"PEN IS MIGHTIER THAN THE SWORD: DOES ANNUAL REPORT WRITING MATTER TO INVESTORS AND MANAGERS? EVIDENCE FROM EXOGENOUS SHOCK"

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Abstract

I examine the causal relation between writing style of annual reports and related capital market outcomes and managerial decision quality. Using a sample of South African firms that adopted Integrated Reporting (IR) under the mandate issued in 2010, I demonstrate that adoption of IR leads to an increase in absolute three-day CAR surrounding the filing, and a reduction in stock price delay. Using a manually coded measure of connectivity of information, I show that IR makes it easier for investors to process the information contained in annual reports by integrating various pieces of information through the principle of connectivity. I also document an improvement in managerial decision quality post the adoption of IR. I contribute to the literature by providing a direct causal evidence of influence of report writing style on investor response to these disclosures. Additionally, I document real effects of disclosure regulations on managerial decision making despite an absence of change in underlying accounting fundamentals.

1. Introduction

This paper examines the causal link between writing style of annual reports and related consequences for investors and managers. Annual reports are frequently criticized for their length and inability to clearly communicate relevant information to investors (Li, 2008; Dyer et al., 2016; Guay et al. 2016; KPMG 2011, SEC, 2013). Prior literature documents negative capital market consequences of overly complicated reports such as muted investor response to the release of annual reports, an increase in post-filing price drift (Lee, 2012; You and Zhang, 2009), and other effects such as low liquidity and low analyst following (Lang and Stice-Lawrence, 2015). However, it is not clear if these consequences arise out of poor writing style of annual reports or the underlying business complexity that the reports capture. If it is the former, then regulatory steps to reduce complexity of annual reports by simplifying annual report writing should entail positive capital market consequences. However, an opposing view is that sophisticated intermediaries such as analysts, institutional investors, and arbitrageurs can decipher decision relevant information and provide counsel to unsophisticated investors (Anderson, 1988; Frederickson & Miller, 2004; Y.-J. Lee, 2012; Simnett, 1996), thereby eliminating the need of a simpler report. Using the mandatory adoption of Integrated Reporting (IR) as an exogenous shock to report writing, this paper disentangles the complexity arising out of poor report writing from business complexity and documents the causal effect of reporting characteristics on: (1) information impounded in stock prices, measured as investor reaction to filing of annual reports and stock price delay, and (2) its subsequent impact on managerial decision-making.

IR is a global reporting framework conceptualized by the International Integrated Reporting Committee (IIRC) with a two-fold objective of improving communication to investors on the firm's value creation process and promoting integrated thinking among firm managers.

Integrated reports replace traditional annual reports and provide a concise message about how a firm's strategy, governance, performance, and prospects lead to the creation of value over the short, medium, and long term. The goal of IR is to provide decision relevant information to managers and investors without burdening them with irrelevant information.

Mandatory adoption of IR in South Africa is an ideal setting to test the causal link between reporting characteristics and capital market outcomes for two reasons. First, IR simplifies report writing through connectivity of information and does not affect the business complexity of a firm. Therefore, any benefit arising out the adoption of IR can be attributed to better report writing, providing direct casual evidence of impact of writing style on capital market consequences. Second, IR does not affect the underlying accounting information disclosed. Most accounting regulations, such as IFRS, impact both textual disclosures and quantitative disclosures, thereby making it difficult to disentangle the effect of the two from each other.

IR can evoke a response from investors by making it easier to process information contained in annual reports. An integrated report combines all the publicly available information into a single report and connects all the pieces of information to reveal the value creation process of the firm. An integrated report can reduce investors' information burden through two channels. First, it ensures the report is more concise than a traditional annual report. Second, the connectivity principle that underlies the IR framework creates a cause-effect linkage between various value drivers of a firm, enabling easier comprehension of decision relevant information. Linguistic theory posits that connectivity of text in an annual report improves readability and adds to the validity of the report (Sydserff & Weetman 1999). Thus, while traditional annual reports have been criticized for increasing length, connectivity in an integrated report integrates the disjointed pieces

of information mitigating the drawback of increasing information disclosure.[1] However, if the complexity of annual reports is a result of complex underlying business transactions (e.g. derivatives accounting), then a better written report may not necessarily provide easier access to information. Thus, if there is no causal link between annual report writing style and capital market outcomes, adoption of IR should have no impact on investor response to filing of annual reports.

I begin the examination of impact of IR adoption on investor reaction by testing investors' response to issuance of integrated reports. Since IR is mandatory in South Africa, my sample consists of 694 firm-year observations on firms listed on JSE and head quartered in South Africa during the period 2008-2013. I compute the 3-day absolute cumulative abnormal returns (CAR) around the filing date of integrated reports by the firms in my sample. I control for the most recent earnings announcement CAR in the regression. If IR reduces the burden of discovering relevant information in an annual report, one should expect an increase in absolute CAR post IR adoption. I find that absolute CAR is higher in the period after adoption of IR by 1.4 percentage points, implying that investors find it easier to process the information contained in an integrated report.

To further corroborate the capital market consequences of IR adoption, I examine if integrated reports lead to more information being impounded into stock prices. Specifically, I test the impact of IR on the speed of stock price discovery, also known as stock price delay. Market frictions such as incomplete information or information asymmetry lead to stock price delay (Hou & Moskowitz, 2005; Callen, Khan, & Lu, 2013), which is a delayed adjustment of stock price to new information. If IR eases the processing of annual reports inducing a reaction from investors, price discovery should also occur faster, leading to a reduction in stock price delay. I find that stock price delay reduces by 11 percentage points post IR adoption.

[1] Deloitte (2015) report that Financial Reporting Council (FRC) in the UK emphasizes the linkage of information in an annual report

In cross sectional tests, I examine the channels through which IR brings about the above documented capital market consequences. An integrated report is expected to reduce the burden of information discovery by connecting the pieces of information transforming them into a value creation story. Therefore, if IR adoption causes an increased response from investors, such a response should be stronger for firms high on connectivity of information. IIRC also specifies connectivity as a crucial pillar of IR adoption. Connectivity captures the extent to which various factors that create value for the firm are interrelated. Connected text passages increase the effectiveness of the communication and assist in getting the message across to the reader (Pinker, 2014). Therefore, I predict that integrated reports with high connectivity are likely to provide easier access to decision relevant information, resulting in higher absolute filing CAR. Similarly, a reduction in stock price delay should be positively associated with connectivity of information in integrated reports. Using a manually coded connectivity measure, I find that firms whose reports have high connectivity have higher absolute CAR by about 5 percentage points and reduced stock price delay by about 7 percentage points.

Next cross-sectional test examines the type of firms that are more likely to benefit from IR adoption. Prior research suggests that traditional corporate reporting does not provide high quality information to shareholders in complex firms, where complexity is measured as size of the firm combined with the level of intangible assets (Aboody & Lev, 2000; Bushman, Chen, Engel, & Smith, 2004; Coles, Daniel, & Naveen, 2008). Since a key benefit of IR is to improve information available to decision makers, firms that are complex and have higher information processing costs are likely to benefit more from IR adoption. Thus, I predict that firms with higher complexity are likely to have higher absolute CAR around the filing of integrated reports, and such firms will also lower stock price delay. My findings support these predictions. I find that complex firms have a

greater reduction in information overload, as suggested by an incremental increase in absolute CAR by 2.8 percentage points, over and above less complex firms, and a corresponding reduction in stock price delay by 34 percentage points.

The tests thus far document the impact of report writing style on the ease of processing information in annual reports. I next examine a spill-over benefit of IR adoption on managerial decision making. Switching to IR is likely to effect managerial decision quality through two channels, which I label as the *Information Hypothesis* and *Transparency Hypothesis*. Information Hypothesis predicts that switching to IR improves the information set of managers leading to higher quality decisions. While managers have access to higher detailed information relative to what is presented in annual reports, their decision making ability is hampered by limited attention (Simon, 1973) and therefore they are unlikely to process all the information available within the firm. Implementation of a new accounting standard can encourage managers to collect information that was unprocessed earlier (Shroff 2017). When firms switch to IR, managers are forced to think holistically about their firm (IIRC, 2013a). Therefore, managers using the IR reporting framework are required to revisit all information available, including information that was previously ignored, and connect these pieces of information to create an integrated report.[2] This can incrementally inform managers about future cash flow consequences of their decisions (Barth, Cahan, Chen, & Venter, 2016). Thus, investment decisions of managers are likely to improve when firms switch to IR framework. *Transparency hypothesis* predicts that decision quality of managers improves through improved monitoring of managers by investors. An integrated report improves transparency (Zhou, Simnett, & Green, 2016 etc.) and allows investors to better monitor

[2] For instance, they must integrate risk assessment into their strategy, which could further integrate into products and services offering. They must facilitate collaboration across departments and divisions to strengthen the strategy. They also must present integrated information about value creation to boards

managerial decisions. This reduces the likelihood of managers investing in negative NPV projects (Jensen, 1986a; Biddle & Hilary, 2006) thereby improving their decision quality.

To operationalize managerial decision quality, I examine firms' investment efficiency. If managers benefit from switching to IR and generating integrated reports on a regular basis, the investment efficiency of firms that adopt IR should increase. On the other hand, if IR brings about only cosmetic changes to the reporting framework, there would be no impact of IR adoption on investment efficiency. I find that investment efficiency increases post IR adoption. I corroborate my findings using a matched benchmark sample of Brazilian firms[3] where there was no mandate for IR. Using difference-in-difference methodology, I find that investment efficiency is higher for South African firms as compared to Brazilian firms, post IR. This suggests that IR improves the information set of managers. Specifically, under-investing adopting firms increase their investments by 2 percentage points as compared to control firms, post IR, and over-investing adopting firms reduce their investments by 5 percentage points relative to control firms.

I also examine the connectivity channel for impact of IR adoption on managerial decision quality. A simple aggregation of various pieces of information into one report is unlikely to be incrementally beneficial to managers (Kaplan & Norton, 1996). However, if managers collect and process additional information and integrate it with their existing information set in a coherent and connected fashion, they are likely to benefit more with the new information set while making a decision. Therefore, investment efficiency should be higher for those firms whose integrated reports have a higher level of connectivity of information. Connectivity also captures the extent to

[3] The reason behind choosing Brazil as a control sample is that both South Africa and Brazil form a part of BRICS (Brazil, Russia, India, China, South Africa) and should therefore have similar economic environment. I run the same test with India as a control sample in place of Brazil, and the result remain the same qualitatively.

which managers seamlessly integrate the new information they process with their existing information set while switching to IR. If a report is high on connectivity, it suggests the new information processed by managers integrates with their existing information set in such a way that it can change their prior beliefs on expected cash flows from an investment, leading to better investment decisions. I find a positive association between connectivity and investment efficiency. Higher connectivity under-investing (over-investing) firms increase (reduce) their investments by 4.3 (1.2) percentage points.

