adds Cross-listing variables to the equation for Small, Medium and Large firms respectively. Similarly, columns (7 to 9) list the results of Model 6 replicating Model 5 in addition to the interaction terms between IR, CL and accounting summary for Small, Medium and Large firms respectively. z-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

The interaction between CL and IR delivers interesting findings. It appears that small CL firms experienced a negative impact on their earnings before the adoption of IR which is also verified using quantile regression. On the other hand, the compound effect of CL and IR appears to differently impact the value relevance of accounting summary during the periods 2008-2013 and 2008-2016. While the value relevance of equity book value for CL firms had significantly increased after the adoption of IR for the period 2008-2013 the impact switched to positively influence the value relevance of earnings over the period 2008-2016 which is also supported by using quantile regression. This impact may be a result of the advent of IR or the increased CL firms during the period 2011-2016.

There is limited evidence that Managers of small firms seem to be integrating information from the market after CL and the application of IR. While CL increases the sensitivity of their investment to the market price, IR appears to decrease this sensitivity. This suggest that managers for small firms uses price signals from the market in investment appraisals and they seem to be more conservative after the application of IR.

### 6.6.2.2   Medium-Size firms

In respect to the results of medium-size firms, IR seems to positively impact the value relevance of equity for the period 2008-2013. However, when this period is extended to 2008 -2016 neither IR nor CL appears to impact the value relevance of accounting summary following both OLS and Quantile regression.

### 6.6.2.3  *Large-Size firms*

Moving to large size firms that are non-CL, IR appears to negatively affect the value relevance of their earnings for both periods 2008-2013 and 2008-2016. The latter findings contradict the contended hypothesis and provides once again a new contribution to the literature on the negative impact of IR on the value relevance of non-CL firms. Furthermore, when the sensitivity of investments to the market price of the latter firms is examined, the findings show that the management of non-CL firms do not integrate information from the market price of stocks in their investment decisions after the advent of IR.

What is more interesting than the negative impact of IR is the influence of CL on the value relevance of earnings. Large firms that cross listed on U.S. and U.K. markets experienced a decrease in the value relevance of their earnings before the advent of IR in South Africa. However, when the compound effect of IR and CL is accounted for, large CL firms experienced a positive increase in the value relevance of their earnings. However, this conclusion regarding the significant impact of both IR and CL firms on the value relevance of earnings does not hold true once the quantile regression is administered.

### 6.6.3  Both methods

Now after presenting the outcomes using the two size-classification methods, I contrast their results against each other to explain the reasons behind the differences. However, interpreting the discrepancy in the outcomes necessitates an understanding of the distribution of size classification of each firm under the two-categorization techniques.

Figure 8 exhibits the distribution of firms into small, medium, and large size firms for every year over the period 2008-2016. While the top row of each year represents the size distribution according to the ranking method, the lower row exhibits the distribution as per JSE classification. The red colour portrays small firms while the blue one is for large firms. Otherwise, the yellow represents medium size firms. Apparently, there is a balance of firm distribution among the three categories using the ranking method (balanced colours in the first line of each year). However, using the JSE indices to classify firms into size categories generates more small firms and less large firms. In other words, what was categorized as a medium size firm under the ranking method almost becomes a small size firm under JSE method (or what I called in a previous chapter the butterfly firms). On the other hand, most of the section of large size firms under the ranking method becomes medium size firms under JSE method. The last shift in firm categorization provides a reasonable justification for the swing of the findings of medium-size firms to be mostly replicated for small-size firms under JSE method.
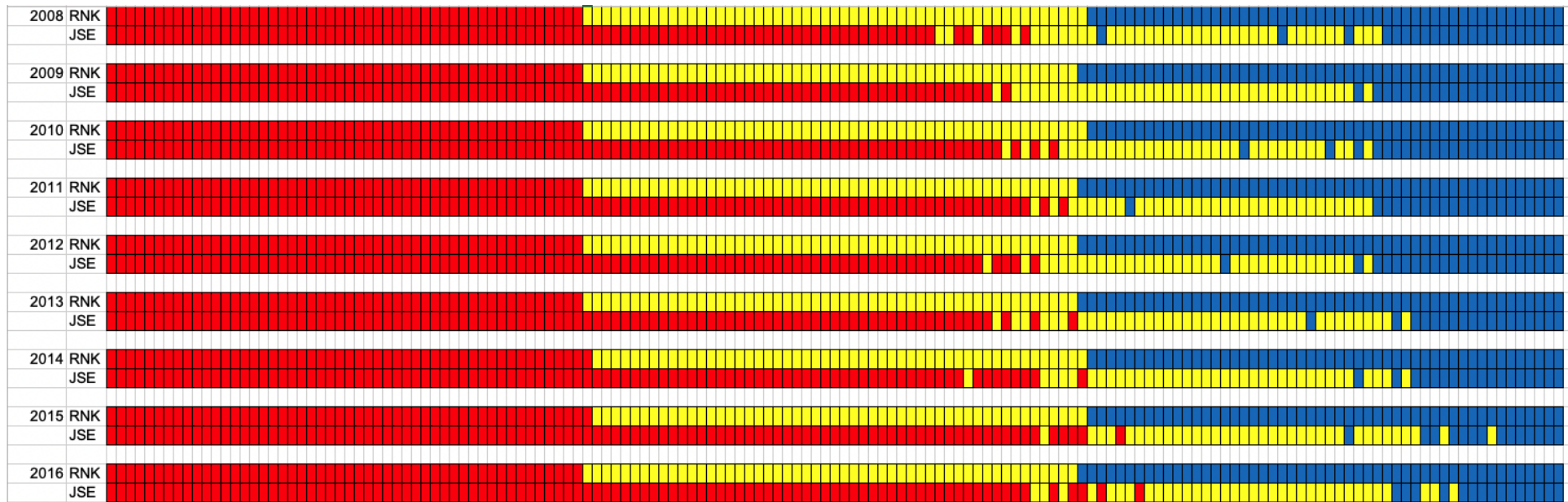
**Figure 8** Size classes' distribution according to the Index and Ranking methods

Therefore, provided what was mentioned before, it is likely that IR does not have an impact on the value relevance of accounting summary for small size firms under JSE method. The difference in the findings of these firms is a direct result of a category shift of butterfly firms from medium-size firms under the ranking method to become small-size firms under JSE classification.

In the light of the previous understanding non-CL medium size firms (small-size firms) under the ranking (JSE) classification seem to be positively benefiting from the advent of IR as far as the value relevance of earnings is concerned. Furthermore, the management of these firms appears to integrate signals from the market after the adoption of IR in their investment decisions which may be interpreted as a form of integrated thinking. The latest conclusion could stem from the financial needs of these firms which seize the opportunity of introducing IR to decrease the information asymmetry between their managements and investors. On the other hand, the management of small (medium) CL firms under JSE (ranking) category appears to learn from their experience after cross-listing. Particularly, the negative influence of CL on the relevance of earnings is converted into a positive one once IR is applied for these firms. In other words, gaining experience in international reporting may influence the application of IR and renders it effective. Moreover, the more firms cross-listing on American and British stock exchanges, the more significant the influence of IR on the value relevance of earnings for these firms. This conclusion is drawn by observing the change of the results between periods 2008-2013 and 2008-2016 and the findings of Table 47. These firms benefit from the learning process after IR and CL and increase the value relevance of their earning after IR and CL.

However, large non-CL size firms under both methods, appear to be negatively impacted by the advent of IR. Once the sensitivity of investments to the market price is considered, the management of these firms appear to ignore information from the markets after the adoption of IR in their investment decisions. It is likely that these firms do not seek further financial needs and therefore apply IR to legitimate their existence (financial need literature, symbolic legitimacy). On the other hand, large CL firms appear to adjust the negative influence of CL on their earnings to a positive one after the adoption of IR which may be a result of IR effectiveness and increased rate of firms cross-listing on American and British exchanges. Moreover, large CL firms show evidence of learning from the market after CL and integrating information from market in their investment decisions. It is also possible that these firms cross-listed in the first place because of financial needs and are using IR to further diminish the gap of information asymmetry between the management and its investors.

The previous discussion should be considered conservatively in the light of the study limitations. First, using a balanced sample may have introduced biased coefficients in terms of the impact of survivorship on the regression parameters. Second, despite using clustering to diminish the impact of heteroscedasticity on the findings of this study, it does not eliminate a possible bias on the regression coefficients. Third, the sensitivity of investments to the market value of equity may be biased because I did not control for the cash flow which is found to be correlated with investments. Finally, the results of quantile regression should not be considered as a robust method for OLS as far as influential and outlier observations are concerned.

Furthermore, quantile regression for panel data in addition Jackknife technique were used as an alternative methodology which does not require any assumptions regarding the distribution of the error term and it is not sensitive to influential observations (Machado & Santos Silva, 2019). Future research can explore why managers of some firms do not integrated signals from the market in their investment decisions.

## 6.7 Conclusion

This chapter examines the impact of Integrated Reporting (IR) and Cross Listing (CL) on the value relevance of accounting summary. After introducing why firms cross list, this paper provided a novel perspective on the similar impact of IR and CL on different factors which in turn may influence the value relevance of equity book value and earnings. The previous relationship was inspected in terms of different size categories using two methods. Furthermore, the impact of CL and IR on the value relevance of accounting summary were investigated using OLS and Quantile regressions. This chapter also employed the learning hypothesis (Foucault & Frésard, 2012) to inspect whether managers used signals from the markets to integrate them in their investment decision.

The findings suggest that either upper small firms (medium firm) or large CL firms are the ones benefiting from the advent of IR in the South African context. The management of these firms seem to be integrating information from the market after IR and CL in their investment decision in contrast to other firms. One of the possible interpretations could be that firms in need of financing resources use IR and CL as platforms to decrease the information asymmetry between their management and investors. This explanation, however, needs to be taken conservatively and provide an opportunity for further research. The results related to this study should be considered with the following limitations; First, the balanced sample may introduce survivorship bias. Second, the heteroscedasticity of the error term may introduce too some bias to the regression coefficients. Third, the sensitivity of investments to the market price of equity may be biased to the impact of missing variable as the model does not include cash flow which is found to be correlated with investments.

## 7   Thesis Conclusion

The purpose of this thesis is to determine whether the introduction of Integrated Reporting (IR) in the South African market has delivered its promises in enhancing the quality of information to the capital providers. To assess whether IR was effective in developing the capacity of information available to investors, it is contended that the relevance of accounting earnings and equity book value to investors should have changed after the introduction of IR.

Given the controversy surrounding the maturity of IR application by firms as well as the doubts cast by its ceremonial adoption, the work of Baboukardos and Rimmel (2016) – BR – was replicated in the first empirical chapter. The aim was to investigate whether the findings of BR (2016) were robust to different methods and for extended periods of time considering the controversial conclusions about IR's effectiveness. To set a baseline for comparison, the work of BR (2016) was reproduced using the same method and sample period which led to achieving similar results to theirs. However, following their methodology revealed the sensitivity of BR's findings to the use of Cook's distance to eliminate influential observations. Upon examining the dropped cases it was found that the exclusion process eliminated pioneering firms in IR which constitute around 40% of the market capitalisation of the sample. Therefore, an important question emerged regarding the robustness of BR's (2016) findings to different techniques in dealing with outliers.

What was found in the first empirical chapter (chapter 4) after extending the periods of investigating IR, using different approaches in dealing with outliers, or following other methods to investigate the relevance of accounting summary, was the lack of change in

value relevance following IR adoption. The adoption of IR in South Africa was perceived to influence the value relevance of accounting summary only if Cook's distance was applied to trim the sample. Furthermore, the substantial market share of the excluded firms suggested that firm size was potentially driving the IR value relevance results. Consequently, the ensuing chapter investigated whether there were some rationales to study the influence of IR on the quality of information from the perspective of a firm's size.

The second empirical chapter (chapter 5) establishes statistical and theoretical grounds to approach the value relevance of accounting summary from a size point of view. The comparison of the literature of ESG and CSR reporting with IR, demonstrated the similarities between them and the possibility of approaching IR effectiveness in small, medium, and large size firms.

The findings suggest that the relevance of accounting information for the largest and the smallest firms listed on JSE did not alter with the introduction of IR in South Africa. However, it appears that medium-size firms, benefited from IR in integrating financial and non-financial information. Furthermore, it is also found that the adoption of IR and the publication of its reporting framework improved the integration of CSR with the earnings for medium and large-size firms. These findings generate further questions to investigate whether an international reporting experience may play a role in IR adoption for medium and large-size firms.

In the third empirical chapter (chapter 6), I investigate whether international reporting experience gained through Cross-Listing (CL) may have influenced the value relevance

of the adoption of IR or vice versa. The comparison of the literature of both CL and IR provides evidence of their similar impact on the value relevance of accounting summary and the possibility of influencing each other. Furthermore, the chapter investigates whether the managers of CL firms or non-CL firms integrate information from the market in their investment decisions.

The findings suggest that either upper non-CL small firms (medium firm) or large CL firms are substantially using IR framework to increase the quality of information to capital providers. Furthermore, the management of these firms appears to be integrating information from the market after IR and CL in their investment decision in contrast to other firms. This latter conclusion suggests that not only a reporting framework is important in the adoption of IR but also providing organizations with the internal motives for serious application of a reporting scheme.

Taken together, these results propose that the advent of IR in the South African market did not lead – on average – to a change in the quality of information available to the providers of capital. However, the management of medium-size firms, which are likely motivated by growth needs, do efficiently utilise IR, this is likely to be for the purpose of attracting funding for expansion purposes.

Furthermore, the openness of managers to learn from the market equipped with international experience in reporting gained through cross-listing in American and British markets provide the necessary grounds for meaningful application of IR.

This thesis contributes to providing deeper understanding of the following points:

1. The challenges associated with the application of statistical techniques which exclude some observations in a balanced setting and the importance of reporting the results with and without excluding these cases.

2. On average – IR is not effective in enhancing the quality of information in the South African context using various methods of investigations.

3. Extends the literature by theorizing that the size of a firm plays an important role in analysing the impact of IR on the quality of information.

4. This study is the first one the provide a comparison between IR and CL and empirically demonstrate their shared influence on the value relevance of large CL firms.

Cautions, however, must be exercised to avoid generalising the finding of this thesis in other settings or countries. South Africa is a developing economy that applies IR on a mandatory basis. Therefore, what is true on JSE market may not necessarily be true in other markets. Furthermore, the balanced setting in which the data were regressed and analysed may have introduced a survivorship bias in the results. Moreover, in respect to the finding of the sensitivity of investments to the market price of equity may suffer from some bias introduced by the omission of cashflow which is likely to be correlated with the investments.

Future research can investigate the effectiveness of IR by using the return specification and explore other proxies to measure the value relevance of the integrational function of IR. Moreover, more research is required to investigate the mechanism by which IR influences the integration of financial and non-financial information among different size categories of firms.

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# 9 Appendix A – Chapter (1-4)

## 9.1 Extensions to the literature review

**Comments on Ahmed Haji and Anifowose (2016)**: Some limitations could be related to the methodology through using a normative index during this study. However, the problem is not mainly because of the subjectivity of such indices as much as it is the reference used. The guiding principles that the authors used to build their index depended on their understanding of IIRC's guiding principles that does not fully match what was available to JSE listed companies. For instance, the connectivity of information was one of the principles of IIRC 2013 but not of IRC's principle. Moreover, one of the study's conclusions was the limited application of IR aspect such "connectivity of information" which was again not part of the IRC's principles.

**Comments on Van Bommel (2014)**: Another interesting perspective used to understand the legitimacy sought by Integrated Reporting, was the use of a sociological framework introduced by the French sociologist Luc Boltanski and his collaborator Laurent Thévenot, namely, the Sociology Of Worth (SOW). Van Bommel (2014), who used this lens, to understand IR as a "constellation of various valuation logics that must be reconciled to attain a state of legitimacy" (van Bommel, 2014, p. 1158). This perception is formed in this way to facilitate the adoption of SOW which is thought of "as a normative scheme of evaluation and classification and thus serves as the basis for the routine hierarchization of people and things within that particular world – that is determining their relative states of worth and hence the justifiability of their actions" (Annisette & Richardson, 2011, p. 232). In other words, what is considered as good or right in each order of worth should be referenced to the set of common values, principles,

or evaluating modes, which are regarded as a justifiable basis for actions or behaviours within a particular world or order (Thévenot et al., 2000).

