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ENVIRONMENTAL, SOCIAL AND GOVERNANCE DISCLOSURE, INTEGRATED REPORTING, AND THE ACCURACY OF ANALYST FORECASTS

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ABSTRACT

The International Integrated Reporting Council advocates that integrated reporting (IR) should become the worldwide norm for corporate reporting aimed at serving the needs of investors. Nonetheless, only in South Africa has IR been mandated. We study the impact of the reporting regime change in South Africa on analyst forecast accuracy over the period 2008 to 2012, as a way of evaluating users' perceptions of the usefulness of IR. We theorise that any effects of IR will be greater the greater is the level of disclosures of environmental, social and governance performance. We find results consistent with those who support IR and our theory that the level of environmental, social and governance disclosures is a mediating variable in determining the effectiveness of IR. The results are driven by the levels of environmental disclosure and, to a lesser extent, governance disclosure. Our results provide some support for those who advocate the virtues of integrated reporting.

Key words: integrated reporting; environmental, social and governance disclosures; analyst forecasts

1 INTRODUCTION

The idea that corporations have responsibilities to not only their shareholders but also to society overall has been around for centuries (Carroll and Shabana, 2010). In this context, a criticism of financial reporting is that it does not adequately satisfy the informational needs of all stakeholders who wish to assess a company's past and future performance. This is because it only provides a partial account of business activities, ignoring the social and environmental impact made by an entity (Flower, 2015). As a consequence, there have been calls for enhanced reporting on corporate social responsibility (CSR), as well as for any additional information that can potentially impact on business performance. Subsequently, the number of companies disclosing their initiatives and performance with respect to environmental and social activities has grown. The preferred format for such disclosures has typically been a stand-alone report.[1]

A concern with stand-alone reports related to environmental and social activities is that they provide non-financial information which is non-integrated and compartmentalised. Therefore, they are not capable of providing stakeholders with the required links and connections that are fundamental to effectively evaluating business performance, strategy and potential for future value creation (Wild and van Staden, 2013, p.6). Integrated Reporting (IR) is seen as a response to this criticism. The International Integrated Reporting Council (IIRC) states that the purpose of IR is to provide '... information about an organisation's strategy, governance, performance and prospects in a way that reflects the commercial, social and environmental context within which it operates' (IIRC, 2011, p.2). The IIRC has

[1] We use the term 'stand-alone report' to describe a number of differently titled reports. These titles include 'Sustainability Report', 'Corporate Social Responsibility Report', 'Sustainable Development Report' and 'Triple Bottom Line Report'. The common characteristic of these reports is a focus on the environment and/or society.

established a network of companies experimenting with IR. Further, the IIRC advocates that IR should become the worldwide norm for corporate reporting to investors.

Research on the usefulness of IR is relatively sparse and impeded by two factors. First, only in South Africa has IR been mandated, with South African listed firms with financial years ending after February 28, 2011 required to publish an integrated report on an 'apply or explain' basis. As a consequence, the study of IR in other jurisdictions involves firms that adopt IR voluntarily. Second, as Pope and McLeay (2011) point out, the study of firms that voluntarily adopt particular reporting practices does not necessarily produce results that are generalisable to all companies. This is because the firms studied could have reason to adopt the practices other than for reasons of good citizenship and a belief in transparency. Consequently, adopting firms might be different from non-adopting firms in ways that bias the results of tests of usefulness. Second, the number of firms voluntarily adopting IR around the world is relatively small.

Given these arguments, studying South African firms has interest. Our analysis investigates South African firms covering the period 2008-2012. Therefore, we cover firms which are mandated to implement IR on an 'apply or explain' basis in the later part of the period investigated. We study the impact of the reporting regime change on analyst forecast accuracy as a way of evaluating investors' perceptions of the usefulness of IR. In particular, we study whether the implementation of IR in South Africa is associated with a change in the relationship between levels of environmental, social and governance (ESG) disclosures and analyst forecast accuracy, consistent with IR providing useful information to financial report users.

Three key assumptions underpin our research approach. First, we assume that a link between ESG-related *disclosures* and analyst forecast accuracy will only exist if there is a link between ESG *performance* and future financial performance for South African listed companies.[2] This appears to be an argument with which the promoters of IR in South Africa agree, and is crucial in attempting to make any case for IR providing useful information about the financial implications of ESG performance to capital markets users. The second assumption is that, if the claims of supporters of IR are valid, and that linking ESG performance with future financial performance through an integrated report provides stakeholders with an improved understanding of the firm and its future, we expect analyst forecast accuracy to improve after the implementation of IR.[3] The third assumption is that any effects of IR will be greater the greater is the level of ESG disclosures. Therefore, an implied assumption is that ESG is a mediating variable in determining the effectiveness of IR. Put another way, the integrated reports of firms which do not disclose much on ESG performance are unlikely to enhance the understanding of the linkages between ESG performance and financial performance, or provide a holistic view of the firms activities, much differently from conventional financial statements. Under these circumstances, we would not expect to see much change in forecast accuracy for such firms.

We note, however, that there were no well accepted guidelines on what constitutes an integrated report in South Africa for the period we study, with the exception of a brief Discussion Paper entitled 'Framework for Integrated Reporting and the Integrated Report'

[2] Any links are likely to be complex. For example, they might relate to factors affecting revenue streams, such as the degree of consumer activism faced by the firm, its competitive position, and the markets served. They might also relate to its cost structure, including regulatory interventions, clean-up costs associated with pollution and other environmental damage, and labour market outcomes.

[3] If it is argued that the low take-up of integrated reporting on a voluntary basis around the world referred to above reflects firms rationally choosing the optimal forms of disclosure, whether mandated or not, with regards to the informational needs of stock market participants, then we would not expect to see the mandating of IR having any positive effect on analyst forecast accuracy.

issued in early 2011 by the Integrated Reporting Committee (IRC) of South Africa. How effective the implementation of IR is in South Africa is an empirical question, therefore. This also implies that tests on the usefulness of IR in South Africa are joint tests of the usefulness of the underlying concept of IR and the effectiveness of the application of the concept.[4]

Our work can be related to two prior papers which either challenge the assumptions underlying our work, or complement our study. The results and theorising in Dhaliwal, Radhakrishnan, Tsang and Yang (2012) challenge the assumptions underlying our research. As part of an international study, they provide results on whether publishing a standalone CSR report improves analyst forecast accuracy in South Africa. They investigate an earlier period than we do (i.e., prior to the mandating of IR in South Africa).

A crucial part of their argument is that a link between ESG performance and future financial performance is only likely to be found for firms in stakeholder–oriented, not shareholder-oriented, economies. Dhaliwal *et al*. (2012) identify South Africa as a shareholder-oriented economy and, hence, do not expect the publication of a standalone CSR report to improve analyst forecast accuracy in South Africa.

[4] South Africa later adopted the more detailed IIRC IR guidelines issued in 2013 (IIRC, 2013). The IIRC guidelines adopt a shareholder focus, a focus that is subject to debate in academic circles (see Adams, 2015; Flower, 2015; Thomson, 2015). Therefore, the period we study is one where firms were not expected to adopt an explicit investor focus in preparing integrated reports. If this implies that the integrated reports are less useful to analysts, our tests are less likely to find any impact of IR on the relationship between ESG disclosure levels and analyst forecast accuracy. If we do find results suggesting that there is an impact, such results provide evidence that an investor focus in IR is not necessary for the resulting integrated reports to be relevant to investors. Further, these guidelines suggest that firms should concentrate on *material* links between aspects of ESG and financial performance in their integrated reports. This suggestion is consistent with the idea that underlying business models differ across firms and that firms have different key aspects of ESG performance that they need to manage. As a consequence, it is not clear which, if any, aspects of ESG disclosures will be linked to forecast accuracy. Therefore, we investigate the links between three different components of ESG disclosures (environmental, social, and governance) and forecast accuracy.

Consistent with their argument, they find no association between the existence of a standalone CSR report and analyst forecast accuracy in South Africa. More generally, they find that a relationship between the publication of a standalone CSR report and improved forecast accuracy is found more in stakeholder-oriented countries. As a consequence, and notwithstanding the views of the promoters of IR in South Africa and elsewhere, it is not clear whether the assumption of a link between ESG performance and future financial performance is justified and, therefore, it is also not clear that IR will improve analyst forecast accuracy in South Africa.

Two points can be made here. First, Dhaliwal *et al*. (2012) do not evaluate the *quality* of the standalone CSR reports in South Africa, or in any of the countries they study, merely their existence. Therefore, one explanation of their results that cannot be ruled out is that the quality of the CSR standalone reports in South Africa in communicating relevant information to capital markets was poor over the period they study and, as a consequence, it is this that explains their results, not any shareholder orientation of the South African economy. Second, it is possible that, although the South African economy during their study period *was* primarily shareholder-oriented, the various South African King reports have produced a move towards a more stakeholder-oriented economy.[5] If such is the case, it is not clear that results from periods prior to the one studied here will generalise to subsequent periods.