This study contributes to several streams of literature. First, it facilitates causal examination of the effect of improved report writing on capital market consequences. Prior literature examines the negative effects of increasing length, quantity, and complexity of disclosure on capital market consequences such as investor reaction, liquidity, analyst following, and trading volume (Miller 2010; Lee, 2012; You and Zhang, 2009; Lang and Stice-Lawrence, 2015). However, these studies do not disentangle the effect of complexity arising out of poor writing from that arising out of inherent business complexity. This study exploits mandatory IR adoption as an exogenous shock to the writing style of annual reports of a firm and documents its causal effect on capital market outcomes such investor response to filing of reports and speed of price discovery in the market.

Second, this study proposes connectivity of information as a new mechanism to reduce information overload in disclosures. With regulators and standard setters expressing concerns about increasing length quantity of information disclosed in annual reports, connectivity strikes a balance between length and quantity of information disclosed, allowing reports to be easier to process for unsophisticated investors.

Third, this study contributes to the literature on information overload by providing evidence on the existence of information overload for unsophisticated investors. Psychology

literature documents that information overload hampers decision quality of individuals (Chewning & Harrell 1990; Stocks & Harrell 1995; Stocks & Tuttle 1998; Tuttle & Burton 1999). Hirshleifer & Teoh (2003) document the impact of limited investor attention on capital market reactions, thereby suggesting investors cannot process all the information efficiently due to limited attention. This study adds to this literature by documenting an increase in the information impounded in stock prices around the filing of annual reports and a faster stock price discovery by the markets post the adoption of IR, thereby providing causal evidence of a reduction in information overload through the adoption of a new reporting framework.

Fourth, this study adds to the literature on the real effects of regulation on managerial quality. Prior literature documents the real effects of accounting regulations such as IFRS (for e.g. see Biddle et. al 2013), and changes in US GAAP (Shroff, 2017). Integrated Reporting changes the reporting environment of a firm, but not the underlying accounting information or financial statements. This is one of the first papers to document an impact of such a regulation on managerial decision quality.

Finally, this study also contributes to the literature on IR. Prior literature on IR shows effects of IR adoption on capital market consequences, analyst forecast accuracy, and cost of capital (Baboukardos and Rimmel 2016; Bernardi and Stark 2017; Zhou et al. 2017) find an increase in the value relevance of earnings after integrated reporting was mandated by the JSE, but a decrease in the value relevance of net assets. This study adds to this literature by showing that IR adoption entails benefits to both investors and managers. It not only reduces information overload for investors, it also improves investment efficiency of managers. Barth et al. (2016) show that investment efficiency relates to integrated reporting quality of adopting firms. This study extends their work in at least two ways: (1) It establishes a causal relationship between IR adoption

and improvement in investment efficiency using a difference in difference methodology, and (2) It provides evidence that connectivity of information is crucial to achieving investment efficiency.

2. Background and Hypotheses Development

2.1. Integrated Reporting – Institutional Background

Global financial crisis of 2007 was an inflection point for reporting framework. Investors and creditors demanded clear and relevant information regarding value creation, risk management, external factors that influence business. With the demand for a new style of disclosure increasing with time, the need was to create a globally accepted framework that results in communications by an organization about value creation over time. This new style of reporting framework is what is known as Integrated Reporting today. Integrated Reporting facilitates the presentation of all the value drivers of a firm in a single report. It also provides a synergy between these value drivers so that investors can understand the value creation story of the firm, in conjunction with the risk embedded in the firm and risk management practices of the firm.

In 2009, The Prince of Wales chaired a meeting of various stakeholder bodies such as investors and companies, and regulators and standard setters to establish the International Integrated Reporting Committee (IIRC), a body to supervise the creation of a globally accepted Integrated Reporting framework. This body was officially created in August 2010 and was renamed as International Integrated Reporting Council in November 2011.

The International Integrated Reporting Council (IIRC) in its International Integrated Reporting Framework defines an 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”. An integrated

report focusses on communicating an organization's ability to create value over time, including employees, customers, suppliers, business partners, local communities, legislators, regulators and policy-makers.

With the IIRC starting a pilot program that included 90 businesses to develop integrated reporting framework, South Africa started making a transition to IR. In February 2010, King III Codes of Governance were made a mandatory part of listing requirements in Johannesburg Stock Exchange for South African firms. One of these requirements was to prepare an integrated report, on a comply or explain basis. To assist firms, a voluntary not-for-profit organization called Integrated Reporting Committee of South Africa (IRC) was formed in 2010. IRC created a framework to ease the process of transition from traditional reporting to integrated reporting.

One of the key elements of an integrated report is the *connectivity* or *integration* of information. It promotes integrated thinking among managers of a firm, leading to better strategic decision making, more connected departments within a firm, and improved internal processes. IR integrates the various value drivers of a firm in a single report. For example, an integrated report describes the business model of an organization, and its connection with the six capitals identified by IIRC (financial, human, intellectual, manufactured, social, and relationship capitals). The report communicates to investors the extent to which the business depends on these capitals, thereby highlighting the potential risks and opportunities that the business faces.

This concept of integrated thinking differentiates IR from traditional reporting. For example, the MD&A (Management's Discussion and Analysis) section of an annual report provides information on firm performance in the prior year as well as future projections. It also discusses key trends and risks in the business. The information, however, is not presented in a connected fashion. IR, on the other hand, documents all the resources, or capitals, of a firm, and

how these resources are linked to the strategy of the firm. Traditional reporting occurs in silos, but IR connects these silos to present a holistic picture of the organization.

The annual integrated report of 2015 prepared by Kumba Iron Ore Ltd, a major South African supplier of iron ore to global steel industry, is an example of how connectivity of information is the core of an integrated report. Kumba's report integrates strategy, business model, operating context, risks and opportunities, and governance. The six capitals are introduced early in the report with key inputs and outcomes of each capital clearly specified. Actions needed to achieve these outcomes are also detailed. The report uses diagrammatic representation of business model to achieve this connectivity.

The IIRC believes that an integrated report should explain the reporting entity's interrelated financial, environmental, social and corporate governance information. At the same time, it should be presented in a clear, concise, consistent and comparable manner. To aid organizations transition to IR from traditional reporting, IIRC proposes a set of guiding principles. These principles are aimed at helping firms prepare integrated reports that achieve the objectives of integrated thinking and effective communication to investors. According to IIRC, an integrated report should report on the following dimensions: (1) Organizational overview, (2) Governance Mechanisms, (3) Business Model Overview, (4) Risks that a firm faces and existing and future opportunities, (5) Strategy formulation and Resource allocation mechanism and structure, (6) Dimensions of Organization performance and its metrics, and (7) Future orientation and outlook. These eight points are the pillars of the official IR framework issued by IIRC in 2013.

2.2. IR and Investor Response to Release of Annual Reports

Regulators and researchers have expressed concerns over increasing difficulty in comprehending disclosures such as annual reports. Prior literature echoes these concerns. Li

(2008) suggests that quantity of information disclosed in annual reports has been increasing over time. Loughran & Mcdonald (2011) document the increase in complexity of annual reports through their length, which has increased to almost 60,000 words over the last 15 years. Dyer, Lang, & Lawrence (2016) show that over the period of 1996-2013, length, boilerplate, and redundancy in annual reports have increased, while specificity, readability, and the amount of verifiable information have reduced. All these factors combine to increase the complexity of annual reports. Likewise, a report by KPMG documents that the quantity of disclosures has increased to an extent where the information relevant for investors is hidden in between huge chunks of other irrelevant information (KPMG 2011). The rise in complexity of disclosures has therefore limited the ability of end users such as investors to make decisions based on the information disclosed (FASB 2012; KPMG 2011;Paredes 2013). Regulators and standard setters have taken steps to mitigate these concerns surrounding disclosures. SEC adopted the *1998 Plain English* regulation and issued a handbook that suggested several ways in which disclosures could be concise and easier to comprehend. In 2013, SEC started reviewing disclosure requirements with the aim of reducing complexity in disclosures (SEC, 2013). FASB has an ongoing project called the "Disclosure Framework" that focuses on textual disclosures and their relevance and effectiveness (FASB, 2012).

An opposing view suggests that sophisticated intermediaries process complex information and disseminate it to the market, thereby negating any information overload concerns of regulators. Frederickson & Miller (2004) provide evidence consistent with the argument that financial experts are not misled by pro forma earnings disclosures. Simnett (1996) suggests that experts retrieve relevant pieces of information more efficiently than non-experts when faced with complex information. Similarly, Anderson (1988) shows that more experienced decision makers spend less

time searching for information. Taken together, increasing length and quantity of information disclosed in annual reports should not be of concern to unsophisticated investors.

Prior literature attempts to unravel this debate. Several studies document the negative effects of increasing length and quantity of information disclosed. Cazier and Pfeiffer (2015b) show that price discovery is slower for firms with long annual reports with excessive boilerplate. Brown and Tucker (2011) find MD&As that borrow text from last year, and contain relatively less new information evoke a low response from the market at the time of filing. Lang and Stice-Lawrence (2015) find that boilerplate in annual reports is positively associated with measures of information asymmetry such as liquidity, analyst following, and institutional ownership.

Behavioral research reports similar findings. Theory of limited attention of investors (Kahneman, 1973) suggests that at any point in time, investors have limited time to weigh the merits of a limited number of stocks. As disclosure quantity increases, investors eventually reach a point where their ability and/or willingness to process the information degrades because of limited capacity (D. A. Hirshleifer & Teoh, 2003) or because the costs of processing the information become too high (Bloomfield, 2002). In the presence of high volume of disclosed information, this information does not get incorporated into stock prices (Paredes, 2013). Hirshleifer & Teoh (2003) propose using theoretical models that investors' limited attention and negatively influence information processing and consequently affect firms' market values. Other studies also suggest that limited investor attention contributes to security mispricing in capital markets. Market reactions to earnings surprises are low when the news is released to the media on days with many competing announcements, or on days of low attention, such as a Friday (D. Hirshleifer, Lim, & Teoh, 2009).

Taken together, prior literature shows association between report characteristics and related capital market outcomes. However, as Lang and Stice-Lawrence (2015) note, causal evidence of this relationship has been difficult to establish. If this relationship is not causal, regulatory efforts of simplifying language in annual reports to ease the process of information discovery might not yield the desired benefits. In this paper, I extend the existing literature by testing the causal relationship between reporting framework and capital market consequences. To facilitate causal interpretation, I use the mandatory adoption of IR in South Africa as an exogenous shock to annual report characteristics. IR changes the reporting framework by introducing several improvements to annual report structure, such as connectivity of information. IR adoption is an apt setting for drawing causal inference because it does not change the underlying accounting information. Therefore, any effect of IR adoption on capital market outcomes can be attributed to narrative disclosures of annual reports.