Different orders of worth were identified by Boltanski and Thévenot (2006) and in subsequent works were supplemented by other orders (Boltanski & Chiapello, 2005; Lamont & Thévenot, 2000; van Bommel, 2014). The original orders were; the "market worth" which is based on price, competition and short-term focused, the "industry worth" based on efficiency, professionalism and long-term focused, the "civic worth" based on equality and solidarity, the "domestic worth" based on tradition and hierarchy, the "inspiration worth" based on grace and creativity, the "renown worth" based on public opinion and fame (Annisette & Richardson, 2011; Boltanski & Thevenot, 2006; Lamont & Thévenot, 2000; van Bommel, 2014).

The other added orders are; "projective worth based on connectivity and flexibility and providing the new spirit of capitalism" (Boltanski & Chiapello, 2005; van Bommel, 2014), while the "green worth" is based on environmental friendliness. For example, the idea of building a nuclear plant in a developing country to produce electricity can be seen from the civic perspective as an access to power for more people and strengthen the equality among them. Equally important, this scheme may be thought of as an opportunity to make profits for power companies from a market-worth perspective. However, this idea most probably would be confronted by green movement on the basis of being environmentally unfriendly. The contradicting perspectives requires a settlement that legitimatise the action and could be reached by; resorting to a dominant order of worth, a private agreement, or a sustainable compromise (van Bommel, 2014). The dominant order happens, in the above example, when the government favours the

civic perspective and decides on building the plant regardless of other perspectives. Another scenario is a local agreement between the government and companies to choose a location attractive for both sides. On the other hand, a compromise can be made if the location is negotiated to be in an area that is less harmful for the environment and appease the involved parties.

Legitimacy, per Van Bommel, is not thought of merely as doing what is right or meeting the expectation of society and stakeholder, but a continuous struggle on compromises which is re-negotiated in a collective dialogue.

**Comments on Beck et al. (2017):** By following the journey of a financial service company, ZETA, from a scandal threating its legitimacy to a company leading in reporting non-financial data, and eventually using IR, the authors show how the firm tried to fix its legitimacy by embracing institutional legitimacy at the beginning to end up with being a strategic legitimacy adopter. Both aforementioned strategies were defined by Suchman (1995); the strategic legitimacy as "an operational resource that organizations extract – often competitively – from their cultural environments and that they employ in pursuit of their goals"; while the institutional legitimacy, rather than extracting legitimacy from the environment, it is when "external intuitions construct and interpenetrate the organization in every aspect" (Suchman, 1995, p. 576).

Beck et al. (2017) used the Pfarrer et al, (2008) four-stage model for legitimacy restoration for corrupted firms. The use of this framework facilitated the interpretation of ZITA's progress journey from the "discovery" of the problem when the company announced irregular trading losses, to the "explanation" of the reason behind this issue,

to moving to the next step of showing "penance" by the resignation of key officials from the company and ending up with "rehabilitations" by starting reporting on non-financial data and then improving their process by adopting GRI's guidance and eventually applying IR.

**Comments on Lai et al. (2016)**: One of the basic assumptions that the authors made is implicitly speculating that companies joining the IIRC PP have the same legitimacy needs of the non-adopters. As shown by the study, both groups (IR adopters and non-adopters) have ESG scores which implies using non-financial reporting mediums in their regular communications (ie, probably SR), in other words they use alternative legitimacy justifying tools other than IR. Equally important in this level of analysis, is the relevance of the duality of strategic challenges and institutional pressures (strategic/institutional legitimacy) while considering whether legitimacy is used as a malleable resource or a taken for granted belief system (Suchman, 1995). To put it differently, the IIRC had called for companies to participate in their pilot program to "play a major role in the development or the <IR> Framework". Furthermore, the first companies constituting the core firms of the program were "leading companies … chosen [by the IIRC] as participants in the IIRC pilot programme" (IIRC, 2011b). This stream of logic led to the conclusion that IIRC PP companies are participating for strategic and active legitimacy purposes with a "a high level of managerial control over the legitimation process" (Suchman, 1995, p. 576). In contrast, the other companies that had low ESG scoring and are IR non-adopters might be using other mediums of reporting under legitimacy pressures that makes them passive adopters "if an organization simply wants a particular audience to leave it alone, the threshold of legitimation may be quite low" (Suchman, 1995, p. 575). To conclude, using a sample of non-adopters that may already have met

the legitimate pressure by producing a kind of non-financial reporting and comparing it with other groups who are seeking the leadership in reporting practises, creates a selection bias.

## 9.2 Ohlson (1995) and its assumptions

In this section, I present Ohlson's (1995) model – on which the relaxed model of this work is built – by first introducing the theoretical framework behind it in addition to its various derivatives. Afterwards, I explain why this work adopts a relaxed version used by Amir and Lev (1996) and reemphasize the reasons behind its choice over return models.

Among the most critical research developments in accounting valuation, stands the work of Ohlson (1995) in an attempt to develop a "theory of accounting" (Beaver, 2002). The paper's contribution lies in establishing a model that links bottom-line items of both balance sheet and income statement together in one equation. This relation is viewed from the perspective of a neoclassical framework relying on the present value of expected future dividends to estimate firm value (Ohlson, 1995).

$$P_t = y_t + \alpha_1 x_t^a + \alpha_2 v_t$$

Model 8

Where $P_t$ is the stock price at time t, $y_t$ is end-of-year book value of equity, $x_t^a$ is the abnormal earnings for period t which equals to current earnings minus the beginning of year book value of equity multiplied by the cost of capital, $v_t$ is other value relevant information.

However, to initiate the analysis from the Present Value of Expected Dividends (PVED) to consequently get Model 8, Ohlson had to presume three assumptions:

1- The market value of a firm is determined under the neoclassical model of security valuation and equals to (PVED).

2- The clean surplus relation[46] holds net of capital contributions (stockholders' contribution in the capital).

3- Abnormal earnings follow autoregressive process and as modified first-order while the term "other information" differs as being a simple first-order variable.

Some implications resulting from applying this model lies in its assumptions, more specifically the second one. The clean surplus assumption, in the case of this research, is a determinant factor in choosing the appropriate modified version of Ohlson (1995). This point, consequently, is further explored in the next section enriched by revisiting the literature to examine the models available and the best match to achieve the objectives of this research.

### 9.2.1 The clean surplus assumption

The concept of clean surplus constitutes the bedrock assumption in Ohlson's (1995) model, therefore, as mentioned in the previous section the choice of the model relays on dealing with this assumption which doesn't hold true for the South African sample[47], dictating the necessity to explore this point further.

---

[46] The mathematical equation that governs the clean surplus relation is $y_t = y_{t-1} + x_t - d_t$ where $x_t$ is the current earnings of the year $t$, $d_t$ represents the distributed dividends for the year $t$. The clean surplus is achieved when the end of the period's book value of equity is only changed through the variables on the right side of the equation. In other words, any modification should pass through the income statement's earnings and not bypass it to the stockholders' equity.

[47] When the clean surplus is examined in the JSE sample – by applying the relationship in which the book value at the end of the period equals to the beginning balance of book value plus

This concept has a historical background that justifies its aims and at the same time is appropriate for our analysis and search for a good-fitted model. The term is believed to be used for the first time in the writings of Paton and Littleton monograph for the American Accounting Association (Paton et al., (1940); as cited by, Zeff, (2017)).

To fully realize the importance behind this concept, an understanding is required of the theory behind it (The explanation is inspired by Cilloni et al., (2013); Zeff, (2017)). By the early of the 20$^{th}$ century, there were two distinctive perspectives on the theory of accounts; the proprietor and managerial point of views. The former embraces the owners' perspective, in which the accounting system assesses the changes in firm's assets contrasted by its liabilities to measure the owners' wealth. This school of thought minimises the importance of any analysis related to the income statement and is led by Charles Ezra Sprague (fair value school / balance sheet perspective).

The later perspective – the managerial one – does not view the accounting system as a process of valuation but rather as an allocation process of cost/revenues matched and assigned to different fiscal periods. In this context, cost is seen as efforts matched with accomplishments (revenues) and the surplus/deficit as a measure of management efficiency (led by William Paton and A. C. Littleton (The Entity school / income statement perspective)). In the early days of this school of thought, assets were equal to liabilities to infer that managers are responsible before all constituents (Employees,

---

earnings minus dividends – the equation did not hold true suggesting the violation of the clean surplus assumptions or in other words the application of dirty surplus case. Therefore, using the original Ohlson model will challenge the clean surplus assumption and a search for other models or precedents of relaxing these assumptions is necessary to avoid any methodological complications.

government, creditors, and investors). However, the pressure from professionals was built against this school to reset their compass towards shareholders' equities.

In this spirit, all charges and gains should flow through the income statement and end up in the statement of stockholders' equity through earnings to be called a clean surplus situation (A procedure preferred by the entity theorists). In contrast, if certain items or accounts bypass income statement through a backdoor and are directly opposed against stockholders' equity, the situation of dirty surplus is present (O'hanlon & Pope, 1999). However, Measuring the management's efficiency through the income statement's bottom-line numbers, has had some impairing effects on the reasoning followed by the Entity school of thought. To explain further, Paton and Littleton (As cited by Cilloni et al., (2013)), insisted on the importance of assessing the managerial efficiency through an objective measurement of the power of earning – another emphasis on the income statement approach. A situation in which the absentee stockholders need to judge the managerial performance to achieve a sound and efficient allocation of capital. Although the common sense of linking the agent's achievements with earnings seems intriguing and convenient for this perspective, the same rationale becomes defective once some items of the income statement neither involve managerial discretions nor their judgement to be considered indicators of their efficiency (i.e. unrealized gains and losses in assets). Consequently, the sensible sub-categorization of income statement into sections of "Operating income" verses "Non-operating Income", aids stakeholders in judging what involves managerial efforts from other random effects.

In summary, the mentioned part sheds light on one of the most important assumptions of Ohlson's model. This equation includes both aspects of (Proprietary and Entity

perspective) which gives it more importance over other models. Furthermore, because IR aims at increasing the quality of information – in other words decreasing the information asymmetry between managers and investors – it is reasonable for the model to contain elements that proxy for the efficiency of the management. However, inspecting whether the elements of the clean surplus equation hold true for the South African sample, reveals the breaching of the clean surplus model. Therefore, the following section review other versions of Ohlson's model with more relaxed assumptions.

### 9.2.2  Ohlson's modified versions

As previously mentioned, to use Ohlson's (1995) model three assumptions need to be assumed leading to some complications and related solutions to facilitate the adoption of this formula. The clean surplus relation dictates that the book value at the end of a fiscal year equals to the beginning balance of book value plus earnings (from the income statement) minus dividends. Using Ohlson's Model 8 requires the calculation of abnormal earnings by subtracting current earnings from the product of the beginning balance of book value by the cost of capital. However, despite the lack of consensus among academics on how to calculate the cost of capital (Hassel et al., 2005) not to mention the contradicting empirical evidence on the optimal way to measure this rate, some researchers used the Ohlson model in their value relevance studies using some proxies to get the required rate of return (i.e. Clarkson et al. (2013)).

Consequently, the related challenges to gauge the cost of equity capital have motivated some researchers to reshape Model 8 into a new model that circumvents the calculation

of abnormal earnings (Collins et al., 1999; Lin & Walker, 2000; Hassel et al., 2005; de Klerk & de Villiers, 2012).

Model 9

$$(MV_t + d_t) = \beta_0 + \beta_1 BV_{t-1} + \beta_2 X_t + \beta_3 v_t + \varepsilon_t$$

This model was originally derived from Ohlson's model by Collins et al. (1999). Where $(MV_t + d_t)$ is the cum-dividend market value, $BV_{t-1}$ is the opening balance of book value of equity, $X_t$ is the period's current earnings and $v_t$ is other value-relevant information. Furthermore, some of these papers dealt with the scale problem through dividing both sides of Model 9 by the book value of equity to get:

Model 10

$$\frac{(MV_{i,t} + d_{i,t})}{BV_{i,t-1}} = \beta_0 \frac{1}{BV_{i,t-1}} + \beta_1 + \beta_2 \frac{X_{i,t}}{BV_{i,t-1}} + \beta_3 \frac{v_{i,t}}{BV_{i,t-1}} + e_{i,t}$$

Accordingly, a new version of Ohlson's model which does not require the calculation of the cost of capital is used by academics in its versions as presented in Model 9 and Model 10.

### 9.2.3 Relaxed versions of Ohlson

In this section, I present two strands of empirical research that used the same modified version of Ohlson (1995) in value relevance studies, but they differ from each other in explicitly addressing the violation of the clean surplus assumption.

Model 11

$$P_{it} = \alpha_0 + \alpha_1 y_{it} + \alpha_2 x_{it} + \alpha_3 v_{it}$$

Where $P_{it}$ is the stock price at time t of firm i, $y_{it}$ is the book value of equity at the end of the period for the same firm, $x_{it}$ is the earnings for period t and $v_{it}$ is other value relevant information for the same firm.

The first group of studies has used Model 11 which differ from Model 8 by replacing the abnormal earnings in Model 8 with current earnings in Model 11. These studies acknowledge the use of a "modified version of Ohlson (1995)" without justifying the violation of the clean surplus assumption. However, most of the studies in this group are leading articles in their field such as Amir and Lev (1996); Collins et al. (1997); Blacconiere et al. (2000); Xu et al. (2007).

The second group, on the other hand, has explicitly illustrated its violation of Ohlson's (1995) clean surplus assumption by simply declaring it in their work (Aboody et al., 1999) or by suggesting the reasoning behind assuming different postulation (Barth et al., 1998).

To illustrate, In a study examining whether management's discretion on revaluating fixed assets in UK firms is exercised to reflect private information, Aboody et al. (1999) contend and find that such revaluation is significantly relevant to the future operating performance of UK firms. To examine this relationship, they used a modified Ohlson model and explicitly demonstrated that clean surplus assumption does not hold under the UK's Generally Accepted Accounting Principles. Barth et al. (1998), on the other hand, examine the relative importance of value relevance of accounting summary as a function of the financial health of a firm. They suggest that firms in unhealthy financial situation may file for bankruptcy before fulfilling the clean surplus condition. Furthermore, the

linear relationship between the share price with accounting earnings may not hold in such situations.

To conclude, this section presented the primary version of Ohlson (1995) and its modified versions that share the same assumptions (Model 8 to Model 10). On the other hand, a relaxed version of Ohlson (1995) was presented in Model 11.

The thesis adopts Model 11 for the following reasons:

1. The clean surplus assumption does not hold in the South African sample and accordingly Model 11 is convenient.

2. I follow the existing examples of articles from leading journals utilising versions of Model 11 with an implicit or explicit violation of the clean surplus assumption such as BR (2016) and Aboody et al. (1999) respectively.

3. Barth et al. (1998) justify the use of a model similar to Model 11 by stating that firms with poor financial health may not meet the clean surplus assumption which was not considered in the assumptions of Ohlson's model. As the examined period in the South African sample includes years 2008-2009 of the financial crisis, following Barth's (1998) model becomes more legitimate.

After introducing the main model adopted in this research and the rationale behind its choice the next section provides more details on alternative methods to explore the value relevance of accounting as used by Collins et al. (1997) and Barth et al. (2008).

### 9.3 The comparison of means and medians before and after IR

Despite the similarities between the results presented in this work with what was reported by BR as Table 3 – panel B shows, a significant difference exists between the two studies. The outcomes reported in the two studies in terms of the statistical summary comparing the pre- and post-adoption periods are close to each other in terms of the reported numbers. However, unlike BR's conclusion, the current investigation finds that the means and medians of the regressed variables before the application of IR, are significantly different from their peers in the post adoption period reported in Table 3 – panel D).