In complementary work, Zhou, Simnett and Green (forthcoming) study the degree of integration of the financial reports of South African firms and its effect on analyst forecast accuracy. Using a sample of South African firm-years from 2009 to 2012, they first develop a measure which captures the extent to which the firms' reports are integrated in line with the

[5] See, for example, Angelopoulos, Parnell and Scott (2013) and Muswaka (2013) for discussions of this possibility.

IIRC framework for IR (IIRC, 2013). They find evidence suggesting that the higher the degree of integration of the reports, the better the accuracy of analyst forecast errors, consistent with the idea of integrated reporting providing useful information to capital market participants.[6]

Our work differs from theirs in the following key respects.[7] Whereas they study the effects of the *degree* of integration of reports across their whole study period, irrespective of whether IR is or is not mandated, they do not explicitly study the effects of the *level* of disclosure of any underlying ESG material. Essentially, they study whether the IIRC framework is effective in defining the characteristics of good integrated reporting, applied to the South African context. In contrast, we focus on the disclosure levels of the base ESG material that arguably provides some of the input of non-financial information that needs to be integrated *via* IR. Then, we consider how the relationship between ESG disclosure levels and analyst forecast accuracy changes with the *mandating* of IR. This approach also allows us to look at separate aspects of ESG disclosure and how their relationships with forecast accuracy change with the mandating of IR. Nonetheless, we do not focus explicitly on the differing degrees of effectiveness across firms in integrating ESG and other non-financial information.[8]

Our main contribution, therefore, is to investigate the impact of the mandating of IR in South Africa on analyst forecast accuracy, using the level of ESG disclosures as a mediating variable in identifying any impact. Secondary contributions of the study are, first, to revisit

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6 They also study analyst forecast dispersion and the cost of capital as capital market outcomes that could be affected by IR. They find some evidence that the degree to which reports are integrated according to their measure is associated with reductions in the cost of capital, at least for some firms (those with smaller analyst followings).

7 Our study also differs from theirs in a number of research design choices. These differences are arguably second-order compared to the differences identified in the main text.

8 Other studies of IR and capital market outcomes in South Africa include Barth, Cahan, Chen and Venter (2015) and Lee and Yeo (2015). These papers are discussed in the next section of the paper.

the link between ESG disclosure levels and analyst forecast accuracy and, within this context, to introduce a more nuanced view of the quality of CSR disclosures, at least in a South African setting.

We use a balanced panel research design as our primary methodology. The balanced panel includes forty-one firms from eight sectors (consumer discretionary; consumer staples; communications; energy; financial services; health care; industrials; materials) for the period 2008 to 2012.[9] Bloomberg ESG disclosure scores are used to capture the level of disclosures. Controlling for firm and time fixed effects and other control variables, our key result is that the relationship between overall ESG disclosure scores and analyst forecast accuracy significantly strengthens once the IR regime is introduced. This result is consistent with IR providing useful information to analysts and investors in general (there tends to be little or no relationship before IR, and a relationship after the introduction of IR). It is primarily driven by the environmental disclosure component of the ESG disclosure score. There is also some evidence of links between the level of governance disclosures and analyst forecast accuracy, but the evidence is not as strong as for environmental disclosure levels. We delve further into our results, by splitting up the sample into financial services firms and the firms from the other seven sectors grouped together. For financial services firms, we find little evidence of relationships between the level of any aspect of ESG disclosure and forecast accuracy, either

[9] We use a small sample by the standards of capital markets research in accounting. Nonetheless, precedent exists for the use of small samples when the question is deemed interesting enough. For example, Leuz and Verrechia (2000) study a sample of 102 German Dax firm-years in considering the impact on measures of information asymmetry of German firms switching from German GAAP to some form of international accounting standards (US GAAP or IAS). Also, Leuz (2003) uses two small samples, one of 69 and the other of 195 German Neue Markt firm-years, to study the relative impacts of US GAAP and IAS on measures of information asymmetry. The research settings used in these two analyses were unique in providing a good site to study interesting research questions. We believe that South Africa provides such a unique site for the initial study of the impact of mandating IR, which we regard as a similarly interesting research question. We should also emphasise that our statistical tests have plenty of degrees of freedom available.

existing in, or changing between, the pre- and post-IR periods. The results for the firms from the other seven sectors grouped together are similar to the results for the whole sample.

The use of firm and time fixed effects is a crucial aspect of our research design in that our results largely disappear or, at the least, substantially weaken in the absence of either, or the presence of less finely granulated firm effects such as sector fixed effects. The use of an unbalanced panel of 310 firm-years produces similar results to the balanced panel, other than that the results also provide evidence that there is a strengthening of the relationships between overall ESG, environmental and governance disclosure levels and analyst forecast accuracy for financial services firms as well.

Overall, we find some results consistent with those who support IR, and our theory that the level of ESG disclosures is a mediating variable in determining the effectiveness of IR in the particular capital market context we study. This outcome is found despite the lack of clear guidance to South African companies concerning the preparation of the early versions of integrated reports. Our results also provide support for the idea that specific aspects of ESG performance could be more important than others for some sets of firms in understanding future performance.

The rest of the paper is organised as follows. The next section provides relevant background, prior literature, and the development of our main hypotheses. Section 3 introduces the methodology underlying our tests. Section 4 provides variable descriptions, data sources, and details of our sample. Section 5 provides the results of our tests. Section 6 discusses additional tests performed to investigate the robustness of our results to changes in the research approaches adopted for our main tests. Finally, Section 7 provides a summary of

our paper, the overall conclusions to be drawn from our work, a discussion of its limitations, and suggestions for further research.

2 RELEVANT PRIOR LITERATURE AND HYPOTHESIS DEVELOPMENT

2.1 Relevant Prior Literature

In this section, for reasons of space, we concentrate on work that is directly relevant to this study, as opposed to providing a background of the development of IR and a description of previous work on IR. Two recent papers that provide the necessary background information and that review the IR literature, although with different rules for the incorporation of studies to be included in the review, are Velte and Stawinoga (2016) and Dumay, Bernardi, Guthrie and Demartini (2016). We focus on papers that relate integrated reporting to capital market outcomes.

In this context, two recent papers can be interpreted as investigating the effectiveness of the IIRC's framework for the desirable characteristics of an integrated report in a South African context. Both studies use data from before and after the date of implementation of IR in South Africa, and develop measures of the degree of integration of financial statements. Lee *et al*. (2015) investigate the relationship between the degree of integration and market value, with the extent of organisational complexity and the need to raise external financing as mediating variables. Using estimates of Tobin's Q as a measure of market value, they find evidence of a relationship between the degree of integration and market value and that, further, the relationship is stronger for firms with higher degrees of organisational complexity and with higher external financing needs. They also find a positive association between the

degree of integration and future performance and that the degree of integration could be mis-priced. Zhou *et al*. (forthcoming) study whether the degree to which South African financial reports are integrated affects analyst forecast accuracy, forecast dispersion, and the cost of capital. They find that the higher the degree of integration, the higher is the degree of forecast accuracy and the lower is the cost of capital, the latter especially for firms with small analyst followings. Nonetheless, the *foci* of these studies are neither the impact of the mandating of IR in South Africa nor the role of ESG disclosure levels as a mediating variable in investigating the impact of mandating IR.

Barth *et al*. (2015) look at the relationship between IR and stock liquidity and market value in South Africa. They find that IR improves stock liquidity and is associated with higher values of Tobin's Q. Unlike Lee *et al*. (2015), they do not use organisational complexity and the need for external financing as mediating variables in the relationship between IR and market value. Like them, however, the effect of IR on Tobin's Q is then attributed mainly to a future cash flow effect, as opposed to a cost of capital effect (in apparent contrast to Zhou *et al*., forthcoming, who find cost of capital effects, especially for firms with small analyst followings). They suggest that this effect is a result of market participants either having a better understanding of the firm's future cash flow generating capacity or that future cash flow expectations are higher as a result of expected improvements in internal decision-making by managers. Again, and unlike us, Barth *et al.* (2015) do not explicitly study the level of ESG disclosure (or its components) as mediating variables for the relationship between IR and their capital market outcomes.

2.2 Development of Hypotheses

Given that IR does not *directly* affect the properties of accounting numbers, but does potentially affect the information set available *via* which the information content of accounting numbers is interpreted, we focus on the properties of analyst forecasts. In particular, we argue that, if IR in South Africa provides useful information to investors, by linking ESG and future financial performance, analyst forecast accuracy should improve subsequent to the start of the IR regime.

Evidence from Bloomberg ESG disclosure scores for South Africa suggests that the quality of ESG reporting varies across firms. *A priori*, it seems unlikely that IR will provide much benefit to users and, specifically, analysts if there is little ESG disclosure to help link ESG performance to future financial performance. Therefore, we argue that IR will improve the forecasting relevance of disclosures concerning ESG performance for analysts and, further, the higher the disclosure levels of ESG performance, the larger will be the improvement. Also, if the arguments of proponents of IR are correct – that, in the absence of IR, ESG disclosures will have limited impact on capital markets because the links to financial performance are not understood – we expect to observe less of a, or indeed no, relationship between ESG disclosure levels and analyst forecast accuracy prior to the IR regime.