An integrated report prepared under IR mandate can improve investor response to release of annual reports in two ways. First, it reduces the number of reports an investor must read before making an investment decision, and at the same time provide all relevant information. It enables investors to focus on the information that is crucial to them while making an investment, and therefore investors do not have to sift through other non-relevant information. Second, it reduces the length of the report and connects all the pieces of information in the report, thereby reducing the complexity of annual reports.

Taken together, adoption of IR should lead to an incremental response from investors. This would suggest that concerns of regulators and standard setters about traditional reports being overloaded with information are rightly placed. However, if sophisticated intermediaries can negate information overload, adoption of IR should not have any impact on investor response. I

measure investor response to release of annual reports by observing changes in absolute CAR around the filings of integrated reports (You, 2011). This leads to the following hypothesis:

H1a: Absolute CAR around the filing of integrated reports increases after the adoption of IR.

2.3.IR and Stock Price Delay

Lawrence (2013) documents that simple disclosures attract investors. In other words, disclosures with information overload are a cause for investors neglecting stocks, leading to stock price delay (Hou & Moskowitz, 2005). Thus, if IR reduces information overload, it should reduce stock price delay. Callen et al. (2013) document that when market wide component of information is held constant, quality of preexisting information set influences the speed at which stock price adjusts to arrival of news, also known as stock price delay. They build upon the work of Hou & Moskowitz (2005) who document that market imperfections such as information symmetry lead to stock price delays. Callen et al. (2013) show that poor accounting quality renders the preexisting information set of investors inferior, leading to slower adjustment of stock prices to news. Based on their arguments, if the preexisting information set of investors can be improved, stock price delay should reduce. IR, through a reduction in information overload, can achieve this. Therefore, I predict that post the adoption of IR, if information overload reduces for adopting firms, stock prices of such firms adjust faster to newly arriving information. This leads to the following hypothesis:

H1b: Stock Price Delay reduces after the adoption of IR.

2.4.IR and Decision Quality of Managers

Managers are expected to invest in positive NPV projects with the objective of maximizing shareholder wealth. However, constraints such as limited attention of managers (Simon, 1973) or frictions such as agency problems (Jensen, 1986a) can lead to a sub-optimal decision quality. Limited attention of managers forces them to focus on information they deem as important, leading to a possibility of relevant information being ignored. IR ensures managers revisit all information before making decisions. This is the *information hypothesis*. IR also reduces the frictions arising out of agency issues, leading to improved transparency, which ensure better monitoring of managers. This is the *transparency hypothesis*.

Since one of the key decision that managers undertake is making long term investments, I focus on investment efficiency as a measure of managerial decision quality (Biddle & Hilary, 2006).

2.4.1. Information Hypothesis

Managers rely on internally generated as well as external information for decision making. Information set of managers is richer than investors or other users of firm information because they have access to more information within the firm than what is reported in financial statements (Shroff, 2017). However, there are at least two ways in which the information set of managers could be lacking, leading to sub optimal decision quality. First, managers have limited information processing capacities and are unlikely to be aware of all the information needed for optimal decision making (DellaVigna, 2009; Simon, 1973; Sims, 2003; Smith & Warner, 1979). Therefore,

managers are likely to ignore useful information while making decisions. This is referred to as the limited attention bias (Shroff, 2017).

Second, even if managers collect all possible information for the purpose of reporting, they may not be able to link it to value creation, again because of limited attention bias and constraints on their time. The absence of a link between information and value creation limits the usefulness of the information set, thereby reducing the decision-making ability of managers,

Integrated reporting is one possible framework that overcomes the two aforementioned limitations of the existing information set of managers, and provides scope of enhancing it. IR requires managers to revisit pieces of information that they may have ignored while reporting under traditional frameworks (Barth et al., 2016). For instance, under IR framework, managers are required to report on stakeholder engagement and how that creates value for the firm. IR could be beneficial in providing incremental benefit of this information because traditional reporting does not mandate disclosure of such information. Therefore, managers could ignore this information given their limited attention. IR forces them to collect and report this information, enriching their existing information set in the process. This should lead to more efficient decisions (such as improved investment decisions) by managers.

Even if managers do report the information on stakeholder engagement in traditional disclosures, they are not required to link it to value creation. Therefore, the information, though collected and reported, may not have been used in decision making. Since IR forces managers to report the link between such information and value creation, it ensures managers think about how the previously ignored information is adding value to the firm. Therefore, this process further enriches their information set, because the new information is not only a part of the set, but it is

useful in decision making as well. This should again reflect in better investment decisions by managers.

Therefore, Information Hypothesis predicts that adoption of IR improves investment efficiency of firms.

2.4.2. Transparency Hypothesis

Transparency hypothesis suggests that there exist at least two determinants of quality of. decisions such as investments. First, a firm needs to raise capital to finance its investment opportunities. In a frictionless market, projects with positive net present values will be funded. Literature, however, documents that firms are constrained financially and that limits managers' opportunities to fund positive NPV projects (Hubbard, 1998). Thus, high cost of capital for these firms leads to underinvestment. Second, agency problems between managers and external capital providers could lead to private benefit projects being selected by managers. Managers could also expropriate resources, or build an empire to wield power, leading to overinvestment. Information plays a key role in such scenarios. Information asymmetry between the firm and investors is a key determinant of a firm's cost of capital. Myers & Majluf (1984) propose an analytical model that underpins information asymmetry between the firm and investors as a driver of firm underinvestment. Literature provides strong evidence on managerial behavior that maximizes their private benefits, leading to investment choices that do not maximize shareholder wealth (Berle & Means, 1934; Jensen & Meckling, 1976, Jensen, 1986, 1993). Other reasons of sub optimal investment choices include career based motivations (Holmström, 1999), "quiet life" hypothesis (Bertrand & Mullainathan, 2003) etc. Taken together, these studies suggest that if investors anticipate that managerial suboptimal behavior, investment efficiency reduces (Lambert, Leuz, & Verrecchia, 2006).

Integrated Reporting reduces information asymmetry between managers and investors. Zhou, Simnett, & Green (2016) find that IR adoption leads to lower cost of equity capital and lower analyst forecast errors. Barth et al. (2016) use proprietary scores on integrated reporting from Ernst and Young, and find a positive association between integrated reporting quality and liquidity. Therefore, *Tranparency Hypothesis* also predicts that investment efficiency increases post adoption of IR.

While IR is expected to benefit managers by improving their decision-making ability, there are at least two reasons that suggest IR could have little or no impact. First, IR mandate is at an early stage, and early adopters are grappling with the complexities involved in the switch to IR. While there are guidelines issued by IIRC, there is still lack of clarity in choosing what to report. Therefore, any informational benefit of IR may not be observed in the initial stages of adoption. Second, IR could simply be a cosmetic change to the narrative and design of annual reports. Moreover, users of annual reports such as investors are not fully aware of what to expect from IR. Therefore, it is easier for managers to make superficial changes to traditional annual reports and publish them as integrated reports.

This discussion leads to the following hypothesis:

H1c: Integrated Reporting improves the investment efficiency of adopting firms.

2.5.Impact of IR – Cross Sectional Hypotheses

2.5.1. Connectivity Element of IR

Integrated Reporting Quality has three key determinants, which are the three key guiding principles: *materiality*, *conciseness*, and *connectivity* of information (IIRC, 2013a). The materiality principle focusses on including only substantial matters affecting a firm's value-

creation ability. The conciseness principle stresses the need for cross-referencing between elements of the report and shifting detailed standard information to other platforms/documents. The connectivity principle means that the relationships among key elements included in the report are explicitly and clearly presented and articulated.

Investors observe connectivity of a report through reading it. If the manager has connected various value creating elements to present the value creation story to investors, the same should reflect in the text of the report. This relates to the concept of coherence in psycholinguistics. Pinker (2014) proposes that a coherent text conveys the idea of a text efficiently, while if the text is no coherent, the reader disregards the information present in the text. Therefore, a report high on connectivity is likely to reduce information overload more significantly.

Connectivity principle also forces managers to connect value relevant pieces of information before presenting them in the report. They must connect the newly collected information with their existing information set so that investors can easily follow the value creation process. Since managers have limited attention, they are more likely to focus on the value creation process when the information pieces are connected, rather than when the same information pieces are disjointed. Thus, connectivity of information is likely to reveal the value creation process of the firm to managers, improving their decision quality. This leads to the following hypotheses:

H2a: Increase in absolute CAR is more prominent for those firms whose integrated reports are high on connectivity principle.

H2b: Reduction in stock price delay is more prominent for those firms whose integrated reports are high on connectivity principle.

H2c: Improvement in investment efficiency is more prominent for those firms whose integrated reports are high on connectivity principle.

2.6.Organizational Complexity

Prior literature shows that organizational complexity in firms creates information asymmetry between managers and external stakeholders such as investors and creditors (Coles et al., 2008; Bushman et al., 2004), complex firms make inefficient investment decisions (J. C. Stein, 1997), and costs of processing information is higher (Habib, Johnsen, & Naik, 1997). The higher information processing cost is due to several firm level and country level economic and cultural factors (Bushman et al., 2004; Chu, Haw, Lee, & Wu, 2014). Consequently, given managers' limited attention, information acquiring costs are expected to be even higher in firms that are more complex.

To measure organizational complexity (OC), I employ two empirical constructs: (1) size of the firm, and (2) level of intangible assets. Prior studies document that organizational complexity increases in firm size due to management inefficiencies (Smith & Watts, 1992).

Intangible assets have uncertain future benefits and are characterized by long period of gestation. Therefore, information asymmetry of firms with higher level of intangible assets is higher (Aboody & Lev, 2000) causing difficulty in governing managerial decision over investments (Smith & Watts, 1992). Analyst accuracy also reduces as the intangible asset proportion rises in a firm (Barth, Kasznik, & McNichols, 2001).

In summary, information gathering and assimilating is cost intensive task in organizationally complex firms. Thus, IR is likely to provide incremental informational benefits to such firms. Therefore, I propose that post the adoption of IR, reduction in information overload and improvement in managers' decision quality set is higher in firms with higher organizational complexity. This leads to the following hypotheses:

H3a: Reduction in information overload post the adoption of IR is higher in firms with higher complexity.

H3b: Reduction in stock price delay post the adoption of IR is higher in firms with higher complexity.

H3c: Improvement in investment efficiency post the adoption of IR is higher in firms with higher complexity.