While BR reported only a single significant difference between mean and median of pre-adoption period with their peers in the post-adoption period, I documented significant differences between the mean and median for most variables (Test **9-1** to Test **9-12**). BR's ROE is larger in the pre-adoption period compared to the after-adoption period using Wilcoxon test for median differences at a significance level of 5%; no other significant differences between the other variables before and after the adoption of IR's framework were reported by BR. In contrast, I found significant differences between the means and medians of the pre-adoption period with their peers in the post-adoption period for all the regressed variables at 1% significance level but not for EPS and LEV. The findings of this thesis suggest that what was detected by BR (2016) as differences between the examined periods can be attributed to the use of CD technique and may be driven by firms' characteristics.

In summary, the Pearson t-tests and Wilcoxon sign tests for means and medians of share market value, share book value and the firm size are significantly higher in the post-

adoption periods compared to the pre-adoption periods. In contrast, the Return on Equity in pre-adoption period is significantly higher than the post-adoption period using Wilcoxon test but are not different using T-tests. Simultaneously, both Earnings Per Share and the firm leverage have not changed significantly between the two periods. Therefore, any difference between the pre and post adoption period detected through the regression analysis and are aligned in direction with the previous relationships will complicate the discussion whether the findings are driven by the introduction of IR or the characteristics of analysed firms.

**Parametric and non-parametric test before and after the application of IR**

MP61 in Test **9-1** is the mean of the share market value before the application of IR, while MP62 is the mean of the share market value during the application of IR. Similarly, MDP61 is the median of the share market value before the application of IR and MDP62 is the median of the share market value during the application of IR.

**Test 9-1** Pearson t-test for the price mean before and after IR - sample (2008 – 2013)

```
Paired t test
```

| Variable | Obs | Mean | Std. Err. | Std. Dev. | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| MP61 | 154 | 24.19221 | 2.835015 | 35.18161 | 18.59138 | 29.79303 |
| MP62 | 154 | 32.83761 | 3.778612 | 46.89134 | 25.37262 | 40.30259 |
| diff | 154 | -8.6454 | 1.682526 | 20.8796 | -11.96938 | -5.321418 |

```
     mean(diff) = mean(MP61 - MP62)                        t =  -5.1383
 Ho: mean(diff) = 0                          degrees of freedom =      153

 Ha: mean(diff) < 0             Ha: mean(diff) != 0             Ha: mean(diff) > 0
 Pr(T < t) = 0.0000          Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

**Test 9-2** Wilcoxon sign test for the price median before and after IR - sample (2008 – 2013)

| sign | observed | expected |
|---|---|---|
| positive | 56 | 76.5 |
| negative | 97 | 76.5 |
| zero | 1 | 1 |
| all | 154 | 154 |

```
One-sided tests:
  Ho: median of MDP61 - MDP62  = 0 vs.
  Ha: median of MDP61 - MDP62  > 0
      Pr(#positive >= 56) =
        Binomial(n = 153, x >= 56, p = 0.5) =  0.9997

  Ho: median of MDP61 - MDP62  = 0 vs.
  Ha: median of MDP61 - MDP62  < 0
      Pr(#negative >= 97) =
        Binomial(n = 153, x >= 97, p = 0.5) =  0.0006

Two-sided test:
  Ho: median of MDP61 - MDP62  = 0 vs.
  Ha: median of MDP61 - MDP62  != 0
      Pr(#positive >= 97 or #negative >= 97) =
        min(1, 2*Binomial(n = 153, x >= 97, p = 0.5)) =  0.0012
```

MBV1 in Test **9-3** is the book value of equity before the application of IR. On the other hand, MBV2 is the book value of equity during the application of IR. In the same fation, MDBV1 is the median book value of equity before the application of IR and MDBV2 is the median after IR.

**Test 9-3** Pearson t-test for the book value mean before and after IR - sample (2008 – 2013)

```
Paired t test
```

| Variable | Obs | Mean | Std. Err. | Std. Dev. | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| MBV1 | 154 | 11.5519 | 1.251237 | 15.52744 | 9.079966 | 14.02383 |
| MBV2 | 154 | 14.77702 | 1.610773 | 19.98916 | 11.5948 | 17.95925 |
| diff | 154 | -3.225127 | .5207325 | 6.462121 | -4.253881 | -2.196373 |

```
    mean(diff) = mean(MBV1 - MBV2)                              t =  -6.1934
 Ho: mean(diff) = 0                           degrees of freedom =      153

 Ha: mean(diff) < 0          Ha: mean(diff) != 0          Ha: mean(diff) > 0
 Pr(T < t) = 0.0000       Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

**Test 9-4** Wilcoxon sign test for the book value median before and after IR - sample (2008 – 2013)

| sign | observed | expected |
|---|---|---|
| positive | 30 | 77 |
| negative | 124 | 77 |
| zero | 0 | 0 |
| all | 154 | 154 |

```
One-sided tests:
  Ho: median of MDBV1 - MDBV2  = 0 vs.
  Ha: median of MDBV1 - MDBV2  > 0
      Pr(#positive >= 30) =
         Binomial(n = 154, x >= 30, p = 0.5) =  1.0000

  Ho: median of MDBV1 - MDBV2  = 0 vs.
  Ha: median of MDBV1 - MDBV2  < 0
      Pr(#negative >= 124) =
         Binomial(n = 154, x >= 124, p = 0.5) =  0.0000

Two-sided test:
  Ho: median of MDBV1 - MDBV2  = 0 vs.
  Ha: median of MDBV1 - MDBV2  != 0
      Pr(#positive >= 124 or #negative >= 124) =
         min(1, 2*Binomial(n = 154, x >= 124, p = 0.5)) =  0.0000
```

MEPS1 in Test **9-5** is the mean EPS before the application of IR, on the other hand MEPS2 if the mean EPS during the application of IR. Likewise, MDEPS1 is the median EPS before the application of IR which MDEPS2 is the median EPS after the application of IR.

**Test 9-5** Pearson t-test for the earnings per share mean before and after IR - sample (2008 – 2013)

```
Paired t test
```

| Variable | Obs | Mean | Std. Err. | Std. Dev. | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| MEPS1 | 154 | 3.420813 | .3855817 | 4.784943 | 2.659061 | 4.182564 |
| MEPS2 | 154 | 3.357935 | .4177723 | 5.184417 | 2.532588 | 4.183282 |
| diff | 154 | .0628777 | .2129146 | 2.6422 | -.3577542 | .4835097 |

```
    mean(diff) = mean(MEPS1 - MEPS2)                            t =   0.2953
 Ho: mean(diff) = 0                              degrees of freedom =      153

 Ha: mean(diff) < 0            Ha: mean(diff) != 0            Ha: mean(diff) > 0
 Pr(T < t) = 0.6159         Pr(|T| > |t|) = 0.7682          Pr(T > t) = 0.3841
```

**Test 9-6** Wilcoxon test for the earnings per share median before and after IR - sample (2008 – 2013)

| sign | observed | expected |
|---|---|---|
| positive | 75 | 77 |
| negative | 79 | 77 |
| zero | 0 | 0 |
| all | 154 | 154 |

```
One-sided tests:
  Ho: median of MDEPS1 - MDEPS2  = 0 vs.
  Ha: median of MDEPS1 - MDEPS2  > 0
     Pr(#positive >= 75) =
        Binomial(n = 154, x >= 75, p = 0.5) =  0.6564

  Ho: median of MDEPS1 - MDEPS2  = 0 vs.
  Ha: median of MDEPS1 - MDEPS2  < 0
     Pr(#negative >= 79) =
        Binomial(n = 154, x >= 79, p = 0.5) =  0.4045

Two-sided test:
  Ho: median of MDEPS1 - MDEPS2  = 0 vs.
  Ha: median of MDEPS1 - MDEPS2  != 0
     Pr(#positive >= 79 or #negative >= 79) =
        min(1, 2*Binomial(n = 154, x >= 79, p = 0.5)) =  0.8091
```

MLEV1 in Test 9-7 the mean leverage before the application of IR. MLEV2 is the mean leverge during the application of IR. Similarly, MDLEV1 is the median leverage before the application of IR while MDLEV2 is the median leverage after the application of IR.

**Test 9-7** Pearson t-test for the leverage mean before and after IR - sample (2008 – 2013)

```
Paired t test
```

| Variable | Obs | Mean | Std. Err. | Std. Dev. | [95% Conf. Interval] | |
|----------|-----|------|-----------|-----------|---------|---------|
| MLEV1 | 154 | .4718581 | .0152801 | .1896206 | .441671 | .5020453 |
| MLEV2 | 154 | .4666384 | .0151083 | .1874891 | .4367905 | .4964862 |
| diff | 154 | .0052198 | .0085733 | .1063916 | -.0117175 | .022157 |

```
      mean(diff) = mean(MLEV1 - MLEV2)                          t =   0.6088
 Ho: mean(diff) = 0                          degrees of freedom =      153

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.7282        Pr(|T| > |t|) = 0.5435           Pr(T > t) = 0.2718
```

**Test 9-8** Wilcoxon test for the leverage median before and after IR - sample (2008 – 2013)

| sign | observed | expected |
|------|----------|----------|
| positive | 83 | 77 |
| negative | 71 | 77 |
| zero | 0 | 0 |
| all | 154 | 154 |

```
One-sided tests:
  Ho: median of MDLEV1 - MDLEV2  = 0 vs.
  Ha: median of MDLEV1 - MDLEV2  > 0
      Pr(#positive >= 83) =
        Binomial(n = 154, x >= 83, p = 0.5) =  0.1877

  Ho: median of MDLEV1 - MDLEV2  = 0 vs.
  Ha: median of MDLEV1 - MDLEV2  < 0
      Pr(#negative >= 71) =
        Binomial(n = 154, x >= 71, p = 0.5) =  0.8526

Two-sided test:
  Ho: median of MDLEV1 - MDLEV2  = 0 vs.
  Ha: median of MDLEV1 - MDLEV2  != 0
      Pr(#positive >= 83 or #negative >= 83) =
        min(1, 2*Binomial(n = 154, x >= 83, p = 0.5)) =  0.3755
```

MROE1 in Test **9-9** is the mean of Return On Equity in the period preceding the application of IR, MROE2 is the mean of Return On Equity in the period after the application of IR. In the same fashion, MDROE1 and MDROE2 is the medians before and after IR.

**Test 9-9** Pearson t-test for the ROE mean before and after IR - sample (2008 – 2013)

Paired t test

| Variable | Obs | Mean | Std. Err. | Std. Dev. | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| MROE1 | 154 | .3018952 | .057564 | .7143507 | .1881723 | .4156181 |
| MROE2 | 154 | .2791367 | .1918583 | 2.380899 | -.0998967 | .6581701 |
| diff | 154 | .0227585 | .1929334 | 2.394241 | -.3583989 | .4039159 |

```
    mean(diff) = mean(MROE1 - MROE2)                           t =   0.1180
 Ho: mean(diff) = 0                              degrees of freedom =      153

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.5469         Pr(|T| > |t|) = 0.9063         Pr(T > t) = 0.4531
```

**Test 9-10** Wilcoxon test for the ROE median before and after IR - sample (2008 – 2013)

```
         sign │  observed    expected
    ──────────┼─────────────────────────
      positive │     104          77
      negative │      50          77
          zero │       0           0
    ──────────┼─────────────────────────
           all │     154         154

One-sided tests:
  Ho: median of MDROE1 - MDROE2  = 0 vs.
  Ha: median of MDROE1 - MDROE2  > 0
      Pr(#positive >= 104) =
        Binomial(n = 154, x >= 104, p = 0.5) =  0.0000

  Ho: median of MDROE1 - MDROE2  = 0 vs.
  Ha: median of MDROE1 - MDROE2  < 0
      Pr(#negative >= 50) =
        Binomial(n = 154, x >= 50, p = 0.5) =  1.0000

Two-sided test:
  Ho: median of MDROE1 - MDROE2  = 0 vs.
  Ha: median of MDROE1 - MDROE2  != 0
      Pr(#positive >= 104 or #negative >= 104) =
        min(1, 2*Binomial(n = 154, x >= 104, p = 0.5)) =  0.0000
```

Test **9-11** is the mean size before the application of IR. On the other hand, MSize2 is the

mean size after the application of IR. Likewise, MDSize1 is the median size before the

application of IR while MDSize2 is the median size after the application of IR.

**Test 9-11** Pearson t-test for the Size mean before and after IR - sample (2008 – 2013)

```
Paired t test
────────────────────────────────────────────────────────────────────────────────
Variable │     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
─────────┼──────────────────────────────────────────────────────────────────────
  MSize1 │     154    14.31227    .1536419    1.906646    14.00873      14.6158
  MSize2 │     154    14.54327    .1544109    1.916189    14.23821     14.84832
─────────┼──────────────────────────────────────────────────────────────────────
    diff │     154   -.2309997    .0347006    .4306234   -.2995539    -.1624454
────────────────────────────────────────────────────────────────────────────────
     mean(diff) = mean(MSize1 - MSize2)                        t =  -6.6569
 Ho: mean(diff) = 0                              degrees of freedom =      153

 Ha: mean(diff) < 0           Ha: mean(diff) != 0            Ha: mean(diff) > 0
 Pr(T < t) = 0.0000          Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

**Test 9-12** Wilcoxon test for the Size median before and after IR - sample (2008 – 2013)