Therefore, our formal hypothesis for the pre-IR regime period, in null and alternative form, is as follows:

H_{1N} Prior to the IR regime, ESG disclosure levels have no association with analyst forecast accuracy; and

H_{1A} Prior to the IR regime, increased levels of ESG disclosure improve analyst forecast accuracy.

For the IR regime period, our second hypothesis, in null and alternative form, is as follows:

H_{2N} During the IR regime, ESG disclosure levels have no association with analyst forecast accuracy; and

H_{2A} During IR regime, increased levels of ESG disclosure improve analyst forecast accuracy.

For differences between the pre-and post-IR regime periods, our third, and *main*, hypothesis, in null and alternative form, is as follows:

H_{3N} There is no difference in the extent to which increasing ESG disclosure levels improves analyst forecast accuracy before and after the IR regime; and

H_{3A} There is an increase in the extent to which increasing ESG disclosure levels improves analyst forecast accuracy after the IR regime.

3 METHODOLOGY

We adopt a regression approach to testing our hypotheses. Within that general approach, we adopt a balanced panel strategy. We do so for a number of reasons. Pope *et al*. (2011) argue that the experimental design necessary to pin down the impact of an accounting regime change can be difficult because, along with the regime change, firm and economic characteristics that might affect some outcome variable (in our case, analyst forecast

accuracy) also change over time. As a consequence, the observation of a change in an outcome variable (in our study, the relationship between the level of ESG disclosure and analyst forecast accuracy) over time could be associated with the regime change, or changes in relevant firm and economic characteristics, or both. Disentangling the impact of one possible cause from the others is, therefore, problematic.

In this context, Pope *et al*. (2011) suggest that a balanced panel approach has some advantages because each firm observation prior to the regime change acts as a control for itself. If it can be assumed that relevant firm characteristics, and their impact on the outcome variable, do not change over time, the inclusion of firm fixed effects in the model can control for these effects (e.g., how difficult it is to forecast the firm's earnings per share). Further, if there are time effects that are constant across firms in their impact on the outcome variable, they can be controlled for *via* the introduction of time fixed effects.[10]

We adopt the approach of introducing firm and time fixed effects as a partial solution to controlling for the effects of firm and economic characteristics that change over time and affect analyst forecast accuracy. Given the implicit assumptions underlying the use of fixed effects, we also control for seven specific variables that have been found to affect analyst forecast accuracy in other studies – firm size, the size of analyst following, leverage, return on assets, the sign of earnings, the book-to-market ratio, and lagged accuracy (as in, for example, Glaum, Baetge, Grothe and Oberdörster, 2013; Preiato, Brown and Tarca, 2015).

We investigate the impact of the introduction of an IR regime in South Africa on forecast accuracy by first defining the following variables:

[10] Zhou *et al*. (forthcoming) find that their measure of the degree of integration of reporting generally increases over their sample period from 2009 to 2012. If their measure is an omitted variable from our regressions, time dummies will at least help capture some of the average effects of this variable.

$Accuracy_{ij+1}$ = a measure of analyst forecast accuracy for firm *i* for year *j* (*j = 1* to *t*, where *t* is the number of calendar years containing financial year-ends in the sample);

F_i = a firm fixed effect which takes the value of one for any firm-year for firm *i* (*i = 1* to *n*, where *n* is the number of firms in the sample); zero otherwise;

T_j = a time fixed effect which takes the value of one for any firm-year with a financial year-end in calendar year *j*; zero otherwise;

C_{ikj} = control variable *k* (*k* = 1 to *m*) for firm *i* for year *j*; and

ESG_{ij} = the overall environmental, social and governance disclosure score for firm *i* for year *j*;

Then, we estimate the following equation on a balanced panel of South African firms:

$$Accuracy_{ij+1} = \sum_{i=1}^{n} F_i + \sum_{j=1}^{t} T_j + \alpha_1 ESG_{ij} + \sum_{k=1}^{m} \delta_k C_{ikj} + \varepsilon_{ij} \quad (1)$$

Subsequently, we create two variables, *PreESG* and *PostESG*. The two variables effectively decompose *ESG* into two components. One takes the value of *ESG* during the period prior to the IR regime starting, and zero otherwise (*PreESG*). The other takes the value of *ESG* during the period after the IR regime starts, and zero otherwise (*PostESG*). Hence, we define *PreESG* and *PostESG* by the following equations:

$$\Pr eESG_{ij} = (1 - IRRD).ESG_{ij} \quad (2)$$

and

$$PostESG_{ij} = IRRD.ESG_{ij} \quad (3)$$

where:

IRRD = 1 for any firm-year *t* with a financial year-end subsequent to March 2011; 0 otherwise.

We then estimate the following equation:

$$Accuracy_{ij+1} = \sum_{i=1}^{n} F_i + \sum_{j=1}^{t} T_j + \alpha_{11} \Pr eESG_{ij} + \alpha_{12} PostESG_{ij} + \sum_{k=1}^{m} \delta_k C_{ikj} + \varepsilon_{ij} \quad (4)$$

We estimate equation (1) to allow us to see whether there is an average effect on forecast accuracy associated with environmental, social and governance disclosure levels across the period studied. This effect is captured by the coefficient of *ESG*, α_1. Equation (4) allows us to identify the effects before and after the IR regime is introduced. More specifically, α_{11} captures the relationship between ESG disclosure levels and forecasting accuracy in the period prior to the introduction of IR and α_{12} captures the relationship between ESG disclosure levels and forecasting accuracy in the period subsequent to the introduction of IR. The coefficients α_{11} and α_{12} allow us to test hypotheses 1 and 2 respectively and the difference between them allows the testing of hypothesis 3.

Having estimated equations (1) and (4) using *ESG*, the *overall* ESG disclosure score, we re-estimate the equations with the environmental disclosure score (*ED*), social disclosure score (*SD*) and governance disclosure score (*GD*) substituted for *ESG*, together with the appropriately defined *Pre* and *Post* versions of the variables, in order to see if any particular component of ESG disclosure has a different relationship with forecast accuracy than other components. In this regard, we first estimate (giving the most comprehensive models estimated):

$$Accuracy_{ij+1} = \sum_{i=1}^{n} F_i + \sum_{j=1}^{t} T_j + \sum_{l=1}^{3} \alpha_1^l ESG_{ilj} + \sum_{k=1}^{m} \delta_k C_{ikj} + \varepsilon_{ij} \quad (5)$$

and then:

$$Accuracy_{ij+1} = \sum_{i=1}^{n} F_i + \sum_{j=1}^{t} T_j + \sum_{l=1}^{3} \alpha_{11}^l \Pr eESG_{ilj} + \sum_{l=1}^{3} \alpha_{12}^l PostESG_{ilj} + \sum_{k=1}^{m} \delta_k C_{ikj} + \varepsilon_{ij} \quad (6)$$

where ESG_{ilj} represents the l'th component (*ED*, *SD* and *GD*) of the overall ESG disclosure score for firm i for year j.

We define analyst forecast accuracy in two ways and denote the measures by *Acc1* and *Acc2* respectively. In mathematical terms, the measures of forecast accuracy are defined as follows:

$$Acc1 = \log\left[\frac{|AEPS - MedFEPS|}{MVPS}\right] \tag{7}$$

and

$$Acc2 = \log\left[\frac{|AEPS - MedFEPS|}{|AEPS|}\right] \tag{8}$$

where:

AEPS = the actual earnings *per* share corresponding to the median consensus one year-ahead forecast of earnings *per* share;

MedFEPS = the first median consensus analyst forecast of one year-ahead earnings *per* share produced after the financial year-end; and

MVPS = the market price *per* share of the firm at the financial year-end prior to the date of the consensus analyst forecast.

A property of both our measures of accuracy is that a *lower* value for the accuracy measures denotes a *higher* degree of forecast accuracy.[11] Therefore, if increasing ESG disclosure

[11] We use log measures of forecast accuracy to avoid having measures that are naturally truncated at zero, leading to possible specification problems for the estimated standard errors in our regressions, and attendant difficulties of economic interpretation of the estimated coefficients from our regressions. Inherently, the relationship between forecasting accuracy and the various explanatory variables must be non-linear. We posit no particular functional form for the relationship and, hence, taking the log of

levels increases forecast accuracy, whether in the whole period or in either of the sub-periods, we will see a *negative* value for α_1, or α_{11}, or α_{12}. When separately considering the component scores of ESG disclosure, if increasing ESG component disclosure levels increases forecast accuracy, whether in the whole period or in either of the sub-periods, we will see a *negative* value for α_1^l, or α_{11}^l, or α_{12}^l. If IR has the effect of strengthening any relationship between ESG disclosure levels, or its components, and analyst forecast accuracy, we expect to see $\alpha_{11} > \alpha_{12}$, or $\alpha_{11}^l > \alpha_{12}^l$.