3. Research Framework and Empirical Results

3.1. Data and Sample

I collect the data for hypotheses tests from various sources. I obtain firm-year level observations for firms domiciled in South Africa and listed on JSE from Compustat Global for the period of 2007 to 2013. The adoption of IR was mandated in 2010. Hence, my pre-event period is from 2007 to 2009, and the post-event period is from 2010 to 2013. I combine this with daily stock price data from Compustat Securities file to compute stock price delay. This is an unbalanced panel data. I winsorize all continuous variables at 1% and 99% levels. To create a score of the quality of Integrated Reporting (IRQ), a careful reading of the reports is required. I obtain annual reports in pdf format of all firms in my sample from 2007 to 2013 from S&P Capital IQ.

3.2.Measuring Integrated Reporting Quality and Connectivity

To construct integrated reporting quality measure, I focus on the eight guiding principles issued by IIRC. According to IIRC, an integrated report should report on the following dimensions: (1) Strategic Focus and Future Orientation, (2) Connectivity of Information, (3) Stakeholder Relationships, (4) Materiality, (5) Conciseness, (6) Reliability and Completeness, (7) Consistency

and Comparability. These seven points are the guiding principles of the official IR framework issued by IIRC. I score each report along these seven dimensions, awarding one point for each dimension. Hence, the maximum score a report can achieve is seven, and minimum is zero. I scale this variable so that it varies between zero and one.

To test the hypotheses based on the connectivity element of the report, I construct the variable *conn*. The variable *conn* is defined as the score awarded to the connectivity element while constructing IRQ. By definition, *conn* varies from zero to one[4].

3.3.Measuring Stock Price Delay

Following Hou & Moskowitz (2005), I calculate the average delay with which information is absorbed into stock prices by first regressing stock returns for each firm on contemporaneous and four lagged market returns as follows:

$$r_{i,t} = \alpha_i + \beta_i R_{m,t} + \sum_{n=1}^{4} \delta_{i,n} R_{m,t-n} + \epsilon_{i,t} \qquad (1)$$

where $r_{i,t}$ is the return on stock *i* and $R_{m,t}$ is the market return in week *t*. The underlying concept of stock price delay is lagged response of stock price to market news. If the stock price response to new information is delayed, returns from prior period will have explanatory power for contemporaneous stock returns. In such a case, $\delta_{i,n}$ could be non-zero. This is the unrestricted regression. In case of no stock price delay, all $\delta_{i,n}$ will be equal to zero. This is restricted regression. Stock price delay is defined as:

$$Delay = 1 - \left(\frac{R^2_{restricted}}{R^2_{unrestricted}}\right)$$

[4]Detailed examples of connectivity and other elements of integrated reports are available in a separate document on request.

Delay is larger lagged returns explain some variance in contemporaneous returns. Model (1) is estimated using weekly returns from $July_{t-1}$ to $June_t$, to calculate $Delay_t$. The model uses market returns, or systematic news, as the stimulus to which stock *i* responds. In this manner, newly arriving market-wide information is held constant.

Delay computed at individual stock level may induce estimation error. To mitigate this, I estimate delay at portfolio level and use it for my main specification. I first sort the firms into deciles based on their size and then sort them into deciles based on the stock level delay measure computed earlier. I then recompute the delay based on portfolio returns.

3.4.Measuring Investment Efficiency

I capture investment efficiency based on the measure proposed by Biddle et al. (2009). I divide firms into over investors and under investors, based on the residuals from the industry level regression in equation (1)

$$Inv_{t+1} = \beta_0 + \beta_1 SalesGrowth_t + \epsilon \qquad (2)$$

The residuals from this model are divided into four quartiles, and if a firm belongs to the highest quartile, it is classified as over-investor, or *high.* Similarly, a firm belonging to bottom most quartile is labeled as *low.* The firms in two middle quartiles are the benchmark firms.

3.5.Empirical Framework and Results

3.5.1. Test for Investor Response

Hypothesis H1a predicts that adoption of IR induces an increased response from investors. An empirical test for the same involves testing the information content of integrated reports. An integrated report does not affect the quantity of information available to investors. Rather, it connects the various pieces of information to present the value creation story of the firm to investors. Therefore, any reaction of investors to the issuance of an integrated report is likely to be a better understanding of the existing information. Thus, investor reaction to an integrated report is expected to be due to a reduction in information overload.

Following prior studies (Bushee, Core, Guay, & Hamm, 2010; Rogers & Van Buskirk, 2009), I examine investor reaction to the issuance of integrated reports by using absolute market adjusted return in the [-1,+1] window around the filing of integrated reports. The model used is:

$$Abret = \beta_0 + \beta_1 Post + \beta_2 mktval + \beta_3 adjROA + \beta_4 mtb + \beta_5 nanalyst + \beta_6 Abret\_EA + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon \quad (3)$$

In (3), *Abret* is the absolute market adjusted return for a firm in the [-1,+1] window around the filing of its annual reports. *Post* is a dummy variable that takes a value of 1 for 2010 and all subsequent years, 0 otherwise. The coefficient β_1 on *Post* captures the change in *Abret* after the adoption of IR. If investors find integrated reports to be more informative than the regular annual reports, β_1 should be positive and significant. Following Merkley (2013), I also control for firm characteristics. Firm size is measured as natural log of market value (*mktval*), *adjROA* captures change in earnings, *mtb* is market-to-book ratio, and *nanalyst* is the number of analysts following

the firm. In one of the specifications, I also control for the information content of the recent most earning announcements for the firm (*Abret_EA*).

Results from this test are presented in Table 4. The coefficient on *Post* in column (1) is 0.0143, significant at 1% level. In other words, post the adoption of IR, absolute 3-day CAR around the filing of annual reports increases by 1.43%. This suggests that investors find integrated reports incrementally informative. In column (2), I additionally control for CAR around the recent most earnings announcement. The coefficient on *Post* does not change significantly. In columns (3) and (4), I include industry fixed effects and firm fixed effects respectively to control for unobservables along these dimensions. The coefficient on Post is 0.0147 and 0.0185 respectively, again establishing the increase in informativeness of integrated reports. In columns (5) through (8), I repeat the specifications of first four columns, but the dependent variable is 7-day absolute CAR around the filings of annual reports. The coefficient on Post in these columns is again economically and statistically significant. On an average, these results suggest that the 7-day CAR increases by 3% approximately, which is a 50% increase on the mean value of 7-day CAR, which is approximately 6%.

Taken together, these findings suggest that investors find integrated reports to be more informative than traditional annual reports. Since all the information available in an integrated report is publicly available from various sources, the increase in CAR cannot be attributed to new information in these reports. Therefore, I take these findings as an initial evidence of a reduction in information overload for investors. Investors are better able to comprehend the information presented in integrated reports and can understand the value creation story of the firm, and therefore react to the issuance of integrated reports.

3.5.2. *Tests for Stock Price Delay*

If IR adoption increases response from investors, information should get impounded faster into stock prices, reducing stock price delay. Increased information in annual reports improves the preexisting information set of investors, leading to a reduced delay in adjustment of stock prices to newly arriving market wide news. Thus, H1b predicts that IR adoption leads to a reduction in stock price delay. The model used for this test is:

$$Delay = \beta_0 + \beta_1 Post + \beta_2 logat + \beta_3 ROA + \beta_4 Lev + \beta_5 lossf + \beta_6 mktval + \beta_7 shturn + \beta_8 lnanalyst + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon \quad (4)$$

Delay is the portfolio level delay measure, computed as discussed in section 3.3. *Lossf* is the number of times a firm reports loss in the past three years. *Shturn* is the share turnover and controls for liquidity of the firm. *Lnanalyst* is the natural log of the number of analysts following a firm. It controls for the information environment of the firm. Based on H1b, I predict a negative coefficient on *Post*.

Table 5 presents the results from this test. Columns (1) through (3) use portfolio level measure of delay, with different combinations industry and firm fixed effects. On an average, delay in stock price adjustment reduces by approximately 11 percentage points post the adoption of IR. These findings suggest that once information overload reduces, investors can focus their attention on neglected stocks, reducing stock price delay for these stocks. Columns (4) through (6) use stock level measure of delay. The results from these columns are qualitatively similar to those in first three columns.

3.5.3. Test for Managerial Decision Quality

Hypothesis H1c predicts that adoption of IR improves decision quality of managers. I focus on the quality of long term investment decision of managers. Thus, I examine the impact of IR

adoption on investment efficiency of firms. Specifically, I test whether adoption of IR is negatively (positively) associated with investment when firms are more likely to over-invest (under-invest). To eliminate concerns about financial crisis impacting investment decision of managers, I estimate a difference-in-difference model. I consider the firms in South Africa as a part of my treatment sample, while a matched sample of Brazilian firms[5] is considered as the control sample. the following models:

$$Inv_t = \beta_0 + \beta_1 Post * treat * high + \beta_2 Post * treat + \beta_3 Treat + \beta_4 high + \beta_5 Post + \beta_6 Post * high + \beta_7 treat * high + \beta_8 logat + \beta_9 mtb + \beta_{10} Zscore + \beta_{11} tang + \beta_{12} CFOsale + \beta_{13} div + \beta_{14} loss + \beta_{15} opcycle + \beta_{16} lev + Industry\ FE + Year\ FE + \epsilon$$

$$Inv_t = \beta_0 + \beta_1 Post * treat * low + \beta_2 Post * treat + \beta_3 Treat + \beta_4 low + \beta_5 Post * + \beta_6 Post * low + \beta_7 treat * low + \beta_8 logat + \beta_9 mtb + \beta_{10} Zscore + \beta_{11} tang + \beta_{12} CFOsale + \beta_{13} div + \beta_{14} loss + \beta_{15} opcycle + \beta_{16} lev + Industry\ FE + Year\ FE + \epsilon \quad (6)$$

Models (5) and (6) examine the change in investment for firms that have an *ex-ante* tendency to over-invest or under-invest respectively. *Post* takes a value of 1 for all years after 2010, zero otherwise. *Treat* takes a value of one for all South African firms, zero otherwise. *Inv* is the measure of investment, including both capital and non-capital investment. It is the sum of capital expenditures, R&D expenditures, and acquisitions minus sales of PPE, scaled by lagged total assets. I control for effects that could confound my findings. Following Biddle and Hillary (2006), I control for factors that determine capital investment of a firm such as firm size (*logat*),

[5] Brazil and South Africa are part of a larger group called *BRICS*, which also comprises of Brazil, Russia and China. For robustness, I replace the control sample by firms from Brazil. The results stay the same qualitatively.

market-to-book (*mtb*), tangibility (*tang*), bankruptcy risk (*Zscore*), volatility of cash flows (*CFOsale*), and dividend payout ratio (*div*).