```
         sign │   observed      expected
──────────────┼───────────────────────────
     positive │        34            77
     negative │       120            77
         zero │         0             0
──────────────┼───────────────────────────
          all │       154           154
```

One-sided tests:
  Ho: median of MDSize1 - MDSize2  = 0 vs.
  Ha: median of MDSize1 - MDSize2  > 0
      Pr(#positive >= 34) =
        Binomial(n = 154, x >= 34, p = 0.5) =  1.0000

  Ho: median of MDSize1 - MDSize2  = 0 vs.
  Ha: median of MDSize1 - MDSize2  < 0
      Pr(#negative >= 120) =
        Binomial(n = 154, x >= 120, p = 0.5) =  0.0000

Two-sided test:
  Ho: median of MDSize1 - MDSize2  = 0 vs.
  Ha: median of MDSize1 - MDSize2  != 0
      Pr(#positive >= 120 or #negative >= 120) =
        min(1, 2*Binomial(n = 154, x >= 120, p = 0.5)) =  0.0000

One-sided tests:

## 9.4 Exploring the multicollinearity problem

To examine the existence of any multicollinearity problems, a correlation matrix between the model variables is constructed in addition to applying the Variance Inflation Factor (VIF). Table 50 – panel A and B list the correlation coefficients between the dependent and independent variables. Panel A reports the coefficient factors between the variables before dropping influential variables using Cook's Distance. Panel B has the same function as panel A but reports the coefficients after excluding influential variables. The coefficients above the diagonal in both panels show Spearman's correlation coefficient, while Pearsons correlation coefficient is presented below the diagonal.

What can be inferred from Table 50 is that regardless of the correlation test used in the analysis, whether it is for linear relationships or non-parametric correlation, the correlation coefficients between the dependent variables become stronger once influential variables are excluded. That is the coefficients of correlation between equity book value and earnings per share (59.5%, 79.4%) using Pearson and Spearman tests respectively increase to become (73.2%, 80.4%) after using Cook's Distance. These high factors increase the probability of collinearity between the focal independent variables, this call for the use of VIF to investigate further the possibilities of multicollinearities among the independent variables.

Table 50 Correlation matrix (08-13)

Panel A - Correlation matrix - before dropping influential obs.

|      | P6       | BV1       | EPS      | LEV      | ROE      | Size     |
|------|----------|-----------|----------|----------|----------|----------|
| P6   | 1        | 0.882***  | 0.847*** | 0.0980** | 0.364*** | 0.797*** |
| BVS  | 0.679*** | 1         | 0.794*** | -0.0258  | 0.115*** | 0.760*** |
| EPS  | 0.613*** | 0.595***  | 1        | 0.128*** | 0.564*** | 0.645*** |
| LEV  | 0.0265   | -0.100**  | 0.0159   | 1        | 0.303*** | 0.275*** |
| ROE  | 0.0197   | -0.0125   | 0.0552   | 0.0807*  | 1        | 0.184*** |
| Size | 0.552*** | 0.550***  | 0.408*** | 0.253*** | 0.0277   | 1        |

Panel B - Correlation matrix - after dropping influential obs.

|      | P6       | BV1      | EPS      | LEV      | ROE      | Size     |
|------|----------|----------|----------|----------|----------|----------|
| P6   | 1        | 0.881*** | 0.871*** | 0.140*** | 0.415*** | 0.776*** |
| BVS  | 0.782*** | 1        | 0.804*** | 0.0329   | 0.154*** | 0.768*** |
| EPS  | 0.806*** | 0.732*** | 1        | 0.195*** | 0.598*** | 0.662*** |
| LEV  | 0.120*** | -0.0341  | 0.159*** | 1        | 0.320*** | 0.310*** |
| ROE  | 0.0897** | 0.0175   | 0.151*** | 0.0149   | 1        | 0.224*** |
| Size | 0.603*** | 0.616*** | 0.533*** | 0.298*** | 0.121*** | 1        |

* p<0.05 ** p<0.01 *** p<0.001

Furthermore, Table 50 illustrates that collinearity becomes a problem once the correlation among the independent variables increases the variance of the parameter estimates (Wooldridge, 2013). In other words, because the coefficients of equity book value and earnings per share are the focal interest in this study, the relative relationship between their estimates and their standard deviations is paramount. Particularly, the calculated t-test in regression tables is calculated by dividing regression coefficients to their standard deviations (the variance of the coefficient estimate). Given the fact that the variance of the coefficient can be written in terms of VIF $(VAR\left(\hat{\beta}_{BV1}\right) = VIF *$

$\frac{\sigma_{\varepsilon}^2}{(n-1)*S_{BV1}^2}$), high VIF values leads to wide standard errors leading to biasing the reliability of the coefficients, testing the hypothesis and the regression estimation and forecasting qualities (Cohen et al., 2002; Belsley, 2004).

Finding VIF for the variables may reveal problems attributed to multicollinearity, and applying this test shows high factors for the variables of interest alongside the interaction

term that reaches a level of 7.86 as demonstrated in Table 51 BR (2016) dealt with this issue by simplifying their model through regressing book value and earnings on their market prices and consequently reached to less VIF values. Despite the lack of clarity in situations where dummy variables intensify the multicollinearity problem by increasing VIF numbers, there is only one study discussing the calculation of VIF in the presence of dummy variables.

Murray et al. (2012) suggests regressing the numerical variables first and then adding dummy variables one by one to understand the effect of each of these dummy variables on VIF and dropping them if necessary. However, the dummy variables in this case are the focal point of this research. Therefore, I follow BR (2016) and Murray et al. (2012) by regressing numerical variables on the equity market price and then introducing the time dummy variable to understand its effect on VIF. While panel B and D of Table 51 shows how VIF values are increased after the application of Cook's Distance, panel C and D shows how VIF values are mitigated once numerical variables are only regressed. It worth noting that the VIF is less than the threshold of 10 that is suggested to indicate high multicollinearity problem and that the application of Cook's Distance worsen the situation.

Table 51 Variance Inflation Factors for the period 2008-2013

| Panel A - VIF for all variables before applying CD | | | Panel B - VIF for all variables after applying CD | | |
|---|---|---|---|---|---|
| Variable | VIF | 1/VIF | Variable | VIF | 1/VIF |
| BVS | 5.44 | 0.18 | BVS | 7.86 | 0.13 |
| IRxBVS | 5.24 | 0.19 | IRxBVS | 7.72 | 0.13 |
| IRxEPS | 3.95 | 0.25 | IRxEPS | 5.66 | 0.18 |
| EPS | 3.94 | 0.25 | EPS | 5.27 | 0.19 |
| IR | 3.44 | 0.29 | IR | 3.69 | 0.27 |
| Size | 1.91 | 0.52 | Size | 2.28 | 0.44 |
| LOSSxEPS | 1.42 | 0.71 | LOSSxEPS | 1.46 | 0.69 |
| Loss | 1.3 | 0.77 | LEV | 1.36 | 0.73 |
| LEV | 1.25 | 0.8 | C_Service | 1.34 | 0.74 |
| ROE | 1.04 | 0.96 | IND_OIL | 1.08 | 0.93 |
| Mean VIF | 2.1 | | Mean VIF | 2.53 | |

| Panel C - VIF for numerical variables before applying CD | | | Panel D - VIF for numerical variables after applying CD | | |
|---|---|---|---|---|---|
| Variable | VIF | 1/VIF | Variable | VIF | 1/VIF |
| BVS | 2.05 | 0.49 | BVS | 3.05 | 0.33 |
| Size | 1.68 | 0.6 | EPS | 2.42 | 0.41 |
| EPS | 1.58 | 0.63 | Size | 1.97 | 0.51 |
| LEV | 1.18 | 0.85 | LEV | 1.28 | 0.78 |
| ROE | 1.01 | 0.99 | ROE | 1.07 | 0.94 |
| Mean VIF | 1.5 | | Mean VIF | 1.96 | |

Table 52 Variance Inflation Factors for the period 2008-2013

| Panel A - VIF for all variables before applying CD | | | Panel B - VIF for all variables after applying CD | | |
|---|---|---|---|---|---|
| Variable | VIF | 1/VIF | Variable | VIF | 1/VIF |
| BVS | 5.44 | 0.18 | BVS | 7.86 | 0.13 |
| IRxBVS | 5.24 | 0.19 | IRxBVS | 7.72 | 0.13 |
| IRxEPS | 3.95 | 0.25 | IRxEPS | 5.66 | 0.18 |
| EPS | 3.94 | 0.25 | EPS | 5.27 | 0.19 |
| IR | 3.44 | 0.29 | IR | 3.69 | 0.27 |
| LOSSxEPS | 1.42 | 0.71 | LOSSxEPS | 1.46 | 0.69 |
| Loss | 1.3 | 0.77 | LEV | 1.36 | 0.73 |
| LEV | 1.25 | 0.8 | C_Service | 1.34 | 0.74 |
| ROE | 1.04 | 0.96 | IND_OIL | 1.08 | 0.93 |
| Mean VIF | 2.1 | | Mean VIF | 2.53 | |

| Panel C - VIF for numerical variables before applying CD | | | Panel D - VIF for numerical variables after applying CD | | |
|---|---|---|---|---|---|
| Variable | VIF | 1/VIF | Variable | VIF | 1/VIF |
| BVS | 2.05 | 0.49 | BVS | 3.05 | 0.33 |
| Size | 1.68 | 0.6 | EPS | 2.42 | 0.41 |
| EPS | 1.58 | 0.63 | Size | 1.97 | 0.51 |
| LEV | 1.18 | 0.85 | LEV | 1.28 | 0.78 |
| ROE | 1.01 | 0.99 | ROE | 1.07 | 0.94 |
| Mean VIF | 1.5 | | Mean VIF | 1.96 | |

## 9.5    Exploring the heteroscedasticity problem

Another regression assumption that is not met in this paper and more probably in BR's is the homoskedasticity assumption. As Figure 11 to Figure 13 illustrate, the relationship between the studentised residual and fitted values shows heteroskedastic pattern which is also verified using the White test for homoskedasticity as demonstrated in Test **9-13** to Test **9-16**. In other words, the higher the predicted price, the higher the residual (fan shape distribution).

In summary, it is noted that solving one problem creates another; that is, using Cook's distance to drop influential variables in this data set has reinforced the collinearity problem.

**Test 9-13** Breusch-Pagan heteroscedasticity test.

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of P6

        chi2(1)      =    848.32
        Prob > chi2  =    0.0000
```

**Test-9-14** White test for heteroscedasticity test

```
White's test for Ho: homoskedasticity
        against Ha: unrestricted heteroskedasticity

        chi2(177)    =    402.17
        Prob > chi2  =    0.0000
```

Cameron & Trivedi's decomposition of IM-test

| Source | chi2 | df | p |
|---|---|---|---|
| Heteroskedasticity | 402.17 | 177 | 0.0000 |
| Skewness | 65.92 | 21 | 0.0000 |
| Kurtosis | 11.68 | 1 | 0.0006 |
| Total | 479.77 | 199 | 0.0000 |

**Test-9-15** White test for heteroskedasticity as seen in Cameron's test for S1 and S2 respectively.

Cameron & Trivedi's decomposition of IM-test

| Source | chi2 | df | p |
|---|---|---|---|
| Heteroskedasticity | 672.99 | 222 | 0.0000 |
| Skewness | 124.49 | 24 | 0.0000 |
| Kurtosis | 31.48 | 1 | 0.0000 |
| Total | 828.96 | 247 | 0.0000 |

Cameron & Trivedi's decomposition of IM-test

| Source | chi2 | df | p |
|---|---|---|---|
| Heteroskedasticity | 811.40 | 222 | 0.0000 |
| Skewness | 133.92 | 24 | 0.0000 |
| Kurtosis | 24.17 | 1 | 0.0000 |
| Total | 969.49 | 247 | 0.0000 |

**Test 9-16** Breusch-Pagan test for heteroskedasticity for S1 and S2 respectively.

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of P6

        chi2(1)     =  1241.16
        Prob > chi2 =   0.0000

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of P6

        chi2(1)     =  1173.35
        Prob > chi2 =   0.0000
```

## 9.6    Comparing pre-adoption period with each year of the post-adoption period

BR compared each year with the pre-adoption period by pooling observations of the pre-adoption period (08 – 10) with every year of the post-adoption period. However, this process was applied by pooling observations after applying CD on the whole population (08 – 13). In other words, when comparing year 2011 with the pre-adoption period (8 – 10) the computed coefficients are biased because they were estimated after dropping influential observations including years 2012 and 2013 whose effects should not be included in our comparison.

To isolate the effects of dropping influential observations that do not relate to the analysis, I pooled the observations of the interested years together and then calculate CD and compared the results. For instance, I pooled the observations of years 2008 to 2011 and then calculated CD and dropped the influential observations to report the results in column (2) of Table 5.

Comparing Table 53 which report similar findings to BR with Table 5 in the findings section (4.4.1.2), shows different results for years 2011 and 2013. BR comments on the non-significance of the interaction term (IRxBVS) in 2011 by stating that the difference

between the two period was not evident until the second year after IR adoption. However, according to my findings in Table 53 both interaction terms were value relevant comparing 2011 with the pre-adoption period.

Table 53 Regression analyses: pre vs post adoption period results

|  | Full period (1) | Pre- vs 11 (2) | Pre- vs 12 (3) | Pre- vs 13 (4) |
|---|---|---|---|---|
| BVS | 1.041*** | 1.097*** | 1.053*** | 1.081*** |
|  | (0.249) | (0.248) | (0.256) | (0.257) |
| EPS | 2.540*** | 2.422*** | 2.485*** | 2.465*** |
|  | (0.669) | (0.665) | (0.684) | (0.685) |
| **IR** | **7.871***** | **-2.932**** | **-2.383*** | **-3.122*** |
|  | **(1.977)** | **(1.211)** | **(-1.366)** | **(-1.625)** |
| **IRxBVS** | **-0.431**** | **-0.317** | **-0.653***** | **-0.378**** |
|  | **(-0.17)** | **(0.241)** | **(0.217)** | **(-0.174)** |
| **IRxEPS** | **2.956***** | **1.775**** | **3.852***** | **3.317***** |
|  | **(0.609)** | **(0.704)** | **(0.774)** | **(0.73)** |
| Loss | 2.288 | 2.02 | 3.458* | 1.209 |
|  | (1.625) | (2.126) | (2.005) | (1.949) |
| LOSSxEPS | -1.866 | 0.94 | -2.244 | -1.374 |
|  | (-1.84) | (2.432) | (-2.582) | (-1.791) |
| LEV | 7.232 | 9.897* | 5.647 | 6.768 |
|  | (5.999) | (5.776) | (6.153) | (5.58) |
| ROE | 0.411 | 0.454 | 1.253 | 1.367* |
|  | (0.435) | (0.402) | (0.791) | (0.791) |
| Size | 2.197*** | 1.825** | 2.307*** | 1.800** |
|  | (0.797) | (0.771) | (0.816) | (0.823) |
| Constant | -42.300*** | -28.576*** | -33.595*** | -27.343** |
|  | (-11.055) | (-10.302) | (-10.915) | (-10.689) |
| Fixed effects | Yes | Yes | Yes | Yes |
| N firm/year | 930 | 620 | 620 | 620 |
| Adj. R^2 | 0.781 | 0.754 | 0.763 | 0.774 |

Column 1 lists the regression results for the whole period (2008-2013). Column 2 lists the regression results of the period (08-11). Column 3 lists the regression results of the period (08-10 and 12). Column 4 lists the regression results of the period (08-10 and 13). Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

On the other hand, the coefficient of the interaction term of IR x BVS in 2013 in Table 5 has turned to be insignificant. Furthermore, similar to the drop in the coefficient value of the IRxEPS from 3.7 in 2012 to 2.34 in 2013, the related statistical significance changed from being 1% in 2012 to 5% in 2013. This requires exploring whether this decreasing trend of value relevance continues over the period 2014-2016.

## 9.7 The comparison of Means and Medians before and after IR for winsorized variables

Test **9-17** exhibits the results of comparing the mean of the market value of a share (MP61) in the pre-period of applying IR (2008-2010) with its counterpart in post-period (2011-2016) in the winsorized setting. As the Pearson t-test shows there is a significant difference between the price before and after the application of IR and MP62 is significantly larger than MP61. Similarly, the non-parametric Test **9-18** – Wilcoxon non-parametric test – reconfirms the finding of the Pearson t-test of higher median in the post-period compared to pre-period.

**Test 9-17** Pearson t-test for the price mean before and after IR - Winsorized (2008 – 2016)

```
Paired t test

─────────────────────────────────────────────────────────────────────────────
Variable │     Obs        Mean    Std. err.    Std. dev.    [95% conf. interval]
─────────┼───────────────────────────────────────────────────────────────────────
    MP61 │     153    36.62285    5.393456     66.71337     25.96703    47.27867
    MP62 │     153    51.52122    6.564237     81.19513     38.55229    64.49014
─────────┼───────────────────────────────────────────────────────────────────────
    diff │     153   -14.89836    3.439761     42.54749    -21.69428    -8.102448
─────────────────────────────────────────────────────────────────────────────
    mean(diff) = mean(MP61 - MP62)                              t =  -4.3312
H0: mean(diff) = 0                              Degrees of freedom =      152

Ha: mean(diff) < 0            Ha: mean(diff) != 0            Ha: mean(diff) > 0
Pr(T < t) = 0.0000        Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

**Test 9-18** Wilcoxon sign test for the price median before and after IR - Winsorized sample (2008 – 2016)

```
Sign test

         Sign │   Observed     Expected
    ──────────┼──────────────────────────
     Positive │         54           76
     Negative │         98           76
         Zero │          1            1
    ──────────┼──────────────────────────
          All │        153          153

One-sided tests:
  H0: median of MDP61 - MDP62  = 0 vs.
  Ha: median of MDP61 - MDP62  > 0
     Pr(#positive >= 54) =
       Binomial(n = 152, x >= 54, p = 0.5) = 0.9999

  H0: median of MDP61 - MDP62  = 0 vs.
  Ha: median of MDP61 - MDP62  < 0
     Pr(#negative >= 98) =
       Binomial(n = 152, x >= 98, p = 0.5) = 0.0002

Two-sided test:
  H0: median of MDP61 - MDP62  = 0 vs.
  Ha: median of MDP61 - MDP62  != 0
     Pr(#positive >= 98 or #negative >= 98) =
       min(1, 2*Binomial(n = 152, x >= 98, p = 0.5)) = 0.0004
```

Test 9-19 exhibits the results of comparing the mean of the equity book value (MBV1) in the pre-period of applying IR (2008-2010) with its counterpart (MBV2) in post-period (2011-2016) in the winsorized setting. As the Pearson t-test shows there is a significant difference between the price before and after the application of IR and MBV2 is significantly larger than MBV1. Similarly, the non-parametric

Test **9-21** – Wilcoxon non-parametric test – reconfirms the finding of the Pearson t-test of higher median in the post-period compared to pre-period.