We estimate the coefficients in equations (1), (4), (5) and (6) using the 'within' estimator to deal with the firm fixed effects, and estimate coefficient standard errors using firm clustering. The *p*-values that we report for the coefficients of our experimental variables in these equations reflect one-tailed tests, because our hypotheses specify a directional alternative hypothesis – as implied above, only *negative* values of the coefficients cause us to reject the null hypothesis in favour of the alternative hypothesis. The same applies to the F-tests of the differences between the coefficients of the *PreESG* (*PreED*, *PreSD*, *PreGD*) and *PostESG* (*PostED*, *PostSD*, *PostGD*) variables - only positive values of these differences cause us to reject the null hypothesis in favour of the alternative hypothesis. The *p*-values for the coefficients of all the control variables reflect two-tailed tests.

We should emphasise, at this stage, that any conclusions that we draw from estimating these equations and, in particular, the estimates of the coefficients of the various ESG variables, are conditional upon accepting that our strategy of controlling for other factors that might affect

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forecast accuracy is just one way of implementing a non-linear relationship. As a consequence of taking the log of forecast accuracy, for both measures, the numerator of the fraction of which we take the natural log can be zero if the consensus forecast is correct. It is not possible to take the log of zero. In such circumstances, we set the fraction equal to an arbitrary low number. In our case, the number is .00001.

analyst forecast accuracy by a combination of firm and time fixed effects and the seven firm-specific control variables, adequately rules out alternative explanations of our results.

Nonetheless, we can make one point on this issue here. Our research design does not rely on a simple assertion that the IR regime change has a blanket impact on forecast accuracy, leading to some of the 'identification' problems discussed above. Instead, it suggests that the IR regime, if successful, alters any relationship between ESG disclosure levels and forecast accuracy. As a consequence, to argue that some omitted variable explains away our results relies upon the existence of different correlations between that variable and ESG disclosure scores in the pre- and post-IR periods.[12]

Finally, Pope *et al*. (2011, p.246) argue that the '... challenge to researchers is ... to find ways of more directly associating market outcomes with ... reporting, for example, by developing evidence showing that market outcomes are stronger for benchmark firms where the ... reporting regime change has had most impact'. We would argue that our research design responds to the *spirit* of their challenge in the South African context of IR. It does so by relating the impact of the introduction of the IR regime in South Africa, a regime that intends to enhance narrative disclosures relating ESG and financial performance, to the underlying level of ESG disclosures.

[12] There is a possibility that another regulatory change could have occurred at the same time as the mandating of IR, the predicted effect of which is similar to that hypothesised for IR. We can find no obvious regulatory change in South Africa that matches this description. It is the case that the Companies Act of 2008, despite being passed in 2009, then entered into a prolonged period of redrafting and only came into force (with some exceptions) in May, 2011. It is not clear why, however, it would act to affect analyst forecast accuracy through the medium of ESG disclosures.

4 VARIABLE DEFINITIONS, DATA SOURCES, AND SAMPLE DESCRIPTIONS

We generate our data from three data sources – Bloomberg, IBES and Compustat Global. We use Bloomberg for ESG disclosure scores. Qui, Shaukat and Tharyan (2016) use these scores in a recent study of UK environmental and social disclosures, and Ioannou and Serafeim (2014) also use them in studying the effects of mandating ESG disclosure in China, Denmark, Malaysia, and South Africa. Descriptions of how Bloomberg create the scores can be found in both papers.

From IBES, we generate our forecast variables. In particular, we use the database to generate observations on the first median consensus one year-ahead earnings *per* share forecast subsequent to a financial year-end (*MedFEPS*), the number of analysts used by IBES in generating the consensus forecast (*NoA* – as a proxy for the number of analysts following the firm), the actual earnings *per* share figure subject to the forecast (*AEPS*), and the price *per* share at the financial year-end prior to the forecast date (*MVPS*). We also use IBES to identify the number of shares outstanding at the financial year-end, which we multiply by *MVPS* to create the market capitalisation at the financial year-end prior to the forecast date. We take the log of this product to create *Log MV*, our measure of firm size.

We generate accounting variables from Compustat Global. In particular, we generate data for total assets (TA), total liabilities (TL) and net income (NI). We then generate the following control variables: (i) leverage (*Lev*) as the ratio of TL to TA; (ii) return on assets (*RoA*) as the ratio of NI to TA; (iii) a loss dummy (*Loss*) equal to one if *RoA* is negative; zero otherwise; and (iv) the book-to-market ratio (*BM*) as the ratio of the difference between TA and TL to

the market value of the firm (estimated using IBES data on the price *per* share and the number of shares outstanding).

From these data sources we then construct a balanced panel for the financial years 2008 to 2012 (with, as a consequence, consensus analyst forecasts for the years 2009 to 2013), after imposing further restrictions. We start our sample period at 2008 because the number of firms with ESG disclosure scores is much lower in 2007 than 2008.[13] We require firms to: (i) have the necessary accounting, ESG, IBES forecast and price data; (ii) have consistent financial year-ends for 2008 to 2012;[14] (iii) have their primary listing on the Johannesburg Stock Exchange (JSE);[15] and (iv) report in South African Rands.

Our final sample consists of 41 firms with 5 years of consecutive observations, giving 205 firm-year observations. The number of firms listed on the JSE is much larger than 41. The main reason we lose firm-years is because of a lack of availability of Bloomberg ESG data – only 68 firms have available ESG data for the full five years. We then lose a further nine firms which do not have their primary listing on the JSE; another four because of changing financial year-ends during the period; and an additional five because they do not report in South African Rands. This leaves us with forty-eight remaining firms, and we lose seven more because of missing accounting and/or analyst forecast data.

The firms in our sample cover a wide range of sectors (consumer discretionary; consumer staples; communications; energy; financial services; health care; industrials; materials).

[13] Dhaliwal *et al*. (2012) find 37 South African firms who issue standalone CSR reports at some time between 1994 and 2007, with 174 firm-years with reports. They compare these firm-years with 877 firm-years that do not feature standalone CSR reports. Perhaps coincidentally, Bloomberg have ESG scores for just 37 firms in 2007.

[14] This restriction ensures that all forecasts relate to the same length of reporting period.

[15] Firms whose primary listing is not on the JSE are not expected to produce integrated reports (see Solomon and Maroun, 2012, p.9, fn.2).

Although mining companies are an important part of the South African economy, they do not dominate our sample. Of the 41 firms, six are subsidiaries of non-South African multinational firms and one is a subsidiary of another listed South African firm.[16] Further, many of the firms have their shares traded outside of South Africa, in addition to their main listing on the JSE. Ten of these firms are also traded on the Namibian Stock Exchange. Many companies have American Depositary Receipts (ADRs) traded in the US. Nonetheless, only one firm has a Level 2 ADR, implying a need to conform to elements of Securities and Exchange Commission (SEC) disclosure regulations. Level 2 ADRs are traded on one of the US stock exchanges, but do not allow a firm to raise capital in the US. The firms with Level 1 ADRs are traded over-the-counter and do not have to conform to SEC disclosure regulations. Further, many of the ADRs are unsponsored, implying that the firm has not deliberately sought to make their shares available for purchase in the US. One firm has a listing on the London Stock Exchange.

Given our sample contains financial services firms, and because it is accepted that ratios involving accounting variables are likely to have different characteristics for financial services firms relative to those in other sectors, we split *Lev*, *RoA* and *BM* into two components, one representing the value of that variable when the firm is a financial services firm and zero otherwise (*Lev-FS*, *RoA-FS*, *BM-FS*), the other representing the value of that variable when the firm does not belong to the financial services sector and zero otherwise (*Lev-NFS*, *RoA-NFS*, *BM-NFS*). Table 1 provides descriptive statistics for our variables for the two sets of firms.[17]

[16] Casual comparisons suggest that the sample contains the larger South African domiciled firms listed on the JSE.

[17] No financial services firms have losses in the financial years ending in 2008-2012. As a consequence, we provide no statistics for that variable for financial services firms.

Insert Table 1

Table 2 provides details of the correlations between the independent and dependent variables for both sets of firms.

Insert Table 2

The correlations in Table 2 suggest that the two measures of forecast accuracy, *Acc1* and *Acc2*, are highly correlated. The components of ESG are significantly and positively correlated, more so for financial services firms, but not to such an extent likely to cause multi-collinearity problems if they are included in the same regressions. Neither *ESG*, nor its components, are significantly correlated at the 5% level with either accuracy measure, other than for *ESG* and *Acc2* for financial services firms, where the correlation is negative. The ESG scores, and the component scores, are significantly correlated with a number of the control variables, especially for financial services firms. Again, these correlations are not of a size likely to cause multi-collinearity problems if the variables are included in the same regression.[18]

As a final description of our sample, we look at the way in which *ESG* scores (and, separately, its components: *ED*, *SD*, *GD*) have evolved over time, given the South African

[18] We estimate variance inflation factors (VIFs) for the independent variables (not including the fixed effect dummy variables) for the various versions of equation (1) that we estimate. The VIFs are all less than 10, a conventional benchmark for judging whether there are significant multi-collinearity problems (if VIFs are over 10, a significant problem is possible). When we estimate the various versions of equation (4), fairly high correlations exist between the *Pre-* and *Post-* variables (higher for *GD* than for *SD* than for *ED*). Nonetheless, even in the presence of multi-collinearity, coefficient estimates remain unbiased. t-tests for the significance of individual coefficients might be biased towards not rejecting the null hypothesis, however. Hence, these correlations *might* cause problems with tests of the first and second hypotheses, but we do not believe they cause problems with the testing of our main hypothesis, the third hypothesis.

mandated requirement for sustainability reporting for financial year-ends ending in 2010 onwards (Ioannou *et al*., 2014) and subsequently for integrated reporting for financial year-ends ending in March 2011 onwards. We do so because the mechanism *via* which IR is hypothesised to affect forecast accuracy is through *ESG* (*ED*, *SD*, *GD*). As a consequence, we would like to identify, specifically, whether the introduction of IR had any incremental impact on *ESG* (*ED*, *SD*, *GD*). To this end, we first estimate:

$$ESG_{ij} = \lambda_0 + \lambda_1 ESRD + \lambda_2 IRRD + \varepsilon_{ij} \tag{9}$$

where *ESRD* is a dummy variable equal to 1 for a firm-year observation with a financial year-end of 2010 onwards, and zero otherwise. On the assumption that these changes in disclosure regimes produce a once-and-for-all effect on ESG disclosure scores, we interpret λ_1 as the impact of the sustainability reporting (ES) regime and λ_2 as the *incremental* impact of the IR regime *relative* to the ES regime.