The sum of coefficients β_1 and β_2 in these two models captures difference in changes in investment for treatment firms compared with control firms. For example, $\beta_1 + \beta_2$ in (5) explains the change in investment of treatment firms incremental to control firms post the adoption of IR. If IR reduces the tendency of firms to over-invest, $\beta_1 + \beta_2$ is expected to be negative for (5). Following similar reasoning, $\beta_1 + \beta_2$ should bear a positive sign for (6).

The results from these models are presented in Table 6. Before estimating a DID model. I examine the change in investment behavior of treatment and control firms separately. Column (1) documents the change in investment behavior for firms that are labeled as under-investors in the period before adoption of IR. The coefficient on *post* * *low* is 0.0338 which is statistically significant at 1% level. This suggests that post the adoption of IR, firms that were under-investing increase their investment levels by approximately 3 percentage points. The coefficient on the same interaction for control firms is statistically insignificant and economically very low, as shown in column (2). Thus, during the same period, there was no change in the investment behavior of under-investing firms in the control sample. Columns (3) and (4) present the same results from a similar test for over-investing firms. Result suggests that the decrease in investment by such firms is higher for treatment sample than control sample.

Taken together, these findings indicate that investment efficiency improved post the adoption of IR, thus suggesting that managerial decision quality improved. To corroborate these findings, I estimate a DID model, results from which are presented in columns (5) and (6) of Table 6. Joint significance test reveals that when compared with control firms, the investment of under-investing treatment firms increases by 1.78 percentage points. This increase is 27% of the sample

mean value of the investment variable. Similarly, the investment of over-investing firms reduces by 4.77%, which is 74% of the mean value of investment in the sample. Thus, findings from DID establish that investment efficiency, and hence managerial decision quality improves post the adoption of IR.

3.5.4. Cross Sectional Tests

3.5.4.1. Role of Connectivity in the impact of IR

The next set of hypotheses examine the moderating influence of connectivity element of integrated reports on the relationships explored in first three hypotheses. I begin with an analysis of the role of connectivity in reducing information overload for investors, post the adoption of IR. I use the following model to test this hypothesis:

$$Abret = \beta_0 + \beta_1 conn + \beta_2 mktval + \beta_3 adjROA + \beta_4 mtb + \beta_5 nanalyst + \beta_6 Abret\_EA + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon \quad (7)$$

Hypothesis H3a predicts that reduction in information overload is higher for firms with reports that have higher $conn$. In model (7), the coefficient β_1 captures the change in *Abret* after the adoption of IR for firms with high $conn$. Based on the prediction of H3a, β_1 should be positive in sign.

Table 9 presents the findings. The coefficient β_1 is 0.0515 in column (1), suggesting that the increase in 3-day CAR is 5 percentage points higher for firms with IR having higher connectivity, when compared to those with low connectivity. This finding further establishes that information overload reduces post the adoption of IR and the connectivity of information reduces the complexity of the report, making it easier to comprehend, reducing information overload for investors. Column (2) with firm fixed effects supports these findings.

Hypothesis H3b examines the role of connectivity in reducing stock price delay. I use the following model to test this hypothesis:

$$Delay = \beta_0 + \beta_1 conn + \beta_2 lossf + \beta_3 mktval + \beta_4 shturn + \beta_5 shturn + Year\ Fixed\ Effect + Industry\ Fixed\ Effect + \varepsilon \quad (8)$$

Hypothesis H3b predicts that reduction in stock price delay is higher for firms with reports that have higher *conn*. Based on the prediction of H3b, β_1 should be positive in sign in model (8).

Columns (3) and (4) document that stock price delay reduces by 7 and 9 percentage points respectively more for firms with high connectivity IR. Thus, these findings corroborate that information overload reduces more for firms with higher connectivity of information.

Hypothesis H3c examines the role of connectivity in improving managerial decision quality. I use the following models to test this hypothesis:

$$Inv_{t+1} = \beta_0 + \beta_1 conn * low + \beta_2 conn + \beta_3 low + \beta_4 logat + \beta_5 mtb + \beta_6 Zscore + \beta_7 tang + \beta_8 CFOsale + \beta_9 div + \beta_{10} loss + \beta_{11} opcycle + \beta_{12} lev + Industry\ FE + Year\ FE + \epsilon \quad (9)$$

$$Inv_{t+1} = \beta_0 + \beta_1 conn * high + \beta_2 conn + \beta_3 high + \beta_4 logat + \beta_5 mtb + \beta_6 Zscore + \beta_7 tang + \beta_8 CFOsale + \beta_9 div + \beta_{10} loss + \beta_{11} opcycle + \beta_{12} lev + Industry\ FE + Year\ FE + \epsilon \quad (10)$$

Hypothesis H3c predicts that improvement in investment efficiency is higher for firms with reports that have higher $conn$. Thus, firms with an ex-ante tendency to over-invest reduce their investment to a higher extent for firms with higher $conn$. Similarly, firms with an ex-ante tendency

to under-invest increase their investment to a higher extent for firms with higher $conn$. Therefore, based on the prediction of H3c, β_1 should be positive in sign in model (9), and negative in (10).

Table 10 documents the findings from these tests. Columns (1) and (2) present the results of model (9). Under-investing firms with higher connectivity in their integrated reports have an incremental increase in their investments by 4.4 percentage points over firms with poor connectivity. Similarly, columns (3) and (4) that show the results from model (10) suggest that over-investing firms with higher connectivity in their integrated reports incrementally reduce their investments by 3 percentage points on an average. Taken together, connectivity does improve investment efficiency of firms that adopt IR.

3.5.4.2.Organizational Complexity and the impact of IR

The final set of hypotheses examine the impact of organizational complexity (OC) of integrated reports on the relationships explored in first three hypotheses. I begin with an examination of the role of OC in increasing investor response, post the adoption of IR. I use the following model to test this hypothesis:

$$Abret = \beta_0 + \beta_1 Post * OC + \beta_2 Post + \beta_3 OC + \beta_4 mktval + \beta_5 adjROA + \beta_6 mtb + \beta_7 nanalyst + \beta_8 abs|Abret_{EA}| + Industry\ FE + Year\ FE + \epsilon \quad (11)$$

I use two proxies for OC: (1) size of the firm, and (2) ratio of intangible assets to lagged total assets. In the model, OC is a dummy variable that takes a value of one for firms that lie in the top two quartiles of size (or intangibles), zero otherwise.

Hypothesis H4a predicts that reduction in information overload is higher for firms with higher complexity. In model (11), the coefficient β_1 captures the change in *Abret* after the adoption of IR for firms with high *OC*. Based on the prediction of H4a, β_1 should be positive.

Table 11 presents the results from this analysis. Columns (1) and (2) show that increase in absolute CAR is significantly higher for more complex firms, as measured by the coefficient β_1, thus suggesting that reduction in information overload is higher for more complex firms.

Hypothesis H4b examines the role of OC in reducing stock price delay. I use the following model to test this hypothesis:

$$Delay = \beta_0 + \beta_1 Post * OC + \beta_2 Post + \beta_3 OC + \beta_4 logat + \beta_5 ROA + \beta_6 Lev + \beta_7 mktval + \beta_8 abs|Abret_{EA}| + Industry\ FE + Year\ FE + \epsilon \quad (12)$$

Hypothesis H4b predicts that reduction in stock price delay is higher for firms with with higher complexity. Based on the prediction of H4b, β_1 should be positive in sign in model (12).

Columns (3) and (4) of Table 11 present the results. Reduction in delay is significantly higher for more complex firms, again corroborating that information overload reduces more for such firms.

Taken together, these findings highlight the usefulness of IR. Complex firms benefit more from IR because traditional reports do not suffice in providing relevant information about such firms. IR bridges that information gap and reduces information overload from complex firms.

Hypothesis H4c examines the role of OC in improving managerial decision quality. I use the following models to test this hypothesis:

$$Inv_t = \beta_0 + \beta_1 Post * OC * high + \beta_2 Post * OC + \beta_3 OC + \beta_4 high + \beta_5 Post + \beta_6 Post * high + \beta_7 OC * high + \beta_8 logat + \beta_9 mtb + \beta_{10} Zscore + \beta_{11} tang + \beta_{12} CFOsale + \beta_{13} div + \beta_{14} loss + \beta_{15} opcycle + \beta_{16} lev + Industry\ FE + Year\ FE + \epsilon$$

$$Inv_t = \beta_0 + \beta_1 Post * OC * low + \beta_2 Post * OC + \beta_3 OC + \beta_4 low + \beta_5 Post * + \beta_6 Post * low + \beta_7 OC * low + \beta_8 logat + \beta_9 mtb + \beta_{10} Zscore + \beta_{11} tang + \beta_{12} CFOsale + \beta_{13} div + \beta_{14} loss + \beta_{15} opcycle + \beta_{16} lev + Industry\ FE + Year\ FE + \epsilon$$

Hypothesis H4c predicts that improvement in investment efficiency is higher for firms with higher complexity. Thus, firms with an ex-ante tendency to over-invest reduce their investment to a higher extent when they have high complexity. Similarly, firms with an ex-ante tendency to under-invest increase their investment to a higher extent when they are high on complexity. Therefore, based on the prediction of H4c, $\beta_1 + \beta_2$ should be positive in sign in model (13), and negative in (14).

Table 12 presents the results from models 17 and 18. Columns (1) and (2) document a significant increase in investment by complex firms that were under-investing post the adoption of IR, while columns (3) and (4) show that investments reduce more for over-investing complex firms post the adoption of IR. The coefficients are significant statistically and economically in all the four columns. Taken together, these findings support the role of IR in making managers more efficient in decision making for complex firms.

4. Robustness Tests

4.1. Timing of Exogenous Shock

I begin with an examination of robustness of my findings on information overload. I conduct a placebo test by replacing the single shock of IR adoption into four sub periods, with one of these sub periods as the benchmark period, and the other three included in the following model, with an assumption that the event occurs at *t=0*:

$$Abret = \beta_0 + \beta_1 IND1 + \beta_2 IND2 + \beta_3 IND3 + \beta_4 logat + \beta_5 ROA + \beta_6 Lev + \beta_7 mktval + \beta_7 Abret\_EA + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon$$

The three indicator variables for the shock are *IND1*, *IND2*, and *IND3*. *IND1* takes a value of 1 for the periods leading up to the event, that is, *t-2* and *t-1*. *IND2* takes a value of 1 for *t=0* and *t=1*, and *IND3* takes a value of 1 for all years after *t=1*. If the change in information overload is related to adoption of IR, then β_1 should be statistically insignificant; β_2, however, could be statistically significant or not, depending on how fast the benefits of IR manifest themselves. Also, I predict β_3 to be positive and significant, since the effectiveness of IR is likely to be in play from second year onwards.