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**Test 9-20** Pearson t-test for the book value of equity mean before and after IR -

Winsorized (2008 – 2016)

```
Paired t test
─────────────────────────────────────────────────────────────────────────────
Variable │     Obs        Mean    Std. err.   Std. dev.   [95% conf. interval]
─────────┼───────────────────────────────────────────────────────────────────
    MBV1 │     153    17.49193    2.290616    28.33335    12.96638    22.01749
    MBV2 │     153     24.8609    3.031488    37.49744    18.87161    30.85019
─────────┼───────────────────────────────────────────────────────────────────
    diff │     153   -7.368965    1.060322    13.11546   -9.463837   -5.274093
─────────────────────────────────────────────────────────────────────────────
    mean(diff) = mean(MBV1 - MBV2)                              t =  -6.9497
H0: mean(diff) = 0                              Degrees of freedom =       152

Ha: mean(diff) < 0              Ha: mean(diff) != 0              Ha: mean(diff) > 0
Pr(T < t) = 0.0000          Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

**Test 9-21** Wilcoxon sign test for the median of equity book value before and after IR -

Winsorized sample (2008 – 2016)

```
Sign test
────────────────────────────────────
     Sign │   Observed     Expected
──────────┼─────────────────────────
 Positive │         27           76
 Negative │        125           76
     Zero │          1            1
──────────┼─────────────────────────
      All │        153          153

One-sided tests:
  H0: median of MDBV1 - MDBV2  = 0 vs.
  Ha: median of MDBV1 - MDBV2  > 0
      Pr(#positive >= 27) =
        Binomial(n = 152, x >= 27, p = 0.5) = 1.0000

  H0: median of MDBV1 - MDBV2  = 0 vs.
  Ha: median of MDBV1 - MDBV2  < 0
      Pr(#negative >= 125) =
        Binomial(n = 152, x >= 125, p = 0.5) = 0.0000

Two-sided test:
  H0: median of MDBV1 - MDBV2  = 0 vs.
  Ha: median of MDBV1 - MDBV2  != 0
      Pr(#positive >= 125 or #negative >= 125) =
        min(1, 2*Binomial(n = 152, x >= 125, p = 0.5)) = 0.0000
```

Test **9-22** exhibits the results of comparing the mean of the earnings per share (MEPS1)

in the pre-period of applying IR (2008-2010) with its counterpart (MEPS1) in post-period

(2011-2016) in the winsorized setting. As the Pearson t-test shows the null hypothesis

can not be rejected, therefore, there is no significant difference between the mean of earnings per share before and after the application of IR. However, the non-parametric Test **9-23** – Wilcoxon non-parametric test – provides evidence at 5% that the earnings per share in the post-period is significantly higher than the pre-period.

**Test 9-22** Pearson t-test for the earnings per share mean before and after IR - Winsorized (2008 – 2016)

```
Paired t test
```

| Variable | Obs | Mean | Std. err. | Std. dev. | [95% conf. interval] |
|----------|-----|------|-----------|-----------|----------------------|
| MEPS1 | 153 | 4.891964 | .6629586 | 8.200345 | 3.58216 | 6.201767 |
| MEPS2 | 153 | 4.919415 | .7012215 | 8.673631 | 3.534016 | 6.304814 |
| diff | 153 | -.0274514 | .5115523 | 6.327553 | -1.038122 | .9832194 |

```
    mean(diff) = mean(MEPS1 - MEPS2)                              t =  -0.0537
H0: mean(diff) = 0                            Degrees of freedom =      152

Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
Pr(T < t) = 0.4786         Pr(|T| > |t|) = 0.9573         Pr(T > t) = 0.5214
```

**Test 9-23** Wilcoxon sign test for the median of earnings per share before and after IR - Winsorized sample (2008 – 2016)

```
Sign test
```

| Sign | Observed | Expected |
|------|----------|----------|
| Positive | 62 | 76.5 |
| Negative | 91 | 76.5 |
| Zero | 0 | 0 |
| All | 153 | 153 |

```
One-sided tests:
  H0: median of MDEPS1 - MDEPS2  = 0 vs.
  Ha: median of MDEPS1 - MDEPS2  > 0
      Pr(#positive >= 62) =
        Binomial(n = 153, x >= 62, p = 0.5) = 0.9925

  H0: median of MDEPS1 - MDEPS2  = 0 vs.
  Ha: median of MDEPS1 - MDEPS2  < 0
      Pr(#negative >= 91) =
        Binomial(n = 153, x >= 91, p = 0.5) = 0.0116

Two-sided test:
  H0: median of MDEPS1 - MDEPS2  = 0 vs.
  Ha: median of MDEPS1 - MDEPS2  != 0
      Pr(#positive >= 91 or #negative >= 91) =
        min(1, 2*Binomial(n = 153, x >= 91, p = 0.5)) = 0.0233
```

Test **9-24** exhibits the results of comparing the aveage leverage (MLEV1) in the pre-period of applying IR (2008-2010) with its counterpart (MLEV2) in post-period (2011-2016) in the winsorized setting. As the Pearson t-test shows the null hypothesis can not be rejected, therefore, there is no significant difference between the mean of leverage before and after the application of IR. However, the non-parametric Test **9-25** – Wilcoxon non-parametric test – provides evidence at 1 % that the earnings per share in the pre-period is significantly higher than the post-period.

**Test 9-24** Pearson t-test for the leverage mean before and after IR - Winsorized (2008 – 2016)

```
Paired t test
```

| Variable | Obs | Mean | Std. err. | Std. dev. | [95% conf. interval] | |
|---|---|---|---|---|---|---|
| MLEV1 | 153 | .4783007 | .0147651 | .1826343 | .4491294 | .5074721 |
| MLEV2 | 153 | .4636463 | .0136755 | .1691572 | .4366276 | .490665 |
| diff | 153 | .0146545 | .0089587 | .1108134 | -.0030453 | .0323542 |

```
    mean(diff) = mean(MLEV1 - MLEV2)                        t =   1.6358
H0: mean(diff) = 0                        Degrees of freedom =      152

Ha: mean(diff) < 0          Ha: mean(diff) != 0          Ha: mean(diff) > 0
Pr(T < t) = 0.9480        Pr(|T| > |t|) = 0.1040          Pr(T > t) = 0.0520
```

**Test 9-25** Wilcoxon sign test for the median of leverage before and after IR - Winsorized

sample (2008 – 2016)

```
Sign test

         Sign │    Observed      Expected
    ──────────┼──────────────────────────
     Positive │          92          76.5
     Negative │          61          76.5
         Zero │           0             0
    ──────────┼──────────────────────────
          All │         153           153

One-sided tests:
  H0: median of MDLEV1 - MDLEV2  = 0 vs.
  Ha: median of MDLEV1 - MDLEV2  > 0
      Pr(#positive >= 92) =
        Binomial(n = 153, x >= 92, p = 0.5) = 0.0075

  H0: median of MDLEV1 - MDLEV2  = 0 vs.
  Ha: median of MDLEV1 - MDLEV2  < 0
      Pr(#negative >= 61) =
        Binomial(n = 153, x >= 61, p = 0.5) = 0.9953

Two-sided test:
  H0: median of MDLEV1 - MDLEV2  = 0 vs.
  Ha: median of MDLEV1 - MDLEV2  != 0
      Pr(#positive >= 92 or #negative >= 92) =
        min(1, 2*Binomial(n = 153, x >= 92, p = 0.5)) = 0.0150
```

Test **9-26** exhibits the results of comparing the mean of the Size (MSize1) in the pre-

period of applying IR (2008-2010) with its counterpart (MSize2) in post-period (2011-

2016) in the winsorized setting. As the Pearson t-test shows there is a significant

difference between firm size before and after the application of IR and MSize2 is

significantly larger than MSize1. Similarly, the non-parametric

Test **9-27** – Wilcoxon non-parametric test – reconfirms the finding of the Pearson t-test

of higher median in the post-period compared to pre-period.

**Test 9-26** Pearson t-test for the mean of Size before and after IR - Winsorized (2008 –

2016)

```
Paired t test
─────────────────────────────────────────────────────────────────────────
Variable │     Obs        Mean    Std. err.    Std. dev.   [95% conf. interval]
─────────┼───────────────────────────────────────────────────────────────
  MSize1 │     153    14.52728    .1641026    2.029837    14.20306      14.8515
  MSize2 │     153     14.9347    .1648695    2.039323    14.60897     15.26044
─────────┼───────────────────────────────────────────────────────────────
    diff │     153   -.4074242    .0386828    .4784801   -.4838496    -.3309988
─────────────────────────────────────────────────────────────────────────
      mean(diff) = mean(MSize1 - MSize2)                        t = -10.5324
 H0: mean(diff) = 0                              Degrees of freedom =     152

 Ha: mean(diff) < 0            Ha: mean(diff) != 0            Ha: mean(diff) > 0
 Pr(T < t) = 0.0000        Pr(|T| > |t|) = 0.0000           Pr(T > t) = 1.0000
```

**Test 9-27** Wilcoxon sign test for the median of firm Size before and after IR - Winsorized

sample (2008 – 2016)

```
Sign test
──────────────────────────────────
     Sign │   Observed    Expected
──────────┼───────────────────────
 Positive │         24          76
 Negative │        128          76
     Zero │          1           1
──────────┼───────────────────────
      All │        153         153

One-sided tests:
  H0: median of MDSize1 - MDSize2  = 0 vs.
  Ha: median of MDSize1 - MDSize2  > 0
      Pr(#positive >= 24) =
        Binomial(n = 152, x >= 24, p = 0.5) = 1.0000

  H0: median of MDSize1 - MDSize2  = 0 vs.
  Ha: median of MDSize1 - MDSize2  < 0
      Pr(#negative >= 128) =
        Binomial(n = 152, x >= 128, p = 0.5) = 0.0000

Two-sided test:
  H0: median of MDSize1 - MDSize2  = 0 vs.
  Ha: median of MDSize1 - MDSize2  != 0
      Pr(#positive >= 128 or #negative >= 128) =
        min(1, 2*Binomial(n = 152, x >= 128, p = 0.5)) = 0.0000
```

## 9.8    The comparison of Means and Medians before and after IR under CD

Test **9-28** exhibits the results of comparing the mean of the market value of a share (MP61) in the pre-period of applying IR (2008-2010) with its counterpart in post-period (2011-2016) using Cook's Distance setting. As the Pearson t-test shows there is a significant difference between the price before and after the application of IR and MP62 is significantly larger than MP61. Similarly, the non-parametric Test **9-29** – Wilcoxon non-parametric test – reconfirms the finding of the Pearson t-test of higher median in the post-period compared to pre-period.

**Test 9-28** Pearson t-test for the price mean before and after IR - CD (2008 – 2016)

```
Paired t test

Variable |     Obs        Mean    Std. err.   Std. dev.   [95% conf. interval]

    MP61 |     139    24.14716    2.945522    34.72719    18.32296    29.97135
    MP62 |     139    35.97522    4.287532    50.54926    27.49747    44.45297

    diff |     139   -11.82806    2.457813    28.97719   -16.68791   -6.968221

     mean(diff) = mean(MP61 - MP62)                            t =  -4.8124
H0: mean(diff) = 0                          Degrees of freedom =      138

Ha: mean(diff) < 0            Ha: mean(diff) != 0            Ha: mean(diff) > 0
Pr(T < t) = 0.0000        Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

**Test 9-29** Wilcoxon sign test for the price median before and after IR - CD (2008 – 2016)

```
Sign test

        Sign │   Observed    Expected
─────────────┼───────────────────────
    Positive │         51        69.5
    Negative │         88        69.5
        Zero │          0           0
─────────────┼───────────────────────
         All │        139         139

One-sided tests:
  H0: median of MDP61 - MDP62  = 0 vs.
  Ha: median of MDP61 - MDP62  > 0
      Pr(#positive >= 51) =
        Binomial(n = 139, x >= 51, p = 0.5) = 0.9994

  H0: median of MDP61 - MDP62  = 0 vs.
  Ha: median of MDP61 - MDP62  < 0
      Pr(#negative >= 88) =
        Binomial(n = 139, x >= 88, p = 0.5) = 0.0011

Two-sided test:
  H0: median of MDP61 - MDP62  = 0 vs.
  Ha: median of MDP61 - MDP62  != 0
      Pr(#positive >= 88 or #negative >= 88) =
        min(1, 2*Binomial(n = 139, x >= 88, p = 0.5)) = 0.0021
```

Test **9-30** exhibits the results of comparing the mean of the equity book value (MBV1) in the pre-period of applying IR (2008-2010) with its counterpart (MBV2) in post-period (2011-2016) using CD setting. As the Pearson t-test shows there is a significant difference between the price before and after the application of IR and MBV2 is significantly larger than MBV1. Similarly, the non-parametric

Test **9-31** – Wilcoxon non-parametric test – reconfirms the finding of the Pearson t-test of higher median in the post-period compared to pre-period.

**Test 9-30** Pearson t-test for the book value of equity mean before and after IR - CD (2008

– 2016)

```
Paired t test
─────────────────────────────────────────────────────────────────────────────
Variable │      Obs        Mean    Std. err.    Std. dev.   [95% conf. interval]
─────────┼───────────────────────────────────────────────────────────────────────
    MBV1 │      139    11.72897    1.403501     16.54704    8.953826     14.50412
    MBV2 │      139    16.76778    1.942827     22.90559    12.92622     20.60934
─────────┼───────────────────────────────────────────────────────────────────────
    diff │      139   -5.038805    .8111855     9.563737   -6.642765    -3.434845
─────────────────────────────────────────────────────────────────────────────
     mean(diff) = mean(MBV1 - MBV2)                          t =  -6.2117
 H0: mean(diff) = 0                              Degrees of freedom =      138

 Ha: mean(diff) < 0            Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0000        Pr(|T| > |t|) = 0.0000           Pr(T > t) = 1.0000
```

**Test 9-31** Wilcoxon sign test for the median of equity book value before and after IR -

CD (2008 – 2016)

```
Sign test
              ┌────────────────────────────
         Sign │   Observed      Expected
──────────────┼────────────────────────────
     Positive │         27          69.5
     Negative │        112          69.5
         Zero │          0             0
──────────────┼────────────────────────────
          All │        139           139

One-sided tests:
  H0: median of MDBV1 - MDBV2  = 0 vs.
  Ha: median of MDBV1 - MDBV2  > 0
     Pr(#positive >= 27) =
        Binomial(n = 139, x >= 27, p = 0.5) = 1.0000

  H0: median of MDBV1 - MDBV2  = 0 vs.
  Ha: median of MDBV1 - MDBV2  < 0
     Pr(#negative >= 112) =
        Binomial(n = 139, x >= 112, p = 0.5) = 0.0000

Two-sided test:
  H0: median of MDBV1 - MDBV2  = 0 vs.
  Ha: median of MDBV1 - MDBV2  != 0
     Pr(#positive >= 112 or #negative >= 112) =
        min(1, 2*Binomial(n = 139, x >= 112, p = 0.5)) = 0.0000
```

Test **9-32** exhibits the results of comparing the mean of the earnings per share (MEPS1)

in the pre-period of applying IR (2008-2010) with its counterpart (MEPS1) in post-period

(2011-2016) using CD settings. As the Pearson t-test shows the null hypothesis can not

be rejected, therefore, there is no significant difference between the mean of earnings per share before and after the application of IR. However, the non-parametric Test **9-33** – Wilcoxon non-parametric test – provides evidence at 5% that the earnings per share in the post-period is significantly higher than the pre-period.