Second, we estimate:

$$ESG_{ij} = \lambda_0 + \lambda_1 ESRD + \lambda_2 IRRD + \sum_{k=1}^{m} \lambda_{3k} C_{ikj} + \varepsilon_{ij} \tag{10}$$

(and for *ED*, *SD* and *GD* separately as dependent variables) in which we also include the control variables we use in our equations investigating forecast accuracy, alongside regime change effects. We do so: (i) because we wish to investigate the impact of variables, some of which partially capture the level of disclosure in other jurisdictions, in order to further check on the regime change effects; and (ii) in order to identify the (partial) associations of our control variables with the disclosure scores, given we will include them all in our regressions where a measure of forecast accuracy is the dependent variable.

The results of estimating equations (9) and (10) are reported in Table 3.

Insert Table 3

When only *ESRD* and *IRRD* are considered, the results suggest that the introduction of the ES regime in 2010 has statistically significant and positive impacts on *ESG*, *ED* and *GD*. The estimates of the impacts on *SD* are positive, but only marginally statistically significant at the 10% level, under these circumstances. The introduction of the IR regime, however, has no statistically significant impacts, at the 5% level, on the levels of disclosure, other than at the 10% level for *GD*. When the control variables are added into the regression, no *IRRD* coefficient is significant at conventional levels, and the coefficients of *ESRD* reduce in terms of statistical significance when the dependent variable is either *ED* or *SD*. As a consequence, we can reasonably assume that any impact of IR that we identify in our subsequent analysis is a consequence of how IR makes ESG disclosures more relevant to analysts, rather than by increasing disclosure levels. [19, 20]

5 RESULTS

The results of estimating equations (1), (4), (5) and (6) for *Acc1* as the dependent variable are presented in Table 4. For reasons of space, we do not separately report the results for *Acc2*, because, in most aspects, they are qualitatively similar to those for *Acc1*. Instead, we comment upon those results when they differ from those for *Acc1*.

[19] We only report the results of estimating equation (10) when using *LAcc1* as the measure of lagged accuracy. The results with respect to the coefficients of *IRRD* are unchanged if we substitute *LAcc2* for *LAcc1* in the regressions. We also estimate equations (9) and (10) with firm fixed effects added. Doing so produces little qualitative change in our results other than the evidence in favour of a positive impact of the introduction of IR on *GD* is slightly strengthened.

[20] The result here can be contrasted with the comment in Zhou *et al*. (forthcoming) that the degree of integration, as captured by their measure, increases with the mandating of IR in South Africa. This suggests that their measure of the degree of integration is not necessarily fully capturing ESG disclosures, which appear to have been more affected by the introduction of mandatory ESG reporting in 2010.

Insert Table 4

The results can be summarised as follows. First, in the absence of any IR regime effects (equations (1) and (5)), both *ESG* and *ED* have a negative and statistically significant relationship with forecast accuracy for both measures of accuracy at least at the 5% level of significance. There is no evidence of a statistically significant relationship between *SD* and forecast accuracy at conventional levels of significance when *Acc1* is the dependent variable. *SD* has a negative and statistically significant relationship with forecast accuracy at the 10% level of significance when *Acc2* is the dependent variable. When *GD* is considered on its own, there is no evidence of a statistically significant relationship with forecast accuracy at conventional levels of significance. When *ED*, *SD* and *GD* are entered into the regression simultaneously (as in equation (5)), ED has a statistically significant relationship with forecast accuracy at the 10% level of significance. At conventional levels of significance, there is no evidence that any of the other *ESG* disclosure level components have a statistically significant relationship with forecast accuracy.

When an IR regime effect is considered (equations (4) and (6)), there is little evidence that any of the ESG disclosure scores, whether considered overall, separately as components, or simultaneously as components, have any statistically significant relationship at conventional levels of significance with forecast accuracy *prior* to the IR regime, as judged by the '*Pre*' coefficients. Only the coefficients of *PreESG* and *PreED* attain a degree of statistical significance, and then only at the 10% level. As a consequence, there is little evidence to cause us to reject the null for our first hypothesis for any of our measures of the level of ESG disclosures.

PostESG, however, has negative and statistically significant relationships with forecast accuracy at the 1% level of significance. *PostED* also has a negative and statistically significant relationship with forecast accuracy at the 1% level of significance when included in the regression on its own, and at the 5% level of significance or better when included in the regression with the other components of ESG disclosure. *PostSD* has a negative and statistically significant relationship with forecast accuracy at the 5% (10%) level of significance when included in the regression equation individually and *Acc2* (*Acc1*) is the measure of forecast accuracy. There is no evidence of a relationship at conventional levels of statistical significance when it is included in the regression equation with the other components of ESG disclosure. There is no evidence of a relationship between *PostGD* and forecast accuracy at conventional levels of statistical significance.

Therefore, there appears to be solid evidence to reject the null for the second hypothesis for the overall ESG disclosure level and for the level of environmental disclosures. Also, there is some, model specification-dependent, evidence to reject the null hypothesis for social disclosure levels. There is no evidence to reject the null for the level of governance disclosure.

We now turn to the *differences* between the coefficients of the '*Pre*' and '*Post*' variables, our main concern and the subject of our third hypothesis. When disclosure levels are considered individually, there is strong evidence of a negative and statistically significant change in the relationship with forecast accuracy for *ESG*, *ED* and *GD*. The difference between the coefficients of *PreSD* and *PostSD*, when these disclosure levels are considered individually, difference is not statistically different from zero at conventional levels of significance when *Acc1* is the accuracy measure. It is significant at the 10% level when the accuracy measure is

Acc2. When the ESG disclosure level components are considered simultaneously, the difference between the coefficients of *PreED* and *PostED* retains its statistical significance at the 1% level. The differences between the coefficients of *PreSD* and *PostSD*, and between *PreGD* and *PostGD*, are not statistically significant at conventional levels, for either of the accuracy measures. Therefore, we have strong evidence to reject the null hypothesis for our third and main hypothesis for overall ESG disclosure levels and for environmental disclosure levels, some evidence for governance disclosure levels, and only weak evidence for social disclosure levels.

The results for the control variables suggest that *Log MV* is consistently statistically significant across all specifications. Other than for *Log MV*, significant coefficients are reported, if only for some model specifications, for: (i) lagged analyst forecast accuracy for both measures of accuracy; (ii) book-to-market for firms not belonging to the financial services sector when *Acc1* is the dependent variable; and (iii) leverage for those firms when *Acc2* is the dependent variable. For all the other variables, the reported coefficients are not statistically significantly different from zero.[21]

Therefore, in summary, we find little evidence that there is a relationship between ESG disclosure scores, either overall or in terms of its components, and forecast accuracy prior to the start of the IR regime. Nonetheless, there is strong evidence of a (more) negative relationship between ESG and, in particular, the environmental disclosure component of the ESG disclosure score and forecast accuracy in the IR regime, with some weaker evidence for

[21] We do not explicitly report the coefficients for the time dummies. Nonetheless, no particular effects are revealed by the pattern of coefficients, with few significant coefficients. There is no trend in the coefficients consistent with the degree of integration in South African financial reports improving with an associated improvement in analyst forecast accuracy. This could be caused by a relative lack of improvement over time in their measure for our sample companies and/or the effects of other time-dependent, omitted variables that cancel out the effects of the degree of integration.

governance disclosure levels as well. Given that we have established above that the mandating of IR does not increase ESG disclosure levels, the results are consistent with the views of advocates of IR who suggest that IR establishes better links between ESG and financial performance, with the implied consequence that forecast accuracy will be higher in the IR period the higher is the level of ESG disclosure.

More specifically, the strongest evidence suggests that this result seems to be driven by IR establishing better links between, in particular, *environmental* and financial performance. If the link between environmental disclosure levels and forecast accuracy is driven by the business models for the firms in our sample generating an economic link between environmental and financial performance, we should stress that no attempt should be made to generalise the results of our study to other samples with different distributions of business models. Indeed, we develop this point immediately below. But, the results do suggest that some aspects of ESG disclosure might be more informative than others for some sub-samples of firms.