Untabulated results show that the coefficient on *IND1* is statistically insignificant. Further, both β_2 and β_3 are significant, though β_3 is economically larger. These findings suggest that reduction in overload is unrelated to the pre-adoption period, and begins only after the mandate arrives.

Similarly, I test for the robustness of my findings on managerial decision quality, as proxied by investment efficiency. I estimate the following models:

$$Inv_t = \beta_0 + \beta_1 IND1 * treat * high + \beta_2 IND2 * treat * high + \beta_3 IND3 * treat * high + \beta_4 IND2 * treat + \beta_5 IND3 * treat + Other\ Interaction\ Terms + \beta_8 logat + \beta_9 mtb + \beta_{10} Zscore + \beta_{11} tang + \beta_{12} CFOsale + \beta_{13} div + \beta_{14} loss + \beta_{15} opcycle + \beta_{16} lev + Industry\ FE + Year\ FE + \epsilon$$

$$Inv_t = \beta_0 + \beta_1 IND1 * treat * low + \beta_2 IND2 * treat * low + \beta_3 IND3 * treat * low + \beta_4 IND2 * treat + \beta_5 IND3 * treat + Other\ Interaction\ Terms + \beta_8 logat + \beta_9 mtb + \beta_{10} Zscore + \beta_{11} tang + \beta_{12} CFOsale + \beta_{13} div + \beta_{14} loss + \beta_{15} opcycle + \beta_{16} lev + Industry\ FE + Year\ FE + \epsilon$$

Again, untabulated results show that the coefficient on *IND1* is statistically insignificant and both β_2 and β_3 are significant, β_3 being economically larger. These findings suggest that improvement in investment efficiency is unrelated to the pre-adoption period, and begins only after the mandate arrives.

4.2. Alternative IRQ Measure

The IRQ score assigns the same significant to all seven guiding principles issued by IIRC. As a robustness test, I replace the IRQ measure I create with an IRQ measure based on weights proposed by (K.-W. Lee & Yeo, 2016). They survey forty financial analysts and assign the following weights based on the responses of these financial analysts: (1) Organizational overview and external environment (19 %); (2) Governance (13 %); (3) Business model (18 %); (4) Risks and opportunities (14 %); (5) Strategy and resource allocation (12 %); (6) Performance (15 %);

(7) Outlook (5 %); and (8) Basis of preparation and presentation (4 %). The results are qualitatively similar using the weighted IRQ score.

4.3. "Comply" or "Explain" Exemption

IR mandate for JSE listed firms exempts firms from adoption if they can provide reasons for non-compliance. As a robustness test, I repeat the main tests by excluding the firms (approximately 3 % of the sample) that do not produce an integrated report by providing an explanation for non-compliance. The results are qualitatively similar.

5. Conclusion

Prior studies document an association between reporting characteristics such as length and quantity of information disclosed and investor reaction to the release of these reports. These studies support the regulatory concern regarding the declining ability of annual reports in conveying relevant information to investors. However, a caveat of these studies is a lack of causal evidence. Using the mandatory adoption of IR in South Africa in 2010 as an exogenous shock to the reporting framework of firms, I examine the impact of reporting framework on the information impounded in stock prices, and a subsequent impact on managerial decision quality. I find that the 3 day (and 7 day) absolute CAR around the filing of reports increases after the mandate of IR in South Africa. Delineating the channels that likely explain the increase in absolute CAR, I find that firms with higher connectivity of information in their integrated reports experience a greater increase in absolute CAR. These findings taken together suggest that information disclosed in annual reports influences investors' information set and therefore regulatory concerns regarding increasing complexity of annual reports are not misplaced. These findings also highlight the role connectivity

of information in increasing the ease of information processing by investors, further strengthening the belief that traditional annual reports suffer from information overload.

Increase in the information set of investors should have an impact on the price discovery in stock markets. It should also impact managerial decision making by allowing better monitoring of managerial actions by investors. I find that stock price delay reduces post the adoption of IR, and the reduction in delay is higher for firms with reports that have higher connectivity. This suggests that a well connected integrated report allows for a faster impounding of information into stock prices. I also find that IR adoption improves investment efficiency of firms, and this efficiency increases in the connectivity of information. These findings suggest that managers either process more information post adoption of IR, leading to better decisions, or shareholders can better monitor managerial actions, forcing managers to choose better projects. In either case, attributes of IR such as connectivity and overall quality play a moderating role.

Taken together, this study lends support to prior findings of information overload in annual reports leading to poor investor response. Criticisms of traditional disclosures point at their complexity. IR was introduced with the objective of reducing the complexity of disclosures, allowing investors to access all relevant information at one place in a cohesive and integrated fashion. This study finds evidence that IR succeeds in achieving these objectives.

My findings point to potentially fruitful areas for future research. First, while I explore one dimension of the types of firms that are likely to benefit more from IR adoption, further analysis could be done exploring other firm aspects that could drive adoption benefits. This would allow governing bodies in various countries to design pilot adoption programs for firms headquartered in those countries, and test the benefits of adoption.

Second, future research could attempt to disentangle the transparency and information channel with regards to improvement in investment efficiency. My findings do not rule out either of these channels. For instance, if it can be shown that information channel leads to an improvement in investment efficiency, it would be a manifestation of integrated thinking, which is also one of the key objectives of IIRC.

Finally, the elements of an integrated report warrant further analysis. This study uses manually coded values for various elements of IR. Advanced textual analysis techniques and machine learning algorithms could make the process of assessing IRQ more efficient and convenient for a researcher. Such an analysis would lend itself to easier replication also, and could be used by both managers and investors in judging the quality of integrated reports.

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Appendix A

This Appendix highlights examples of connectivity principle of IR in practice in South African firms. These examples have been sourced from Integrated Reporting Examples Database (http://integratedreporting.org/resource/emerging-integrated-reporting-database/)

ABSA, 2011

Description: The integrated report of ABSA presents business overview explaining the strategy of the firm concisely and crisply.

The strategy of ABSA is explained in relation the material issues concerning investors. Use of graphics and diagrams maintains the link between strategy and material issues Thus, the principle of strategic orientation is demonstrated, as is the principle of connectivity. These two in conjunction provide investors with a clear view of future direction of the business

AngloGold Ashanti, 2013

Description: AngloGold Ashanti's business overview provides investors with the information on how the firm connects strategy to value creation.

Using box graphics, it links business objectives to overall strategy of the firm. It supplements this information with details on this connection later in the report.

Since the firm operates in the mining industry, it carefully lays out the impact of its operations on environment, and connects this impact to business outcomes, and therefore to value creation

Vodacom, 2013

Description: The report of Vodacom has a high level of connectivity between stakeholder relationships and value creation. The report dedicates a separate section to highlight this link, also highlighting ways in which the firm maintains its stakeholder relationships.

SASOL, 2013

Description: The integrated report of SASOL follows the "six capitals" approach and dedicates a separate section to explain the link between these capitals and value creation. Input to each capital is linked to the output of each capital, thereby maintaining connectivity of inputs to value creation.

This report enables investors to understand how capitals are influencing value creation, and the principle of connectivity plays a major role in highlighting this.

Table 1: Variable Description

Variable	Notation	Definition/Measurement	Level (Firm / Firm-Year)
CAR[-1,1]	*Abret*	Cumulative Abnormal Return 3 days around the filing of annual report	Firm-Year
CAR[-3,3]	*Abret*	Cumulative Abnormal Return 5 days around the filing of annual report	Firm-Year
Portfolio Delay	*Delay*	Delay computed at Portfolio level based on the procedure outlined in *Callen et al. (2013)*	Firm-Year
Stock Delay	*Delay*	Delay computed at stock level based on the procedure outlined in *Callen et al. (2013)*	Firm-Year
Total Investment	Inv_{t+1}	(Capex + R&D + acquisitions – sale of PPE) / lagged total assets	Firm-Year
Integrated Reporting Quality	*IRQ*	Integrated Reporting Quality measure computed as a simple aggregation of scores for each of the seven guiding principles. Each report is awarded a score of one for each guiding principle based on its presence or absence	Firm-Year
Connectivity	*Conn*	Connectivity measure based on the presence or absence of the connectivity guiding principle	Firm-Year
Organizational Complexity	*complex*	Dummy that takes a value of one if a firm belongs to above median group on both size and intangibility, measured as log of total assets and ratio of intangible assets to total assets respectively	Firm-Year
Market Value of Equity	*mktval*	Stock price at the end of year * total shares outstanding at the end of the year	Firm-Year
Adjusted ROA	*adjROA*	Change in ROA over the previous year. ROA is measured as net income scaled by lagged total assets	Firm-Year
Number of Analysts	*nanalyst*	Number of analysts from IBES following the firm	Firm-Year
CAR around earnings announcement	*abret_EA*	3 day or 5 day CAR around the recent most earnings announcement of a firm	Firm-Year
Loss Frequency	*lossfreq*	Number of times a firm reports loss in last four years	Firm-Year
Share Turnover	*shturn*	Trading volume of a stock	Firm-Year
Size of the Firm	*logat*	Natural log of total assets of a firm	Firm-Year
Growth Opprtunities	*mtb*	*mktval* / book value of a firm	Firm-Year
Cash	*cash*	Total cash and cash equivalents, scaled by lagged total assets	Firm-Year

Tangibility	*tang*	Net PP&E scaled by lagged total assets	Firm-Year
Cash Flow	*CFOsale*	Net Cash Flow from Operations scaled by total sales	Firm-Year
Dividends	*div*	Dummy that takes a value of one if a firm pays dividend in that year	Firm-Year
Loss	*loss*	Dummy that takes a value of one of a firm reports a loss in that year	Firm-Year
Financial Leverage	*lev*	Long term debt scaled by total assets	Firm-Year

Table 2: Sample Selection

	Dropped	**Sample Size**
Compustat Global Data for South African firms from 2007-2013		2,436
Drop missing observations for control variables:		
Drop missing Sales Data	(713)	1,723
Drop missing control variables (logat, mtb, tang, lev, cash etc.)	(121)	1,602
Drop influential observations based on Def Betas	(536)	1,066
Drop observations that do not match with the control sample of Brazilian firms using propensity score matching	(372)	694
Firm – Year Sample		**694**