**Test 9-32** Pearson t-test for the earnings per share mean before and after IR - CD (2008 – 2016)

```
Paired t test
```

| Variable | Obs | Mean | Std. err. | Std. dev. | [95% conf. interval] | |
|---|---|---|---|---|---|---|
| MEPS1 | 139 | 3.257803 | .3746751 | 4.417354 | 2.516957 | 3.99865 |
| MEPS2 | 139 | 3.41315 | .4354273 | 5.133612 | 2.552178 | 4.274122 |
| diff | 139 | -.1553463 | .2644461 | 3.117773 | -.6782365 | .3675438 |

```
    mean(diff) = mean(MEPS1 - MEPS2)                            t =  -0.5874
H0: mean(diff) = 0                            Degrees of freedom =      138

Ha: mean(diff) < 0          Ha: mean(diff) != 0          Ha: mean(diff) > 0
Pr(T < t) = 0.2789        Pr(|T| > |t|) = 0.5579          Pr(T > t) = 0.7211
```

**Test 9-33** Wilcoxon sign test for the median of earnings per share before and after IR - CD (2008 – 2016)

```
Sign test
```

| Sign | Observed | Expected |
|---|---|---|
| Positive | 56 | 69.5 |
| Negative | 83 | 69.5 |
| Zero | 0 | 0 |
| All | 139 | 139 |

```
One-sided tests:
  H0: median of MDEPS1 - MDEPS2  = 0 vs.
  Ha: median of MDEPS1 - MDEPS2  > 0
     Pr(#positive >= 56) =
        Binomial(n = 139, x >= 56, p = 0.5) = 0.9914

  H0: median of MDEPS1 - MDEPS2  = 0 vs.
  Ha: median of MDEPS1 - MDEPS2  < 0
     Pr(#negative >= 83) =
        Binomial(n = 139, x >= 83, p = 0.5) = 0.0135

Two-sided test:
  H0: median of MDEPS1 - MDEPS2  = 0 vs.
  Ha: median of MDEPS1 - MDEPS2  != 0
     Pr(#positive >= 83 or #negative >= 83) =
        min(1, 2*Binomial(n = 139, x >= 83, p = 0.5)) = 0.0271
```

Test **9-34** exhibits the results of comparing the aveage leverage (MLEV1) in the pre-period of applying IR (2008-2010) with its counterpart (MLEV2) in post-period (2011-2016) using CD setting. As the Pearson t-test shows the null hypothesis can not be rejected, therefore, there is no significant difference between the mean of leverage before and after the application of IR. However, the non-parametric Test **9-35** – Wilcoxon non-parametric test – provides evidence at 1 % that the earnings per share in the pre-period is significantly higher than the post-period.

**Test 9-34** Pearson t-test for the leverage mean before and after IR - CD (2008 – 2016)

```
Paired t test
```

| Variable | Obs | Mean | Std. err. | Std. dev. | [95% conf. interval] | |
|---|---|---|---|---|---|---|
| MLEV1 | 139 | .4821783 | .0159045 | .1875119 | .4507302 | .5136264 |
| MLEV2 | 139 | .4696108 | .0147105 | .1734342 | .4405237 | .4986979 |
| diff | 139 | .0125675 | .0101207 | .1193208 | -.0074441 | .0325791 |

```
    mean(diff) = mean(MLEV1 - MLEV2)                          t =   1.2418
H0: mean(diff) = 0                              Degrees of freedom =      138

Ha: mean(diff) < 0            Ha: mean(diff) != 0            Ha: mean(diff) > 0
Pr(T < t) = 0.8918          Pr(|T| > |t|) = 0.2164          Pr(T > t) = 0.1082
```

**Test 9-35** Wilcoxon sign test for the median of leverage before and after IR - CD (2008

– 2016)

```
Sign test

        Sign │  Observed    Expected
─────────────┼───────────────────────
    Positive │        80        69.5
    Negative │        59        69.5
        Zero │         0           0
─────────────┼───────────────────────
         All │       139         139

One-sided tests:
  H0: median of MDLEV1 - MDLEV2  = 0 vs.
  Ha: median of MDLEV1 - MDLEV2  > 0
     Pr(#positive >= 80) =
        Binomial(n = 139, x >= 80, p = 0.5) = 0.0447

  H0: median of MDLEV1 - MDLEV2  = 0 vs.
  Ha: median of MDLEV1 - MDLEV2  < 0
     Pr(#negative >= 59) =
        Binomial(n = 139, x >= 59, p = 0.5) = 0.9692

Two-sided test:
  H0: median of MDLEV1 - MDLEV2  = 0 vs.
  Ha: median of MDLEV1 - MDLEV2  != 0
     Pr(#positive >= 80 or #negative >= 80) =
        min(1, 2*Binomial(n = 139, x >= 80, p = 0.5)) = 0.0895
```

Test **9-36** exhibits the results of comparing the mean of the Size (MSize1) in the pre-

period of applying IR (2008-2010) with its counterpart (MSize2) in post-period (2011-

2016) using CD settings. As the Pearson t-test shows there is a significant difference

between firm size before and after the application of IR and MSize2 is significantly larger

than MSize1. Similarly, the non-parametric

Test **9-37** – Wilcoxon non-parametric test – reconfirms the finding of the Pearson t-test

of higher median in the post-period compared to pre-period.

**Test 9-36** Pearson t-test for the mean of Size before and after IR - CD (2008 – 2016)

```
Paired t test
───────────────────────────────────────────────────────────────────────────
Variable │     Obs        Mean    Std. err.    Std. dev.   [95% conf. interval]
─────────┼─────────────────────────────────────────────────────────────────────
  MSize1 │     139     14.3334    .1647133     1.941941    14.00772    14.65909
  MSize2 │     139    14.74895    .1656962     1.953529    14.42132    15.07658
─────────┼─────────────────────────────────────────────────────────────────────
    diff │     139   -.4155448    .0414198     .4883321   -.4974443   -.3336453
───────────────────────────────────────────────────────────────────────────
    mean(diff) = mean(MSize1 - MSize2)                          t = -10.0325
H0: mean(diff) = 0                            Degrees of freedom =      138

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0000        Pr(|T| > |t|) = 0.0000         Pr(T > t) = 1.0000
```

**Test 9-37** Wilcoxon sign test for the median of firm Size before and after IR - CD (2008 – 2016)

```
Sign test
─────────────────────────────────────────
     Sign │    Observed     Expected
──────────┼──────────────────────────
 Positive │          23         69.5
 Negative │         116         69.5
     Zero │           0            0
──────────┼──────────────────────────
      All │         139          139

One-sided tests:
  H0: median of MDSize1 - MDSize2  = 0 vs.
  Ha: median of MDSize1 - MDSize2  > 0
      Pr(#positive >= 23) =
        Binomial(n = 139, x >= 23, p = 0.5) = 1.0000

  H0: median of MDSize1 - MDSize2  = 0 vs.
  Ha: median of MDSize1 - MDSize2  < 0
      Pr(#negative >= 116) =
        Binomial(n = 139, x >= 116, p = 0.5) = 0.0000

Two-sided test:
  H0: median of MDSize1 - MDSize2  = 0 vs.
  Ha: median of MDSize1 - MDSize2  != 0
      Pr(#positive >= 116 or #negative >= 116) =
        min(1, 2*Binomial(n = 139, x >= 116, p = 0.5)) = 0.0000
```

## 9.9    Exploring the multicollinearity problem

As it is mentioned in section 4.4.2.1 and Table 11, the 80% threshold may indicate the existence of multicollinearity problem which requires further investigations. The way I approach this problem is by calculating the Variance Inflation Factor (VIF) for the variables as demonstrated in panels A and B of Table 54 While some of VIF values in

panel B for CD variables exceeds 10, all the values of the Winsorized variables fall below

7.25 suggesting a possible multicollinearity problem following CD (Cohen et al., 2002).

Furthermore, according to Cohen et al. (2002), it is expected to get high values of VIF in

regression models involving interaction terms. One of the suggested solutions is to drop

one of the collinear variables which, in this case, are the interaction terms for both

earnings and equity book value (Gujarati, 2004). However, the main question of this

research revolves around the interaction terms, making the previous option not feasible.

Consequently, the only suggested solution to circumvent using the interaction terms is

by dropping them from the regression analysis and running the model in the pre- and

post-adoption periods[48]. Afterwards, the regression coefficients of the accounting

summary are compared using seemingly unrelated estimation tests (SUEST) which

allows for cross-model comparison (Weesie, 2000). If the null hypothesis of equal

coefficients is rejected or accepted and it simultaneously mirrored the outcomes of the

---

[48] The idea of comparing the regression results by running the model in the two periods is used in BR (2016). However, the authors use Wald test and a simpler version of the model that only includes earnings and equity book value. Nonetheless, Wald test requires one model that uses interaction terms, leading me to use the methodology suggested by Weesie (2000).

interaction model, there is less chance for the findings of the interaction model to be affected by the multicollinearity problem.

Table 54 Variance Inflation Factors for Winsorized and CD variables

| Panel A: VIF for Winsorized variables | | |
|---|---|---|
| Variable | VIF | 1/VIF |
| BVS | 7.24 | 0.14 |
| EPS | 5.37 | 0.19 |
| IR | 4.50 | 0.22 |
| IRxBVS | 7.12 | 0.14 |
| IRxEPS | 6.23 | 0.16 |
| LOSS | 1.61 | 0.62 |
| LOSSxEPS | 1.66 | 0.60 |
| LEV | 1.30 | 0.77 |
| Size | 2.08 | 0.48 |
| Mean VIF | 7.77 | |

| Panel B: VIF for CD variables | | |
|---|---|---|
| Variable | VIF | 1/VIF |
| BVS | 11.30 | 0.09 |
| EPS | 7.34 | 0.14 |
| IR | 4.80 | 0.21 |
| IRxBVS | 11.14 | 0.09 |
| IRxEPS | 7.99 | 0.13 |
| LOSS | 1.46 | 0.69 |
| LOSSxEPS | 1.57 | 0.64 |
| LEV | 1.36 | 0.73 |
| Size | 2.33 | 0.43 |
| Mean VIF | 7.73 | |

However, to run the SUEST test, the exact model must be run in the two periods leading to a complexity in controlling for time effects. This issue arises from the different time-dummy variables in each period. Therefore, I regress the time fixed effects on the price and then regress the free-interaction model (reported in Table 55) on the residual from the time fixed effects regression following similar method of Barth et al. (2008) However, before proceeding with the coefficient comparison, I run the model on the whole period and compare the results with what is reported in the Table 12 in section 4.2.2.2. Contrasting the results of the full period in Table 55 with their counterparts in

Table 12 produces similar outcomes for the variables of interest in terms of coefficient values and significance levels.

Table 55 Regression results following Barth et al. (2008)

|  | 1 | 2 |
|---|---|---|
| BVS | 0.99** | 1.21*** |
|  | (0.46) | (0.16) |
| EPS | 2.37** | 2.28*** |
|  | (1.19) | (0.57) |
| IR | -12.01*** | -10.33*** |
|  | (3.99) | (-1.43) |
| IRxBVS | -0.11 | -0.45 |
|  | (0.22) | (-0.28) |
| IRxEPS | 0.9 | 2.95*** |
|  | (1.21) | (1.07) |
| LOSS | 3.24 | 1.05 |
|  | (4.52) | (1.91) |
| LOSSxEPS | -1.08 | -3.90* |
|  | (-4.92) | (-2.12) |
| LEV | 7.3 | -1.79 |
|  | (17.42) | (-7.33) |
| SIZE | 7.23** | 1.81* |
|  | (3.27) | (0.92) |
| Constant | -133.87*** | -48.32*** |
|  | (-41.6) | (-11.75) |
| Fixed effects | Yes | Yes |
| N firm/year | 1,377 | 1,251 |
| Adj. R^2 | 0.652 | 0.756 |

Note. RE is the residual from regressing the time dummy variables on the price. Column (1) reports the regression results of the Winsorized data and Column (2) for the regression variables after the application of Cook's Distance. Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 56 and Table 57 contrast VIF values for Winsorized and CD variables respectively of the free-interaction model reported in Table 54 during the full-, pre-, and post-adoption periods as demonstrated in panels A, B, and C respectively. It can be noted from comparing panel A of both tables with panels B and C, the drop in VIF values for the variables of interest between the full and sub-periods diminishing the possible influence of multicollinearity on the regression findings.

The SUEST tests exhibited in Test **9-38** and

Test **9-39** for both Winsorized and CD settings respectively verify the results achieved in Table 55. The results of Test **9-38** do not provide enough support to reject the null hypothesis for both the earnings and equity book values using the Winsorized settings. In other words, there is no significant difference between the coefficients of earnings and book value of equity in the pre- and post-adoption periods supporting the findings of no significant influence of IR on the value relevance of accounting summary in Table 54. On the other hand,

Test **9-39** provides enough support to reject the null hypothesis for earnings and to conclude on the positive effect of IR on the value relevance of earnings in CD settings.

In summary, the high values of correlation coefficients reported in Table 11 highlights the possible impact of multicollinearity on the precision of the regression outcomes. Consequently, calculating the VIF values resulted in high values that bypassed the threshold of 10. According to Cohen et al. (2002), however, one of the main sources of multicollinearity problem is the inclusion of interaction terms in regression models. As a result, I run the model without the interaction terms in each period separately and compared the VIF values which, in the worst scenario, fall approximately 60% after dropping the interaction term. Furthermore, the comparison of the coefficients using SUEST test produced similar results to what is reported in Table 12 providing supporting evidence on the robustness of the regression results to the multicollinearity problem. Value Inflation Factors for the Winsorized variables.

Table 56 Value Inflation Factors for the Winsorized variables

| Variable | Panel A | | Panel B | | Panel C | |
|---|---|---|---|---|---|---|
| | VIF | 1/VIF | VIF | 1/VIF | VIF | 1/VIF |
| BVS | 7.23 | 0.14 | 2.55 | 0.39 | 2.96 | 0.34 |
| EPS | 5.35 | 0.19 | 2.04 | 0.49 | 2.41 | 0.42 |
| IR | 1.37 | 0.73 | | | | |
| IRxBVS | 7.06 | 0.14 | | | | |
| IRxEPS | 6.18 | 0.16 | | | | |
| LOSS | 1.6 | 0.62 | 1.52 | 0.66 | 1.64 | 0.61 |
| LOSSxEPS | 1.65 | 0.61 | 1.34 | 0.74 | 1.74 | 0.57 |
| LEV | 1.29 | 0.77 | 1.24 | 0.8 | 1.33 | 0.75 |
| SIZE | 2.07 | 0.48 | 1.98 | 0.51 | 2.06 | 0.49 |
| ICBIC | | | | | | |
| 1000 | 26.47 | 0.04 | 28.52 | 0.04 | 26.06 | 0.04 |
| 2000 | 37.59 | 0.03 | 40.83 | 0.02 | 36.87 | 0.03 |
| 3000 | 15.02 | 0.07 | 16.1 | 0.06 | 14.77 | 0.07 |
| 4000 | 5.96 | 0.17 | 6.33 | 0.16 | 5.88 | 0.17 |
| 5000 | 25.5 | 0.04 | 27.65 | 0.04 | 25 | 0.04 |
| 6000 | 6.01 | 0.17 | 6.51 | 0.15 | 5.89 | 0.17 |
| 9000 | 12.55 | 0.08 | 13.49 | 0.07 | 12.35 | 0.08 |
| **Mean VIF** | **10.18** | | **11.55** | | **10.69** | |

Note. Panel A report the VIF values for the model used in Table 48 with the interaction terms on the full period. Panel B reports the VIF values for the model after dropping the interaction terms on the pre-adoption period. Panel C reports the VIF values for the model after dropping the interaction terms on the post-adoption period.