It might be a little difficult to understand, however, why environmental disclosure scores should drive the link between ESG disclosure levels and forecast accuracy for all firms in our sample if it fundamentally reflects a strong economic link between environmental and financial performance. After all, it would not be clear why such a link should exist for financial services firms. As a consequence, we split our sample between the financial services sector and the other sectors combined and re-run our regressions. We only report the results for equations (4) and (6) when using *Acc1* as the measure of forecast accuracy (the results for *Acc2* are qualitatively similar). The results are reported in Table 5.

Insert Table 5

Focussing on our third, and main, hypothesis, the results are fairly clear-cut. For financial services firms, there is little robust evidence of any change in the relationship between ESG disclosure levels and forecast accuracy. Nor do the control variables affect forecast accuracy. For firms in the other sectors combined, the results are similar to the results for the whole sample. This suggests that the firms outside of the financial services sector are driving the results for the whole sample. Specifically, for this sub-sample, the differences between the coefficients of *PreESG* and *PostESG*, and between *PreED* and *PostED*, are negative and statistically significant at least at the 5% level of significance, whatever the regression specification. A negative and statistically significant difference (at the 5% level) exists between the coefficients of *PreGD* and *PostGD*, when this aspect of ESG disclosure is considered individually. Overall, however, the sub-sample results suggest that IR is not necessarily an important disclosure mechanism for all firms in all sectors, at least for the context of this study. [22, 23]

6 ADDITIONAL TESTS

We perform additional tests to identify the robustness of our results to alternative specifications and explanations. First, because of the relatively small number of observations in our balanced panel, and despite our preference for the balanced panel research design, we

[22] An anonymous reviewer makes the suggestion to us that the additional regulations surrounding the financial services sector reinforce a shareholder focus, which could, at least in part, explain the results we get for the financial services sector.

[23] At the suggestion of an anonymous reviewer, we also re-estimate the standard errors for all our tests using the bootstrap methods (we use the standard bootstrap methodology built into STATA). This methodology still uses OLS to estimate the coefficients. The results are very similar other than there is no reason to reject our main hypothesis, the third hypothesis, for governance disclosures. All the results with respect to the overall ESG disclosure level and the environmental disclosure level are qualitatively unchanged.

also run our tests on an unbalanced panel of 310 firm-year observations.[24] This does nothing to alter our main conclusion about the introduction of IR in South Africa - the relationship between ESG and, more specifically, environmental disclosure levels and analyst forecast accuracy strengthens after the introduction of IR. We find, however, some evidence of a relationship between ESG and environmental disclosure levels and analyst forecast accuracy before the IR period. We also find evidence of a strengthened relationship between ESG, environmental and governance disclosure levels and analyst forecast accuracy following the introduction of IR for financial services firms.[25, 26]

We also expand our model specifications to allow for the coefficients of the control variables to change between the pre- and post-IR periods. Such an expansion has little qualitative impact on our main results with respect to the impact of IR on the relationship between the levels of ESG and environmental disclosure and analyst forecast accuracy. We then restrict our sample to those firms that have at least two, or three, analysts making earnings forecasts, in order to guard against the possibility that our results are caused by the idiosyncrasies of

[24] We start from 481 firm-years with Bloomberg ESG data for South African firms.

[25] In an attempt to rule out the possibility that some unspecified global effect associated with the passage of time and coincidental with the pre- and post-IR periods in South Africa has intervened to increase the strength of the relationship between ESG disclosure scores and forecast accuracy, we also replicate our study using a balanced panel of 211 UK companies on data from the same period and using the same sample inclusion criteria, as applicable to a UK sample. We find no evidence of a significant and *negative* change in the coefficient for any of our measures of disclosure in any of our model specifications between the two periods. Indeed, we find no relationships between ESG disclosure levels and analyst forecast errors at all. We regard these findings as supportive of our interpretation that the South African outcomes can be attributed to the mandating of IR. The generic possibility identified above is a particular example of an omitted variable problem and one solution to the problem is to adopt what is typically referred to as a 'difference-in-differences' research design. This is what we have done. Such a design finds a benchmark sample without the effect under investigation (in our case, the mandating of IR) and replicates the study research design on the benchmark sample. If, as in our case, no effect is found for the benchmark sample, that strengthens the case that the outcome in the sample of interest can be attributed to a particular cause (in our case, the mandating of IR). Nonetheless, as Pope *et al*. (2011) argue, such a research design does not completely solve the omitted variable problem, essentially because the identification of an effective benchmark sample is a non-trivial task.

[26] Just in case there is anything special about the firms in the balanced panel relative to those that do not have full data for each year from 2008 to 2012, we define a dummy variable equal to one if a firm-year in the unbalanced panel also belongs to the balanced panel; zero otherwise. We then substitute the 'balanced panel' dummy for the firm fixed effects. This substitution substantially weakens the results, relative to using firm fixed effects. It is not possible to include both firm fixed effects and the 'balanced panel' dummy in the same regression because of multi-collinearity issues.

specific analysts associated with firms with limited analyst followings. Such restrictions again have little impact on our main conclusions.

We add into our regressions proxies for the quality of the integrated report, as in Zhou *et al.* (forthcoming). We note that they point out that their measure of IR quality is similar to those produced by professional accountancy firms in South Africa. Hence, we use rankings produced by Ernst and Young (EY) and available from their website for those firms common to our sample and those covered by EY. We create three dummy variables for firms in the post-IR period corresponding to whether a firm's integrated report is classified as either (i) top ten; (ii) excellent; or (iii) good. Firms not featured in the EY reports, or with a classification worse than the three mentioned, together with firm-years in the pre-IR period become the base case. Including these dummy ranking variables does not alter our results.

Finally, we focus on the role of fixed firm and time effects. First, we investigate different forms of fixed effects. Initially, we use sector fixed effects rather than firm fixed effects.[27] We retain time fixed effects. With this specification, the evidence in favour of the main conclusions of our previous analyses is much weaker – specifically, there are no statistically relationships between ESG disclosure levels and analyst forecast errors at the 10% level or better, either before or after the mandating of IR in South Africa. When *Acc1* is the dependent variable, there are, however, statistically significant differences, of the predicted sign if only at the 10% level of significance, in the strengths of relationships, before and after the mandating of IR, between environmental disclosure levels and analyst forecast errors. The significance level is 5% when *Acc2* is the dependent variable.[28] If we substitute *IRRD*

[27] It is not possible to use both firm and sector fixed effects because of multi-collinearity issues.

[28] An anonymous reviewer points out that some of the firms are subsidiaries of larger, multinational, firms which have more resources to implement IR. We model this suggestion in two ways. First, when we substitute a 'subsidiary' dummy for firm fixed effects, our key results with respect to the third hypothesis

for the time fixed effects, retaining firm fixed effects and using the 'within' fixed effect estimator, we largely return to the results reported in the previous section, but with stronger evidence of IR producing a governance disclosure level effect on analyst forecast accuracy.

Second, we investigate the impact of removing the various sets of fixed effects. We remove time fixed effects, whilst maintaining firm fixed effects and using the 'within' fixed effect estimator. With this specification, we find that both the level of overall ESG disclosures and the level of environmental disclosures, but only when the latter is considered on its own, are significantly associated with analyst forecast accuracy both before and after the mandating of IR. Additionally, the strength of the relationship does not change between the two periods. When *ED*, *SD* and *GD* are considered jointly, the results are similar to our main results. When we remove firm fixed effects and retain time effects, or remove both firm and time fixed effects, we get little evidence to reject any of our null hypotheses for any of the disclosure levels.

Overall, our results are fairly robust to the additional tests we run, other than in one respect. First, the presence of firm fixed effects in the modelling substantially strengthens the statistical significance of relationships to be observed between ESG disclosure levels, or any of its components, and analyst forecast accuracy. Second, some form of time fixed effects is generally needed in the modelling if any *change* in the relationship between ESG disclosure levels and analyst forecast accuracy in the direction predicted is to be observed between pre-

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are unchanged although the results for the first and second hypotheses are much weakened. The coefficient of the 'subsidiary' dummy is positive, suggesting these firms have lower forecast accuracy, *ceteris paribus*. This suggests the importance of firm fixed effects, as opposed to more tightly specified effects. We also interact the 'subsidiary' dummy with the *Post-* disclosure measures and add it into our regressions. We find that its coefficients are generally not significant, and do not alter our results, other than in one case – when all the different disclosure levels are included in the equation at the same time. In these cases, we find that the third hypothesis cannot be rejected for *GD* for non-subsidiary firms, but can be for subsidiary firms. This applies for both measures of accuracy. For *SD*, we get a similar result, but only for our first measure of accuracy.

and post-IR periods, other than when all the components of ESG disclosure levels are considered simultaneously. Third, relaxing the balanced panel aspect of our research design produces evidence of a strengthened relationship between ESG, environmental and governance disclosure levels and analyst forecast accuracy following the introduction of IR for both financial services firms and firms from the other sectors represented in our sample.