Table 3: Summary Statistics

VARIABLES	(1) N	(2) Mean	(3) Sd	(4) P25	(5) Median	(6) P75
Dependent Variables						
CAR[-1,1]	694	0.036	0.045	0.002	0.012	0.089
CAR[-3,3]	694	0.068	0.066	0.022	0.037	0.107
Portfolio Delay	694	0.304	0.236	0.138	0.196	0.378
Stock Delay	694	0.312	0.231	0.145	0.235	0.374
Inv_{t+1} *(%)*	694	0.064	0.049	0.027	0.055	0.091
IR Variables						
IRQ	694	0.662	0.348	0.231	0.903	0.943
Conn	694	0.101	0.062	0.031	0.124	0.163
complex	694	0.277	0.448			
Control Variables – Information Overload						
mktval	694	6.968	2.118	5.335	6.930	8.604
adjROA	694	-0.006	0.083	-0.004	-0.004	-0.004
nanalyst	694	5.774	2.204	5.000	6.000	7.000
abret_EA	694	0.018	0.034	0.005	0.005	0.016
lossfreq	694	0.198	0.285	0.000	0.000	0.333
shturn	694	6.891	0.936	6.324	6.971	7.537
lnanalyst	694	1.860	0.344	1.792	1.946	1.946
Control Variables – Investment Efficiency						
logat	694	7.505	1.737	6.217	7.523	8.827
mtb	694	1.554	2.226	0.903	1.205	1.759
cash	694	0.112	0.111	0.035	0.083	0.151
tang	694	0.285	0.213	0.096	0.236	0.450
CFOsale	694	0.077	0.149	0.022	0.073	0.137
div	694	0.740	0.439			
loss	694	0.199	0.400			
lev	694	0.008	0.189	-0.092	0.006	0.106

Table 4: Test for Information Overload

This table presents the results of the following equation:

$Abret = \beta_0 + \beta_1\ Post + \beta_2 mktval + \beta_3 adjROA + \beta_4 mtb + \beta_5 nanalyst + \beta_6 Abret\_EA + \ Year\ Fixed\ Effects\ + Industry\ Fixed\ Effects + \varepsilon$

Abret is the absolute CAR in the three-day/five-day window around filing date of annual reports. *Post* is a dummy variable that takes a value of 1 for all years after 2010, 0 otherwise. *Mktval* is the natural log of market value of equity. adjROA is the operating income before R&D and advertising expense scaled by ending total assets. *Mtb* is the market-to-book ratio. Nanalyst is the number of analysts following the firm at the beginning of the fiscal period. *Abret_EA* is the absolute CAR in the three-day/five-day window around the recent most earnings announcements. All continuous variables are winsorized at 1% and 99% levels. Heteroskedasticity consistent *z*-statistics based on standard errors clustered at firm level are reported in parentheses. ***, **, and * correspond to 1%, 5%, and 10% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	*CAR [-1,1]*	*CAR [-1,1]*	*CAR [-1,1]*	*CAR [-1,1]*	*CAR [-3,3]*	*CAR [-3,3]*	*CAR [-3,3]*	*CAR [-3,3]*
post	0.0143***	0.0143***	0.0147***	0.0185**	0.0323***	0.0322***	0.0327***	0.0343***
	(2.8337)	(2.8357)	(2.9913)	(2.3781)	(6.2826)	(6.2833)	(6.3212)	(4.8811)
Control Variables								
mtb	0.0013***	0.0012***	0.0015***	0.0009	0.0012**	0.0012**	0.0013***	0.0026***
	(4.4720)	(4.3737)	(3.9850)	(0.9940)	(2.5839)	(2.4234)	(2.8047)	(3.8609)
mktval	-0.0066***	-0.0065***	-0.0068***	-0.0059	-0.0055***	-0.0054***	-0.0050***	-0.0096
	(-4.1123)	(-4.0871)	(-4.0768)	(-0.7378)	(-3.2868)	(-3.2123)	(-2.9831)	(-1.5569)
adjROA	0.0084	0.0089	0.0098	-0.0102	0.0551	0.0559	0.0572*	0.0346
	(0.1665)	(0.1747)	(0.1929)	(-0.1331)	(1.5647)	(1.5777)	(1.7265)	(0.6772)
nanalyst	0.0012*	0.0012*	0.0014*	0.0008	0.0014	0.0013	0.0013	0.0015
	(1.7840)	(1.7058)	(1.7156)	(0.4739)	(1.1399)	(1.0518)	(1.0311)	(0.7956)
abs_EA		-0.0462	-0.0477	-0.1661*		-0.0818	-0.0880	-0.1022
		(-1.0179)	(-0.9434)	(-1.6977)		(-1.3623)	(-1.5659)	(-1.3880)
Constant	0.0658***	0.0666***	0.0665***	0.0646	0.0764***	0.0778***	0.0749***	0.1029**
	(5.8839)	(5.8157)	(5.7644)	(1.2464)	(5.9850)	(6.0619)	(5.6579)	(2.3783)
Observations	694	694	694	694	694	694	694	694
R-squared	0.054	0.055	0.092	0.416	0.096	0.097	0.129	0.535
INDUSTRY FE	NO	NO	YES	NO	NO	NO	YES	NO
FIRM FE	NO	NO	NO	YES	NO	NO	NO	YES

Table 5: Test for Information Overload

This table presents the results of the following equation:

$$Delay = \beta_0 + \beta_1\, Post + \beta_2 lossfreq + \beta_3 mktval + \beta_4 shturn + \beta_4 lnanalyst + Year\ Fixed\ Effect + Industry\ Fixed\ Effect + \varepsilon$$

Delay is the measure of stock price delay. *Post* is a dummy variable that takes a value of 1 for all years after 2010, 0 otherwise. *Lossf* is the number of times a firm reports loss in last three years. *Mktval* is the natural log of market value of equity. *Shturn* is the natural log of share turnover, where turnover is average monthly shares traded scaled by shares outstanding. *Lnanalyst* is the natural log of number of analysts following the firm at the beginning of the fiscal period. All continuous variables are winsorized at 1% and 99% levels. Heteroskedasticity consistent t-statistics based on standard errors clustered at firm level are reported in parentheses. ***, **, and * correspond to 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1) *Portfolio Delay Measure*	(2) *Portfolio Delay Measure*	(3) *Portfolio Delay Measure*	(4) *Stock Delay Measure*	(5) *Stock Delay Measure*	(6) *Stock Delay Measure*
post	-0.1090***	-0.1090***	-0.1142***	-0.0877***	-0.0877***	-0.1001***
	(-7.3037)	(-7.3115)	(-5.0636)	(-5.5548)	(-5.6012)	(-3.9574)
Control Variables						
lossfreq	0.0173	0.0274	0.0253	-0.0377	-0.0232	-0.0354
	(0.6499)	(0.9995)	(0.6139)	(-1.4369)	(-0.8833)	(-1.0455)
mktval	-0.0007	-0.0002	0.0021	0.0048	0.0064*	0.0028
	(-0.2182)	(-0.0685)	(0.1827)	(1.3057)	(1.6613)	(0.2241)
shturn	-0.0595***	-0.0599***	-0.0335**	-0.0628***	-0.0622***	-0.0309*
	(-5.9401)	(-5.8255)	(-2.2257)	(-4.7451)	(-4.9599)	(-1.7501)
lnanalyst	-0.1059***	-0.1134***	-0.0973	-0.1811***	-0.1920***	-0.1271
	(-3.3463)	(-3.7822)	(-1.5431)	(-5.2577)	(-5.7102)	(-1.6149)
Constant	0.9562***	0.9679***	0.7425***	1.1105***	1.1129***	0.8110***
	(12.4577)	(12.6048)	(4.1642)	(12.0008)	(12.6114)	(3.9452)
Observations	694	694	694	694	694	694
R-squared	0.194	0.207	0.523	0.215	0.234	0.543
INDUSTRY FE	NO	YES	NO	NO	YES	NO
FIRM FE	NO	NO	YES	NO	NO	YES

Table 6: Test for Investment Efficiency

This table presents the results of the following equation:

$$Inv_{t+1} = \beta_0 + \beta_1 Post * treat * low/high + \beta_2 Post * treat + \beta_3 Treat + \beta_4 low/high + \beta_5 Post + \beta_6 Post * low/high + \beta_7 treat * low/high + \beta_8 logat + \beta_9 mtb + \beta_{10} cash + \beta_{11} tang + \beta_{12} CFOsale + \beta_{13} div + \beta_{14} loss + \beta_{15} lev + Industry\ FE + Year\ FE + \epsilon$$

Inv_{t+1} is total investment scaled by lagged total assets. *Post* is a dummy variable that takes a value of 1 for all years after 2010, 0 otherwise. Treat is a dummy variable that takes a value of 1 for all firms listed on JSE, 0 otherwise. *Low* is a dummy variable that takes a value of 1 for all firms in the bottom quartile of investment in 2009, 0 for two middle quartiles. *High* is a dummy variable that takes a value of 1 for all firms in the top quartile of investment in 2009, 0 for two middle quartiles. *Logat* is the natural log of total assets. *Mtb* is the market-to-book ratio. *Cash* is the total cash equivalents scaled by lagged total assets. *Tang* is the tangibility measure computed as PP&E scaled by lagged total assets. *CFOsale* is the proportion of cash flows in total sales. *Div* is a dummy variable that takes a value of 1 if a firm pays cash dividend, 0 otherwise. *Loss* is a dummy variable equal to 1 if a firm reports loss. *Lev* is the financial leverage of the firm. All continuous variables are winsorized at 1% and 99% levels. Heteroskedasticity consistent t-statistics based on standard errors clustered at firm level are reported in parentheses. ***, **, and * correspond to 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1) *Investment – Under-investors (Treatment)*	(2) *Investment – Under-Investors (Control)*	(3) *Investment – Over Investors (Treatment)*	(4) *Investment – Over Investors (Control)*	(5) *Investment - Under-Investors (DID)*	(6) *Investment - Over-Investors (DID)*
*post * low*	0.0338***	0.0056			0.0036	
	(4.6469)	(0.8291)			(0.55)	
*post * high*			-0.0536***	-0.0203**		-0.0185**
			(-7.1827)	(-2.4413)		(-2.32)
*post * low * treat*					0.0301***	
					(3.0506)	
*post * treat*					-0.0123**	-0.0102*
					(-2.2340)	(-1.8414)
*post * high * treat*						-0.0376***
						(-3.5522)
Joint Significance Test for DID						
*(post * low * treat) + (post * treat)*					0.0178**	
					(2.09)	
*(post * high * treat) + (post *treat)*						-0.0477***
						(-4.73)
Observations	602	551	540	536	1,153	1,076
R-squared	0.275	0.348	0.317	0.356	0.287	0.306
Control Variables	YES	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES	YES
YEAR FE	YES	YES	YES	YES	YES	YES

Table 7: Information Overload and Connectivity

This table presents the results of the following equations:

$$Abret = \beta_0 + \beta_1 conn + \beta_2 mktval + \beta_3 adjROA + \beta_4 mtb + \beta_5 nanalyst + \beta_6 Abret\_EA + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon$$

$$Delay = \beta_0 + \beta_1 conn + \beta_2 lossf + \beta_3 mktval + \beta_4 shturn + \beta_5 shturn + Year\ Fixed\ Effect + Industry\ Fixed\ Effect + \varepsilon$$

Abret is the absolute CAR in the three-day/five-day window around filing date of annual reports. *Post* is a dummy variable that takes a value of 1 for all years after 2010, 0 otherwise. *Conn* is the quality score of connectivity in an integrated report. *Mktval* is the natural log of market value of equity. *AdjROA* is the operating income before R&D and advertising expense scaled by ending total assets. *Mtb* is the market-to-book ratio. Nanalyst is the number of analysts following the firm at the beginning of the fiscal period. *Abret_EA* is the absolute CAR in the three-day/five-day window around the recent most earnings announcements. All continuous variables are winsorized at 1% and 99% levels. Heteroskedasticity consistent *z*-statistics based on standard errors clustered at firm level are reported in parentheses. ***, **, and * correspond to 1%, 5%, and 10% significance levels, respectively.