Table 57 Value Inflation Factors for the CD variables

| Variable | Panel A | | Panel B | | Panel C | |
|---|---|---|---|---|---|---|
| | VIF | 1/VIF | VIF | 1/VIF | VIF | 1/VIF |
| BVS | 11.26 | 0.09 | 3.07 | 0.33 | 3.22 | 0.31 |
| EPS | 7.25 | 0.14 | 2.26 | 0.44 | 2.76 | 0.36 |
| IR | 1.62 | 0.62 | | | | |
| IRxBVS | 11.07 | 0.09 | | | | |
| IRxEPS | 7.91 | 0.13 | | | | |
| LOSS | 1.45 | 0.69 | 1.42 | 0.71 | 1.47 | 0.68 |
| LOSSxEPS | 1.57 | 0.64 | 1.18 | 0.85 | 1.64 | 0.61 |
| LEV | 1.36 | 0.73 | 1.36 | 0.74 | 1.38 | 0.73 |
| SIZE | 2.32 | 0.43 | 2.4 | 0.42 | 2.27 | 0.44 |
| ICBIC | | | | | | |
| 1000 | 22.09 | 0.05 | 23.89 | 0.04 | 21.75 | 0.05 |
| 2000 | 35.6 | 0.03 | 38.87 | 0.03 | 34.94 | 0.03 |
| 3000 | 14.09 | 0.07 | 15.15 | 0.07 | 13.87 | 0.07 |
| 4000 | 4.96 | 0.2 | 5.26 | 0.19 | 4.9 | 0.2 |
| 5000 | 21.75 | 0.05 | 23.81 | 0.04 | 21.31 | 0.05 |
| 6000 | 5.02 | 0.2 | 5.44 | 0.18 | 4.94 | 0.2 |
| 9000 | 12.49 | 0.08 | 13.48 | 0.07 | 12.3 | 0.08 |
| Mean VIF | 10.11 | | 10.58 | | 9.75 | |

Note. Panel A report the VIF values for the model used in Table 48 with the interaction terms on the full period. Panel B reports the VIF values for the model after dropping the interaction terms on the pre-adoption period. Panel C reports the VIF values for the model after dropping the interaction terms on the post-adoption period.

**Test 9-38** SUEST test for the Winsorized variables in pre- and post-adoption periods

```
. test [IR0_mean]BVS_w =[IR1_mean]BVS_w

 ( 1)  [IR0_mean]BVS_w - [IR1_mean]BVS_w = 0

          chi2(  1) =    1.62
        Prob > chi2 =    0.2037

. test [IR0_mean]EPS_w=[IR1_mean]EPS_w

 ( 1)  [IR0_mean]EPS_w - [IR1_mean]EPS_w = 0

          chi2(  1) =    0.10
        Prob > chi2 =    0.7470
```

**Test 9-39** SUEST test for the CD variables in pre- and post-adoption periods

```
. test [IR0_mean]BVS =[IR1_mean]BVS

 ( 1)  [IR0_mean]BVS - [IR1_mean]BVS = 0

          chi2(  1) =    1.78
        Prob > chi2 =    0.1821

. test [IR0_mean]EPS=[IR1_mean]EPS

 ( 1)  [IR0_mean]EPS - [IR1_mean]EPS = 0

          chi2(  1) =    5.34
        Prob > chi2 =    0.0209
```

## 9.10  Explanatory power as a value relevance measure

In this section, I introduce alternative methods to gauge the value relevance of accounting summary following Collins et al. (1997) and Barth et al. (2008). However, I start by illustrating the methods of Collins et al. (1997) which are applied to Barth et al. (2008) too, then I highlight the difference between the two methods.

One of the proxies to measure the value relevance of accounting summary is by regression earnings and equity book value on its equity market value and then measure the explanatory power of the model during a period and contrasting it by another period. If the explanatory power increases in one period in comparison to the other, the researcher concludes that accounting summary – in the period of higher explanatory

power – is more relevant to the market value of equity. Following Easton (1985) and Theil (1971), Collins et al. (1997) decompose the explanatory power of the regression Model 11 into three parts; the incremental part relating to earnings, the incremental part relating to equity book value, the part common to earnings and equity book value. Running Model 11 will produce a total explanatory power denoted $R_T^2$, to produce the explanatory power related to book value $R_y^2$, the explanatory power of earnings $R_x^2$ resulted from running Model 12 is deducted from the total explanatory power of Model 11, $R_T^2$. In other words; $R_y^2 = R_T^2 - R_x^2$

$$P_{it} = \beta_0 + \beta_1 x_{it} + \alpha_2 \varepsilon_{it}$$

Model 12

Likewise, to get the explanatory power related to earnings is produced by deducting the explanatory power of Model 13, $R_y^2$ from the total explanatory power $R_T^2$ ; $R_x^2 = R_T^2 - R_y^2$

$$P_{it} = \gamma_0 + \gamma_1 y_{it} + \alpha_2 \varepsilon_{it}$$

Model 13

On the other hand, the common part to both earnings and equity book value is achieved by deducting both of explanatory powers of Model 12 and Model 13 from the total explanatory power; $R_c^2 = R_T^2 - R_y^2 - R_x^2$.

The difference between the methods followed by Collins et al. (1997) from the ones adopted by Barth et al. (2008) is that the latter regress the equity stock price on the fixed

effects (In the case of this research the fixed effects are the time and industry fixed effects) and then taking the residual from the last regression and following the same steps of Collins et al. (1997).

# 10   Appendix B – Chapter 5

## 10.1   Testing the normality assumption.

**Figure 9** Normality test using Shapiro-Wilk W test.

```
              Shapiro-Wilk W test for normal data

    Variable │    Obs       W        V        z      Prob>z
   ──────────┼───────────────────────────────────────────────
          sr │  1,020   0.61499   247.241   13.657   0.00000
```

## 10.2   SUR findings for small and medium size firms

In the descriptive statistics of section 5.5.1 and 5.5.2, a possibility of multicollinearity problem was detected using Variance Inflation Factors showing high values for interaction variables and each of the earnings and equity book value variables. Panels B in both Table 20 and Table 21 show that eliminating the interaction term from the adopted model decreases the VIF factors significantly. Therefore, finding a method by which the effectiveness of IR is assessed without the use of the Interaction term becomes necessary.

Following Mac An Bhaird and Lucey (2010) who studied the capital structure of SME's across different industries by using SUR instead of using dummy variable approach, I employ SUR instead of utilizing a time binary variable. Furthermore, SUR equations have been used in some studies to deal with the multicollinearity problem such as Asante-Darko et al. (2018) and Isshaq et al. (2009). Moreover, as far as efficiency is concerned, SUR models are recommended over OLS regressions when regression equations share similar independent variables (Zellner, 1962; Jaffe et al., 1989; Habermann et al., 2015).

This method requires running the regression (without the interaction term) twice over the periods before and after the adoption of IR. Then the coefficients on both equity book value and earnings are compared before and after the adoption of IR using Wald test (Wald, 1943).

Table 58 generally confirms the results of the OLS regressions in Table 28 and Table 29 However, as it can be noticed from the table, the results related to the negative book value of medium-size firms following the Ranking method in Table 28 cannot be verified over the two examined periods. This suggests the possible impact of multicollinearity on the findings related to equity book value.

Table 58 Coefficient comparison using Wald test on SUR

| Panel A - Ranking method (08-13) | | |
|---|---|---|
| | Small-Size | Medium-Size |
| EPS | 0.61 | 3.98** |
| BVS | 0.4 | 1.19 |
| **Panel B - Ranking method (08-16)** | | |
| | Small-Size | Medium-Size |
| EPS | 2.53 | 5.51** |
| BVS | 1.89 | 2.59 |
| **Panel C - JSE Method (08-13)** | | |
| | Small-Size | Medium-Size |
| EPS | 6.99*** | 0.53 |
| BVS | 0.97 | 21.35*** |
| **Panel D - JSE Method (08-16)** | | |
| | Small-Size | Medium-Size |
| EPS | 8.82*** | 1.62 |
| BVS | 0.12 | 25.84*** |

Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

# 11   Appendix C – Chapter 6

## 11.1  Trading hours and liquidity

Cross-listing in different time zones can extend the trading hours and may promote competition for attracting trading volume by market makers or dealers through decreasing transaction costs. However, the evidence of increased liquidity resonates more with competition over market orders when stocks are traded in both markets. Therefore, this advantage is unique to stocks that can be traded or newly issued on other exchanges such as ADR 2/ADR 3 and Rule 144.

Cases on the competition among exchanges over liquidity or order flow can be examined under different scenarios in terms of the related trading times. The following studies show different degrees of time extension; First Barclay et al. (1990) examines the stocks cross-listed on both Tokyo Stock Exchange (TSE) and New York Stock Exchange (NYSE) where each market operates while the other is closed. Second, Werner and Kleidon (1996) are concerned with stocks listed over London Stock Exchange (LSE) and NYSE where the two markets overlap for two operating hours. Third, Foerster and Karolyi (1999) study Canadian firms cross-listed on American exchanges where both markets almost operate simultaneously. All of these studies show evidence of increase in trading as a result of cross-listing.

Barclay et al. (1990) try to understand the effect of extending trading hours on liquidity by studying American and Japanese cross-listing on each other's market. Particularly, they study NYSE stocks that are cross-listed over Tokyo Stock Exchange (TSE) and stocks from the latter cross-listed on NYSE. The liquidity hypothesis was conjectured in a way that extending hours would lead to more trading in the foreign market which in

turn would attract informed investor when the market is thick to conceal their trading activity. Consequently, there would be an increase in the variance of return as some of the informed investors are making abnormal return leading to more liquidity. The study did not find supporting evidence for the American firms cross-listing on TSE. However, some of the Japanese stocks cross-listed in NYSE experienced an increase in return variance suggesting an increase in trading volume of informed investor in accordance with liquidity hypothesis (Karolyi, 1998).

In another study on British stocks cross-listed over NYSE, Werner and Kleidon (1996), found that even though the stocks had been trading for 6 hours on London Stock Exchange (LSE), most of the trading volume and variance happen when the NYSE opens. The evidence suggests that private information is available when the two exchanges are simultaneously operating. Furthermore, it is found that LSE dealers decrease their ask-bid margin to attract order flows from NYSE during the latter's operating hours.

Foerster and Karolyi (1999) study the trading costs of Canadian firms cross-listed on a U.S. exchange. The study found that these firms experienced 29% increase in the trading volume and a decrease in ask-bid spread upon U.S. cross-listing. The latter effect was more distinct for firms that experienced a significant shift in the volume of trading.

## 11.2  The way data were collected on cross-listing.

As mentioned in the sample section 6.3.1, the methods by which data on cross-listing is collected differ if the company is directly listed on a foreign exchange or via depository

receipts. Another factor that complicates the previous process is the firm's listing status on JSE whether it is active or dead.

Regarding the active JSE firms that are cross-listed on other exchanges, their details were retrieved by requesting the datatype QTEALL on Datastream (Erasmus Data Service Centre, 2013). This command provides interesting items as far as cross-listing details are concerned. For example, it presents the status of each firm's securities on every exchange whether it is primary or secondary listed, the location of the exchange, its formal name, and the domestic code of the security in that market. Binary dummy variables were created to reflect the status of each security on either the American or/and European markets. The dummy variable takes a value of one if the condition is met, or null otherwise.

In respect to firms cross-listed over the United States using depository receipts, their data were gathered using QTEALL and examined to distinguish between direct listing and via depository receipts. Then, each firm with foreign exchange listing was re-checked over Capital IQ using their International Security Identification Number (ISIN) for their American Depository Receipts (ADRs). This piece of information was matched and compared with data retrieved from depository receipts data bases on the website of the hosting banks. I follow Boubakri et al. (2016) in locating cross-listing information by using the online databases of these banks: Bank of New York Mellon, Deutsche Bank, Citi Bank and J.P. Morgan. These sources present information about the structure of security (direct-listing or depository receipts), the sponsorship status (whether it is sponsored or unsponsored), the depository bank, the effective date (when the security was formally traded on the exchange) and its unique CUSIP number.

Turning back to the issue of dead firms, Datastream does not keep records of companies that were delisted from their markets. For example, when looking into any type of data on Datastream, it provides the researcher only with data related to active firms on market exchanges at the date of the search. Consequently, the researcher needs to look up for each firm on the data base and explore it for further details. In the detailed page of information about each dead firm, the item "Related Securities" was explored to find out about all related securities of the firm of interest as demonstrated in Figure 10. After exploring these securities, filters were applied to retrieve only securities of firms that
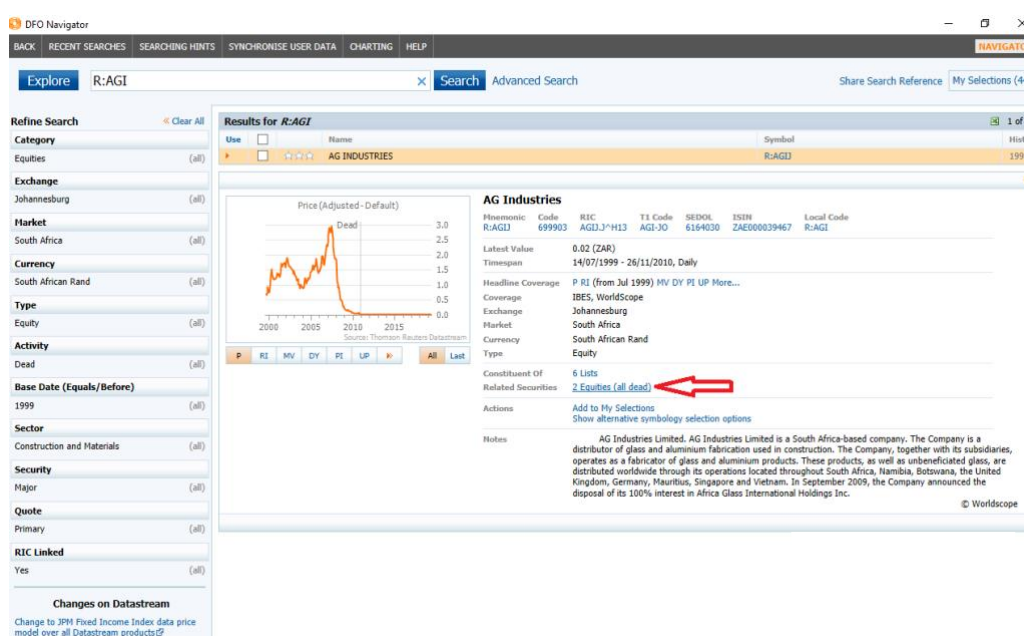


**Figure 10** - Retrieving the status of exchange listing from Datastream.

were primary listed on JSE. This process was repeated for every dead company to find its cross-listed securities, and then were searched for on Capital IQ and the databases of the depository banks. Furthermore, the formal web page of Over-The-Counter (OTC) markets was used to double check the reliability and credibility of the information provided in the previous step.