Given the difficulties in fully specifying a model of analyst forecast accuracy from a theoretical perspective, we believe that our use of firm and time fixed effects in the modelling is justifiable. Nonetheless, it is important to stress the crucial role played by including these effects in coming to the conclusions that we do about the impact of the mandating of IR in South Africa.

7 SUMMARY AND CONCLUSIONS

We investigate the impact of mandating IR in South Africa on the accuracy of analyst one year-ahead forecasts of earnings. Given that IR is intended to link ESG and financial performance, we theorise that, if there is any impact, it will be higher for firms with higher ESG disclosure. Further, if there is a need for the link provided by IR, ESG disclosure levels will not be strongly associated with analyst forecast accuracy before IR is implemented, whereas they will be once integrated reports are provided.

The results using our main, balanced panel, methodology, with firm and time fixed effects, suggest that ESG disclosure levels are not robustly associated with analyst forecast accuracy before the IR regime was introduced. There is evidence, however, that ESG disclosure levels, and, in particular, environmental disclosure levels, are associated with forecast

accuracy after the introduction of the IR regime. There is also evidence that the level of governance disclosures has a *strengthened* association with forecast accuracy after the introduction of the IR regime, but this association tends to be dominated by the environmental disclosure effect. Nonetheless, we also find that the results described above are driven by the firms outside the financial services sector in the sample we study, with no robust relationships being found between any of our measures of the level of ESG disclosure and forecast accuracy for financial services firms. The use of firm and time fixed effects as an element of our modelling is crucial for generating these results. Also, if we relax the balanced panel aspect of our research design, we find evidence of a strengthened relationship between ESG, environmental and governance disclosure levels and analyst forecast accuracy following the introduction of IR for both financial services firms and those from the other sectors.

If accepted as valid, these results are consistent with IR having the potential to provide useful information on the links between ESG and financial performance (although the potential might not be inevitably realised for all sets of firms). These results complement other recent papers, such as Lee *et al*. (2015), Zhou *et al.* (forthcoming) and Barth *et al.* (2015), which also suggest that IR can provide useful information to capital markets. Importantly, the results are also consistent with our theory that the usefulness of these links will improve the higher is the level of ESG disclosure. Further, IR in South Africa over the period did not, of necessity, have an investor focus because relatively little guidance was on offer as to how integrated reports should be prepared. More recently, however, the IIRC has produced guidelines concerning IR recommending an investor focus. Our results, again if accepted as valid, also suggest that an *explicit* investor focus is not *required* for IR to be useful to investors. It would appear that any balancing of the interests of different stakeholders by

South African firms in producing an integrated report did not produce any undue move away from providing information useful to investors. This evidence can be contrasted with the IIRC's version of IR which *specifies* an investor focus, a policy that has created academic debate (e.g., Adams, 2015; Flower, 2015; Thomson, 2015).

There are limitations to our work. For example, our control variable strategy could be inadequate, leading to an omitted variable problem, leading in turn to biased coefficient estimates on our experimental variables and biased conclusions. This is the 'identification' problem associated with identifying the effects of accounting and regime changes. In our case, however, to argue that some omitted variable explains away our results relies upon both an association of the variable with forecast accuracy and the existence of different correlations between that variable and ESG disclosure scores in the pre- and post-IR periods, not merely a variable associated with forecast accuracy that changes over the time period of the regime change.

Our work suggests future research possibilities. For example, longer-term analyst forecasts could be studied (e.g., two year-ahead earnings *per* share forecasts) within our framework. Given that one of the benefits of IR is argued to be a focus on the future implications of various actions and decisions concerning ESG activities for financial performance, studying longer-term forecasts makes sense.[29] Also, following the idea in Zhou *et al*. (forthcoming), as more data is gathered through the passage of time, the impact of firms having differing degrees of effectiveness in integrating ESG information into their reports could be studied within our research framework, given we only capture average effects associated with the mandating of IR.

[29] At the time of collecting the data, only one set of two-year forecasts, along with the associated outcomes, is available.

REFERENCES

Adams, C.A. (2015). The International Integrated Reporting Council: A call to action. *Critical Perspectives on Accounting*, 27, 23-28.

Angelopoulos, G., Parnell, J.A., Scott, G.J. (2013). Performance satisfaction, shareholder and stakeholder orientations: Managers' perceptions in three countries across continents. *South African Journal of Economic and Management Sciences*, 16(2), 199-215.

Barth, M.E., Cahan, S.F., Chen, L., Venter, E.R. (2015). The economic consequences associated with integrated report quality: Early evidence from a mandatory setting. Available on the internet at http://ssrn.com/abstract=2699409.

Carroll, A. B., Shabana, K. M. (2010). The business case for corporate social responsibility: A review of concepts, research and practice. *International Journal of Management Reviews*, 12(1), 85-105.

Dhaliwal, D.S., Radhakrishnan, S., Tsang, A., Yang, Y.G. (2012). Nonfinancial disclosure and analyst forecast accuracy: International evidence on corporate social responsibility disclosure. *The Accounting Review*, 87(3), 723-759.

Dumay, J., Bernardi, C., Guthrie, J., Demartini, P. (2016). Integrated reporting: A structured literature review. *Accounting Forum*, 40(3), 166-185.

Flower, J. (2015). The International Integrated Reporting Council: A story of failure. *Critical Perspectives on Accounting*, 27, 1-17.

Glaum, M., Baetge, J., Grothe, A., Oberdörster, T. (2013). Introduction of international accounting standards, disclosure quality and accuracy of analysts' earnings forecasts. European Accounting Review, 22(1), 79-116.

Integrated Reporting Committee (IRC) of South Africa (2011). Framework for integrated reporting and the integrated report: Discussion Paper. Pretoria: Integrated Reporting Committee (IRC) of South Africa.

International Integrated Reporting Council (IIRC), (2011). Towards Integrated Reporting. Communicating Value in the 21st Century. London: International Integrated Reporting Council.

International Integrated Reporting Council (IIRC), (2013). The International <IR> Framework. London: International Integrated Reporting Council.

Ioannou, I., Serafeim, G. (2014). The consequences of mandatory corporate sustainability reporting: Evidence from four countries. Harvard Business School Research Working Paper No. 11-100.

Lee, K.W., Yeo, G.H-H. (2015). The association between integrated reporting and firm evaluation. *Review of Quantitative Finance and Accounting*. doi:10.1007/s11156-015-0536-y.

Leuz, C., Verrecchia, R.E. (2000). The Economic consequences of increased disclosure. *Journal of Accounting Research*, 38, 91-124.

Leuz, C. (2003). IAS versus U.S. GAAP: Information asymmetry-based evidence from Germany's new market. *Journal of Accounting Research*, 41(3), 445-472.

Muswaka, L. (2013). An Appraisal of the Protection of Stakeholder Interests under the South African Companies Act and King III. *World Journal of Social Sciences*, 3(5), 67-75.

Pope, P.F., McLeay, S.J. (2011). The European IFRS experiment: Objectives, research challenges and some early evidence. *Accounting and Business Research*, 41(3), 233-266.

Preiato, J., Brown, P., Tarca, A. (2015). A comparison of between-country measures of legal setting and enforcement of accounting standards. *Journal of Business Finance and Accounting*, 42(1-2), 1-50.

Qiu, Y., Shaukat, A., Tharyan, R. (2016). Environmental and social disclosures: Link with corporate financial performance. *The British Accounting Review*, 48(1), 102-116.

Solomon, J., Maroun, W. (2012). Integrated Reporting: The influence of King III on social, ethical and environmental reporting. London: The Association of Chartered Certified Accountants.

Thomson, I. (2015). 'But does sustainability need capitalism or an integrated report' a commentary on 'The International Integrated Reporting Council: A story of failure' by Flower, J. *Critical Perspectives on Accounting*, Vol. 27, 18-22.

Velte, P., Stawinoga, M. (2016). Integrated reporting: The current state of empirical research, limitations and future research implications. *Journal of Management Control*. doi:10.1007/s00187-016-0235-4.

Wild, S., van Staden, C. (2013). Integrated Reporting: Initial analysis of early reporters – An institutional theory approach. In Seventh Asia Pacific Interdisciplinary Research in Accounting Conference.

Zhou, S., Simnett, R., Green, W. (forthcoming). Does Integrated Reporting matter to the capital market? *Abacus*.