	(1)	(2)	(3)	(4)
VARIABLES	*CAR [-1,1]*	*CAR [-1,1]*	*Portfolio Delay*	*Portfolio Delay*
conn	0.0515***	0.0383***	-0.0674***	-0.0902***
	(7.5969)	(5.0257)	(-2.9802)	(-3.3280)
Control Variables				
mtb	0.0023***	0.0007		
	(3.9651)	(0.9256)		
mktval	-0.0076***	-0.0037	-0.0019	-0.0034
	(-3.7434)	(-0.4387)	(-0.6403)	(-0.3286)
adjROA	-0.0047	0.0634		
	(-0.0599)	(1.0319)		
nanalyst	0.0009	0.0012		
	(1.1090)	(0.8310)		
abs_EA	-0.0718	0.0343		
	(-0.9648)	(0.4149)		
lossfreq			0.0087	0.0332
			(0.2450)	(0.4904)
shturn			-0.0664***	-0.0573***
			(-5.3909)	(-3.3192)
lnanalyst			-0.0907**	-0.0325
			(-2.4564)	(-0.4975)
Observations	419	354	419	354
R-squared	0.226	0.568	0.176	0.526
INDUSTRY FE	YES	NO	YES	NO
YEAR FE	YES	YES	YES	YES
FIRM FE	NO	YES	NO	YES

Table 8: Investment Efficiency and Connectivity

This table presents the results of the following equation:

$$Inv_{t+1} = \beta_0 + \beta_1 conn * low/high + \beta_2 conn + \beta_3 low/high + \beta_4 logat + \beta_5 mtb + \beta_6 Zscore + \beta_7 tang + \beta_8 CFOsale + \beta_9 div + \beta_{10} loss + \beta_{11} opcycle + \beta_{12} lev + Industry\ FE + Year\ FE + \epsilon$$

Inv_{t+1} is total investment scaled by lagged total assets. *Post* is a dummy variable that takes a value of 1 for all years after 2010, 0 otherwise. *Conn* is the quality score of connectivity in an integrated report. *Low* is a dummy variable that takes a value of 1 for all firms in the bottom quartile of investment in 2009, 0 for two middle quartiles. *High* is a dummy variable that takes a value of 1 for all firms in the top quartile of investment in 2009, 0 for two middle quartiles. *Logat* is the natural log of total assets. *Mtb* is the market-to-book ratio. *Zscore* is the Altman Z-score of bankruptcy. *Tang* is the tangibility measure computed as PP&E scaled by lagged total assets. *CFOsale* is the proportion of cash flows in total sales. *Div* is a dummy variable that takes a value of 1 if a firm pays cash dividend, 0 otherwise. *Loss* is a dummy variable equal to 1 if a firm reports loss. *Opcycle* is the operating cycle of a firm. *Lev* is the financial leverage of the firm. All continuous variables are winsorized at 1% and 99% levels. Heteroskedasticity consistent t-statistics based on standard errors clustered at firm level are reported in parentheses. ***, **, and * correspond to 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1) *Investment – Under-investors*	(2) *Investment – Under-Investors*	(3) *Investment – Over Investors*	(4) *Investment – Over Investors*
*low * conn*	0.0435*** (4.4533)	0.0262** (2.4166)		
*high * conn*			-0.012*** (-4.0456)	-0.0372*** (-3.8655)
low	0.0103 (1.2953)	-		
high			-0.0245 (1.0549)	-
conn	-0.0290*** (-5.8738)	-0.0194*** (-3.3156)	-0.0197*** (-3.7381)	0.0048 (0.9584)
Observations	351	293	323	268
R-squared	0.433	0.754	0.754	0.722
Control Variables	YES	YES	YES	YES
INDUSTRY FE	YES	NO	YES	NO
YEAR FE	YES	YES	YES	YES
FIRM FE	NO	YES	NO	YES

Table 9: Information Overload and Complexity of Organization– Role of IR

This table presents the results of the following equations:

$$Abret = \beta_0 + \beta_1\, Post * complex + \beta_2\, complex + \beta_3 mktval + \beta_4 adjROA + \beta_5 mtb + \beta_6 nanalyst + \beta_7 Abret\_EA + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon$$

$$Delay = \beta_0 + \beta_1\, Post * complex + \beta_2\, complex + \beta_3 lossf + \beta_4 mktval + \beta_5 shturn + \beta_6 shturn + Year\ Fixed\ Effect + Industry\ Fixed\ Effect + \varepsilon$$

	(1)	(2)	(3)	(4)
VARIABLES	*CAR [-1,1]*	*CAR [-1,1]*	*Portfolio Delay*	*Portfolio Delay*
*Post * complex*	0.0280**	0.0874***	-0.3442***	-0.3012***
	(1.9779)	(4.3948)	(-9.8271)	(-5.7970)
complex	-0.0282***	-0.0925***	0.3878***	0.2931***
	(-3.7847)	(-5.1124)	(14.7013)	(6.2558)
post	0.0230**	0.0368***	-0.1064***	-0.1019***
	(2.2717)	(2.9134)	(-6.1567)	(-4.8717)
Control Variables				
mtb	0.0032*	0.0001		
	(1.8713)	(0.0547)		
mktval	-0.0107***	-0.0069	0.0008	0.0074
	(-5.0182)	(-0.7641)	(0.2541)	(0.7587)
adjROA	0.0467	0.0061		
	(0.9306)	(0.1015)		
nanalyst	0.0026	0.0059*		
	(1.2020)	(1.8730)		
abs_EA	0.0340	-0.0629		
	(0.2753)	(-0.4353)		
lossfreq			0.0235	-0.0186
			(0.8698)	(-0.5312)
shturn			-0.0674***	-0.0409***
			(-6.4775)	(-3.0311)
lnanalyst			-0.1306***	-0.0886*
			(-4.3730)	(-1.7654)
Observations	694	644	694	644
R-squared	0.094	0.362	0.329	0.537
INDUSTRY FE	YES	NO	YES	NO
FIRM FE	NO	YES	NO	YES

Abret is the absolute CAR in the three-day/five-day window around filing date of annual reports. *Post* is a dummy variable that takes a value of 1 for all years after 2010, 0 otherwise. *Complex* is a dummy variable that takes a value of 1 if a firm is above median value on both size of the firm and proportion of intangible assets in total assets. *Mktval* is the natural log of market value of equity. *AdjROA* is the operating income before R&D and advertising expense scaled by ending total assets. *Mtb* is the market-to-book ratio. Nanalyst is the number of analysts following the firm at the beginning of the fiscal period. *Abret_EA* is the absolute CAR in the three-day/five-day window around the recent most earnings announcements. All continuous variables are winsorized at 1% and 99% levels. Heteroskedasticity consistent *z*-statistics based on standard errors clustered at firm level are reported in parentheses. ***, **, and * correspond to 1%, 5%, and 10% significance levels, respectively.

Table 10: Investment Efficiency and Complexity of Organization – Role of IR

This table presents the results of the following equation:

$$Inv_{t+1} = \beta_0 + \beta_1 Post * complex * low/high + \beta_2 Post * complex + \beta_3 complex + \beta_4 low/high + \beta_5 Post + \beta_6 Post * low/high + \beta_7 complex * low/high + \beta_8 logat + \beta_9 mtb + \beta_{10} Zscore + \beta_{11} tang + \beta_{12} CFOsale + \beta_{13} div + \beta_{14} loss + \beta_{15} opcycle + \beta_{16} lev + Industry\ FE + Year\ FE + \epsilon$$

Inv_{t+1} is total investment scaled by lagged total assets. *Post* is a dummy variable that takes a value of 1 for all years after 2010, 0 otherwise. *Complex* is a dummy variable that takes a value of 1 if a firm is above median value on both size of the firm and proportion of intangible assets in total assets. *Low* is a dummy variable that takes a value of 1 for all firms in the bottom quartile of investment in 2009, 0 for two middle quartiles. *High* is a dummy variable that takes a value of 1 for all firms in the top quartile of investment in 2009, 0 for two middle quartiles. *Logat* is the natural log of total assets. *Mtb* is the market-to-book ratio. *Zscore* is the Altman Z-score of bankruptcy. *Tang* is the tangibility measure computed as PP&E scaled by lagged total assets. *CFOsale* is the proportion of cash flows in total sales. *Div* is a dummy variable that takes a value of 1 if a firm pays cash dividend, 0 otherwise. *Loss* is a dummy variable equal to 1 if a firm reports loss. *Opcycle* is the operating cycle of a firm. *Lev* is the financial leverage of the firm. All continuous variables are winsorized at 1% and 99% levels. Heteroskedasticity consistent t-statistics based on standard errors clustered at firm level are reported in parentheses. ***, **, and * correspond to 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1) *Investment – Under-investors*	(2) *Investment – Under-Investors*	(3) *Investment – Over Investors*	(4) *Investment – Over Investors*
*post * low * complex*	0.0406**	0.0322**		
	(2.4218)	(2.2461)		
*post * high * complex*			-0.0364**	-0.0408**
			(-2.2953)	(-2.1269)
*post * complex*	0.0047	0.0033	0.0065	0.0057
	(0.4471)	(0.3074)	(0.6445)	(0.5327)
Joint Significance Test				
*(post * low * complex) + (post * complex)*	0.0453***	0.0355***		
	(3.20)	(3.36)		
*(post * high * complex) + (post * complex)*			-0.0299**	-0.0350**
			(-2.41)	(-2.31)
Observations	602	551	540	497
R-squared	0.309	0.710	0.471	0.705
Control Variables	YES	YES	YES	YES
INDUSTRY FE	YES	NO	YES	NO
YEAR FE	YES	YES	YES	YES
FIRM FE	NO	YES	NO	YES