## 11.3 Quantile Regression Results

Table 59 Quantile regression for all firms (2008-2013)

| | VAR | 1 M1-All | 2 M2-All | 3 M3-All |
|---|---|---|---|---|
| 1 | BVS | 0.54 | 0.3 | 0.15 |
| | | (0.89) | (0.79) | (0.24) |
| 2 | EPS | 2.41* | 2.25 | 2.44 |
| | | (1.81) | (1.32) | (1.04) |
| 3 | IR | 14.41** | 18.08** | 17.68** |
| | | (2.33) | (2.05) | (2.29) |
| 4 | IRxBVS | -0.14 | -0.46 | -0.23 |
| | | (-0.46) | (-1.20) | (-0.39) |
| 5 | IRxEPS | 0.99 | 1.41 | 0.6 |
| | | (0.93) | (0.96) | (0.31) |
| 6 | CL | | -11.87 | -11.9 |
| | | | (-0.85) | (-0.66) |
| 7 | CLxBVS | | 1.66*** | 1.76*** |
| | | | (3.28) | (2.73) |
| 8 | CLxEPS | | -0.63 | -1.11 |
| | | | (-0.32) | (-0.39) |
| 9 | IRxCL | | | -0.29 |
| | | | | (-0.02) |
| 10 | IRxCLxBVS | | | -0.23 |
| | | | | (-0.41) |
| 11 | IRxCLxEPS | | | 1 |
| | | | | (0.48) |
| | Fixed effects | Yes | Yes | Yes |
| | Year effects | Yes | Yes | Yes |

Column (1) lists the finding of Model 4 which regresses the market price of equity on accounting summary figures and their interaction with IR. Column (2) lists the finding of Model 5 which replicates Model 4 but adds Cross-listing variables to the equation. Similarly, Model 6 replicates Model 5 in addition to the interaction terms between IR, CL and accounting summary. z-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 60 Quantile regression for all firms (2008-2016)

|  | VAR | **1** M1-All | **2** M2-All | **3** M3-All |
|---|---|---|---|---|
| **1** | BVS | 1.13* | 0.44 | 0.47 |
|  |  | (1.66) | (0.93) | (1.06) |
| **2** | EPS | 1.99 | 2.58*** | 1.97 |
|  |  | (1.56) | (4.54) | (1.18) |
| 3 | IR | 6.49 | 13.35** | 13.49** |
|  |  | (0.58) | (2.05) | (2.34) |
| 4 | IRxBVS | 0.65 | -0.02 | -0.13 |
|  |  | (0.7) | (-0.02) | (-0.33) |
| 5 | IRxEPS | -2.54 | -1 | -0.11 |
|  |  | (-1.00) | (-0.52) | (-0.05) |
| **6** | CL |  | -22.19 | -11.77 |
|  |  |  | (-0.97) | (-0.66) |
| **7** | CLxBVS |  | 2.25** | 2.01*** |
|  |  |  | (2.07) | (4.08) |
| **8** | CLxEPS |  | -1.53 | -0.77 |
|  |  |  | (-1.08) | (-0.45) |
| **9** | IRxCL |  |  | -13.04 |
|  |  |  |  | (-0.31) |
| **10** | IRxCLxBVS |  |  | 0.31 |
|  |  |  |  | (0.22) |
| **11** | IRxCLxEPS |  |  | -1.21 |
|  |  |  |  | (-0.41) |
|  | Fixed effects | Yes | Yes | Yes |
|  | Year effects | Yes | Yes | Yes |

Column (1) lists the finding of Model 4 which regresses the market price of equity on accounting summary figures and their interaction with IR. Column (2) lists the finding of Model 5 which replicates Model 4 but adds Cross-listing variables to the equation. Similarly, Model 6 replicates Model 5 in addition to the interaction terms between IR, CL and accounting summary. z-statistics in parentheses
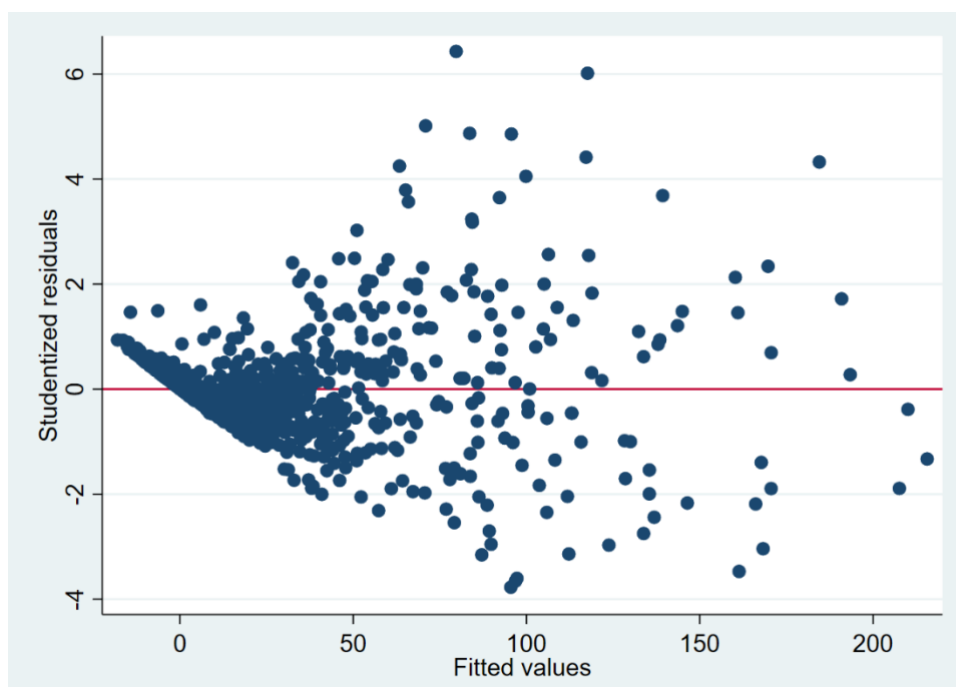*** $p<0.01$, ** $p<0.05$, * $p<0.1$

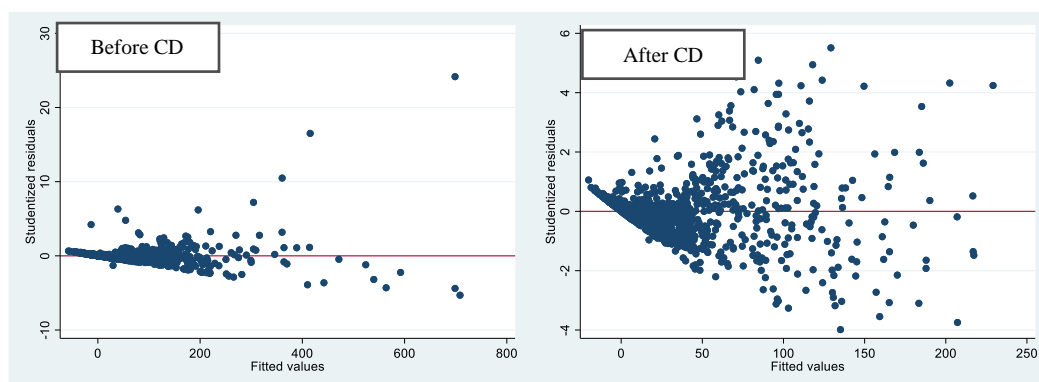**Figure 11** Regressing studentized residuals on fitted values.



**Figure 12** The distribution of the standardised residual on fitted values for S1
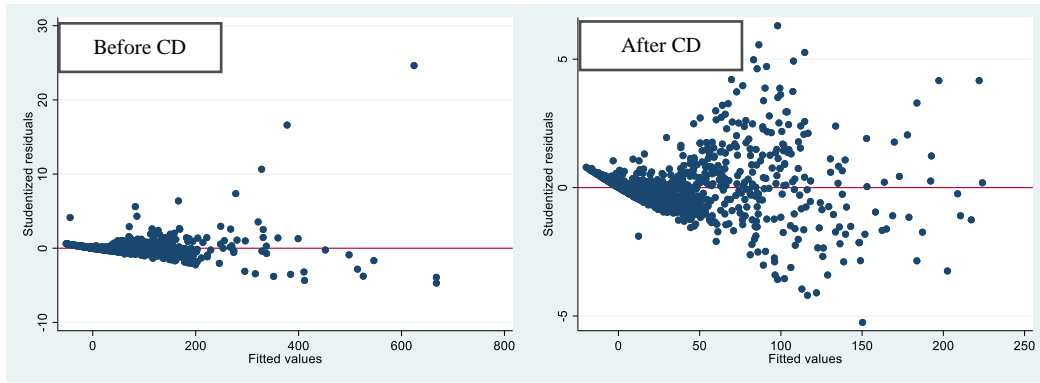
**Figure 13** The distribution of the standardised residual on fitted values for S2
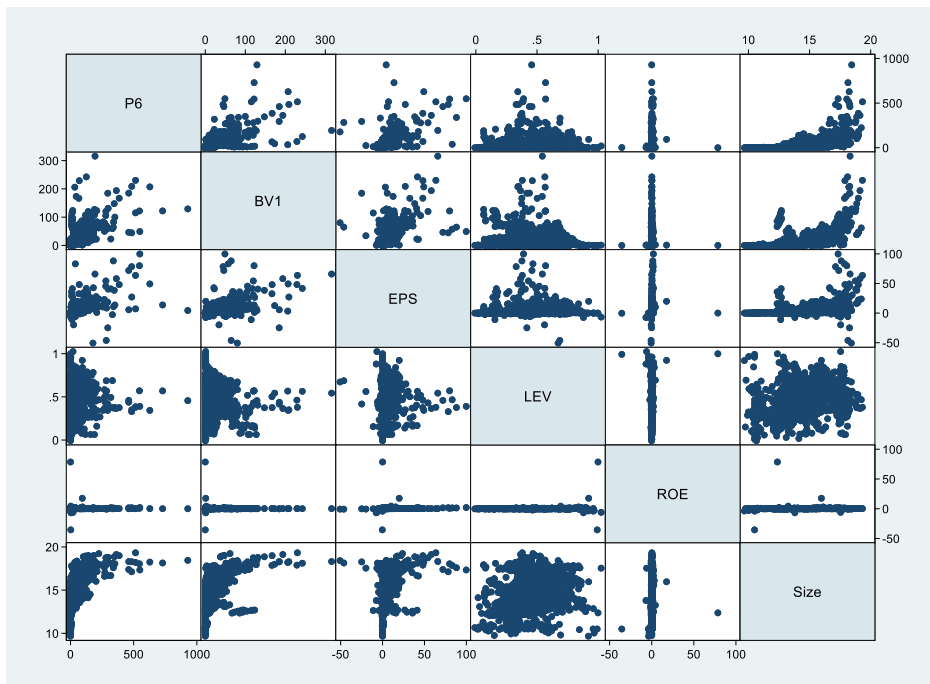


**Figure 14** Scater diagram of the regressed variables

Figure 14 displays a scatter diagram depicting the relationship between the share market value as a dependent variable and the other continuous independent variables in the regression model. The patterns exhibited Figure 14 mostly show linear relationships between the dependent and independent variables. However, the relationship between share market value and the size takes an upward sloping shape implying non-linear

relationship. Subsequently, the last issue relating to the relationship between the size

and the share market value suggests looking for a different proxy for a firm size.

**Table 4**
Regressions analyses: Pre- vs post- adoption periods results.

Model $PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \alpha_3 D_{it} + \alpha_4(BVS_{it} \times D_{it}) + \alpha_5(EPS_{it} \times D_{it}) + \alpha_6 LOSS_{it} + \alpha_7(EPS_{it} \times LOSS_{it})$
$+ \alpha_8 LEV_{it} + \alpha_9 ROE_{it} + \alpha_{10}SIZE_{it} + \sum\alpha_{11j}IND_{it} + \sum\alpha_{12y}YR_{it} + \varepsilon_{it}$

|  | (1) Full period | (2) Pre- vs 2011 | (3) Pre- vs 2012 | (4) Pre- vs 2013 |
|---|---|---|---|---|
| Constant | −43.417*** | −28.878*** | −33.351*** | −25.607** |
|  | (11.706) | (10.769) | (11.525) | (11.164) |
| BVS | 1.187*** | 1.237*** | 1.173*** | 1.265*** |
|  | (0.240) | (0.247) | (0.245) | (0.258) |
| EPS | 2.325*** | 2.219*** | 2.359*** | 2.151*** |
|  | (0.626) | (0.637) | (0.634) | (0.669) |
| D | 8.089*** | −3.280*** | −2.340* | −3.376** |
|  | (2.053) | (1.214) | (1.314) | (1.525) |
| BVS × D | −0.474*** | −0.376 | −0.610*** | −0.485*** |
|  | (0.173) | (0.245) | (0.196) | (0.185) |
| EPS × D | 3.164*** | 2.023*** | 3.652*** | 3.878*** |
|  | (0.624) | (0.730) | (0.688) | (0.781) |
| *Controls* |  |  |  |  |
| LOSS | 2.939* | 2.973 | 3.415* | 2.311 |
|  | (1.629) | (1.824) | (2.009) | (1.766) |
| EPS × LOSS | −2.584* | −1.360 | −3.313** | −2.309 |
|  | (1.326) | (1.456) | (1.403) | (1.409) |
| LEV | 4.922 | 8.692 | 4.007 | 5.411 |
|  | (5.862) | (5.906) | (6.282) | (5.321) |
| ROE | 0.143 | 0.598 | 0.180 | 2.572*** |
|  | (0.120) | (0.586) | (0.161) | (0.880) |
| SIZE | 2.254*** | 1.820** | 2.287*** | 1.608* |
|  | (0.825) | (0.794) | (0.846) | (0.836) |
| Industry effects | Yes | Yes | Yes | Yes |
| Year effects | Yes | Yes | Yes | Yes |
| N (firm/year) | 954 | 636 | 636 | 636 |
| Adj. $R^2$ | 0.790 | 0.775 | 0.775 | 0.784 |

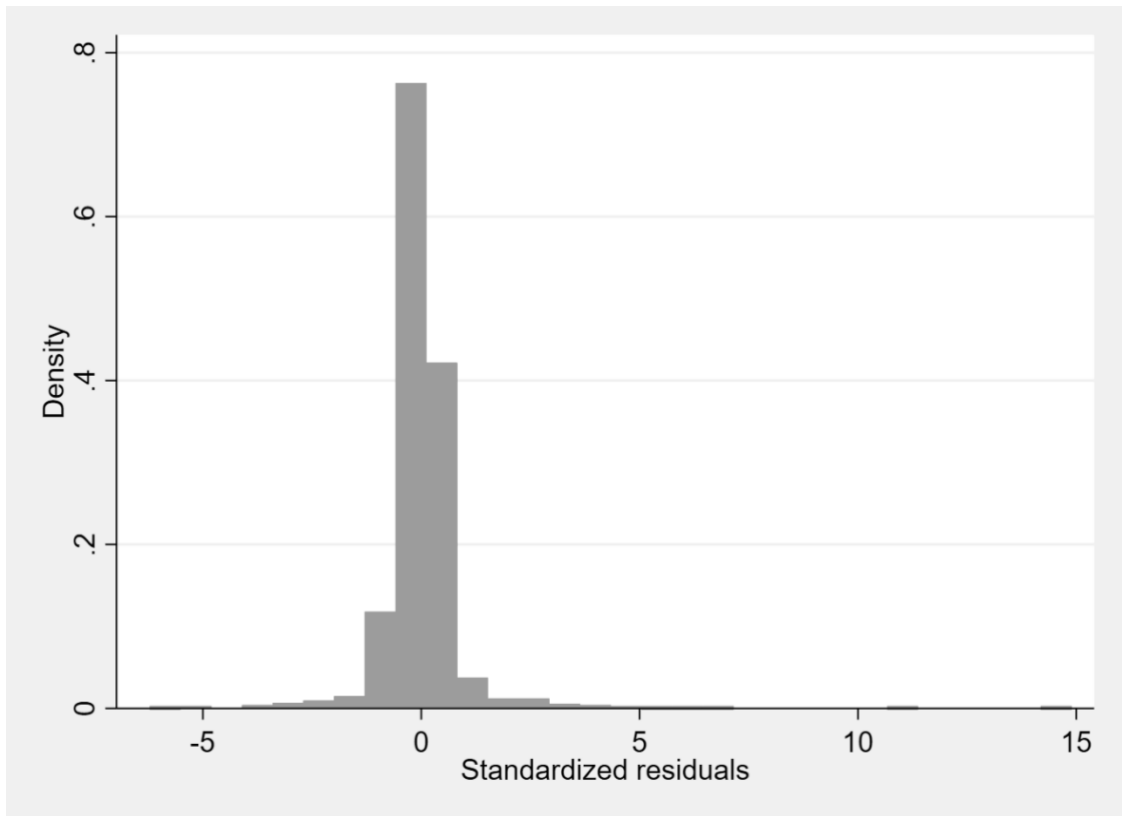**Figure 15** BR's comparison of the results of every year after with pre-adoption period.

**Figure 16** Density of the standardised residual distribution.