TABLE 1

DESCRIPTIVE STATISTICS

PANEL A – FINANCIAL SERVICES FIRMS – 60 FIRM-YEAR OBSERVATIONS

Variables	*Min*	*Median*	*Mean*	*Max*	*SD*
Acc1	-3.87	-1.98	-2.15	-0.96	0.60
Acc2	-2.86	-0.86	-1.02	1.03	0.66
ESG	10.53	34.87	33.85	63.60	13.33
ED	0.00	19.65	19.28	49.11	13.56
SD	0.00	40.00	39.12	88.33	20.74
GD	42.86	57.14	58.04	76.79	9.44
Log MV	3.36	4.53	4.53	5.28	0.50
NoA	1.00	6.00	7.18	16.00	3.96
LAcc1	-3.61	-1.86	-2.02	-0.96	0.60
LAcc2	-2.62	-0.79	-0.92	1.03	0.65
Lev-FS	0.35	0.91	0.82	0.97	0.17
RoA-FS	0.00	0.01	0.03	0.11	0.03
BM-FS	0.06	0.49	0.46	1.03	0.20

PANEL B – OTHER SECTORS – 145 FIRM-YEAR OBSERVATIONS

Variables	*Min*	*Median*	*Mean*	*Max*	*SD*
Acc1	-3.87	-1.95	-1.98	-0.68	0.68
Acc2	-2.86	-0.81	-0.77	1.03	0.73
ESG	11.98	37.60	37.72	64.11	11.51
ED	0.00	27.13	27.07	65.29	15.66
SD	5.26	42.11	42.44	78.95	17.40
GD	32.14	57.14	56.17	71.43	6.38
Log MV	3.17	4.32	4.40	5.56	0.56
NoA	1.00	7.00	7.39	16.00	3.68
Loss	0.00	0.00	0.08	1.00	0.27
LAcc1	-3.61	-1.80	-1.91	-0.66	0.69
LAcc2	-2.62	-0.70	-0.75	1.03	0.72
Lev-NFS	0.14	0.53	0.53	1.02	0.19
RoA-NFS	-0.10	0.09	0.11	0.51	0.11
BM-NFS	-0.03	0.36	0.46	3.19	0.44

Notes: *Acc1* is the absolute value of the difference between actual earnings *per* share and the median consensus earnings *per* share forecast divided by market value per share at the previous financial year end. *Acc2* is the absolute value of the difference between actual earnings *per* share and the median consensus earnings *per* share forecast divided by the absolute value of actual earnings *per* share. *ESG* is the overall Bloomberg ESG disclosure score. *ED* is the environmental disclosure component score. *SD* is the social disclosure component score. *GD* is the governance disclosure component score. *Log MV* is the log of the market value of the firm at the financial year end prior to the year for which the earnings forecast is made. *NoA* is the number of analysts forecasts used to create a consensus forecast. *Loss* is a dummy variable equal to 1 if the firm made a loss in the

year prior to the earnings forecast; 0 otherwise. *LAcc1* is the one year lag of *Acc1*. *LAcc2* is the one year lag of *Acc2*. *Lev-FS* (*Lev-NFS*) is the ratio of total liabilities to total assets for financial services (other sector) firms; 0 otherwise. *RoA-FS* (*RoA-NFS*) is the ratio of net income to total assets for financial services (other sector) firms; 0 otherwise. *BM-FS* (*BM-NFS*) is the ratio of book value (total assets less total liabilities) to market value at the financial year-end prior to the forecast for financial services (other sector) firms; 0 otherwise.

TABLE 2

PEARSON CORRELATIONS BETWEEN VARIABLES

PANEL A - FINANCIAL SERVICES FIRMS – 60 FIRM-YEARS

Variables	*Acc1*	*Acc2*	*ESG*	*ED*	*SD*	*GD*	*Log MV*	*NoA*	*Lag Acc1*	*Lag Acc2*	*Lev-FS*	*RoA-FS*
Acc2	0.97											
ESG	-0.23	-0.26										
ED	-0.23	-0.27	0.94									
SD	-0.21	-0.24	0.92	0.76								
GD	-0.18	-0.18	0.81	0.70	0.68							
Log MV	-0.13	-0.16	0.71	0.59	0.69	0.68						
NoA	-0.18	-0.25	0.72	0.63	0.73	0.56	0.82					
Lag Acc1	0.20	0.17	-0.25	-0.20	-0.32	-0.09	-0.19	-0.16				
Lag Acc2	0.19	0.16	-0.26	-0.23	-0.32	-0.11	-0.21	-0.20	0.97			
Lev-FS	0.08	0.03	0.36	0.31	0.34	0.32	0.24	0.49	0.00	-0.04		
RoA-FS	-0.09	-0.06	-0.29	-0.22	-0.31	-0.31	-0.37	-0.54	-0.08	-0.06	-0.74	
BM-FS	-0.01	-0.03	0.37	0.33	0.37	0.37	0.50	0.44	0.14	0.09	-0.14	-0.36

TABLE 2 CONTINUED

PANEL B – OTHER SECTORS – 145 FIRM-YEARS

Variable	*Acc1*	*Acc2*	*ESG*	*ED*	*SD*	*GD*	*Log MV*	*NoA*	*Loss*	*Lag Acc1*	*Lag Acc2*	*Lev-NFS*	*RoA-NFS*
Acc2	0.94												
ESG	0.12	0.11											
ED	0.19	0.17	0.92										
SD	0.04	0.03	0.75	0.47									
GD	-0.01	-0.03	0.53	0.36	0.39								
Log MV	-0.25	-0.17	0.10	0.11	0.06	0.05							
NoA	-0.18	-0.13	0.24	0.18	0.24	0.19	0.70						
Loss	0.09	0.11	0.10	0.09	0.09	0.09	-0.14	0.10					
Lag Acc1	0.34	0.30	0.15	0.23	0.03	0.00	-0.32	-0.23	0.34				
Lag Acc2	0.31	0.31	0.18	0.24	0.07	0.05	-0.26	-0.15	0.39	0.93			
LeV-NFS	-0.12	-0.15	-0.26	-0.27	-0.18	-0.10	-0.27	0.03	0.09	-0.02	-0.04		
RoA-NFS	-0.15	-0.18	0.06	-0.02	0.21	-0.11	0.36	0.06	-0.40	-0.26	-0.38	-0.34	
BM-NFS	0.42	0.39	0.20	0.21	0.13	0.16	-0.50	-0.35	0.13	0.38	0.39	-0.23	-0.41

Notes: See the notes to Table 1 for variable definitions.

TABLE 3

DETERMINANTS OF ESG SCORES AND ITS COMPONENTS

Variables	*Dependent Variable*							
	ESG		*ED*		*SD*		*GD*	
ESRD	5.49**	4.76**	5.90**	5.05*	5.65*	4.59	4.10***	4.17***
p-value	(0.01)	(0.01)	(0.04)	(0.05)	(0.09)	(0.10)	(0.00)	(0.00)
IRRD	1.63	0.34	1.44	0.26	1.63	-0.59	2.26*	1.67
p-value	(0.46)	(0.86)	(0.62)	(0.92)	(0.63)	(0.84)	(0.08)	(0.14)
Log MV		1.07		2.60		-2.90		2.98*
p-value		(0.63)		(0.38)		(0.39)		(0.10)
NoA		1.28***		1.23***		2.31***		0.19
p-value		(0.00)		(0.00)		(0.00)		(0.39)
Loss		3.88		0.85		12.71**		0.97
p-value		(0.37)		(0.88)		(0.02)		(0.59)
Lev-FS		2.05		-5.70		13.27		4.48
p-value		(0.74)		(0.39)		(0.19)		(0.29)
Lev-NFS		-0.09		-7.68		9.39		5.88
p-value		(0.99)		(0.32)		(0.29)		(0.12)
RoA-FS		-10.82		-23.47		30.56		-26.61
p-value		(0.82)		(0.73)		(0.61)		(0.32)
RoA-NFS		32.52***		15.79		88.47***		5.77
p-value		(0.00)		(0.21)		(0.00)		(0.40)
BM-FS		10.24		2.91		23.44*		11.50**
p-value		(0.21)		(0.70)		(0.09)		(0.04)
BM-NFS		11.88***		11.38***		20.25***		5.49***
p-value		(0.00)		(0.00)		(0.00)		(0.00)
LAcc1		1.37		3.89**		-1.76		0.32
p-value		(0.32)		(0.03)		(0.41)		(0.69)
Adjusted R^2	0.06	0.31	0.04	0.24	0.02	0.31	0.14	0.28

Notes: The regressions are estimated using OLS for the coefficient estimates. The significance levels reported are based upon heteroscedasticity-adjusted standard errors. *ESRD* is a dummy variable equal to 1 if the firm financial year-end falls in the years 2010, 2011 and 2012; 0 otherwise. *IRRD* is a dummy variable equal to 1 if the firm financial year-end falls after February 2011; 0 otherwise. See the notes to Table 1 for other variable definitions.

TABLE 4

THE IMPACT OF ESG SCORES AND THE INTEGRATED REPORTING REGIME ON ANALYST FORECAST ACCURACY (205 FIRM-YEARS)

Dependent Variable is Acc1

PANEL A - REGRESSION COEFFICIENTS – ESG VARIABLES

	ESG		*ED*		*SD*		*GD*		*ED, SD and GD*	
	Eqn (1)	*Eqn (4)*	*Eqn (5)*	*Eqn (6)*	*Eqn (5)*	*Eqn (6)*	*Eqn (5)*	*Eqn (6)*	*Eqn (5)*	*Eqn (6)*
ESG	-0.02**									
(p-value)	(0.01)									
ED			-0.01**						-0.01*	
(p-value)			(0.01)						(0.07)	
SD					-0.01				-0.00	
(p-value)					(0.10)				(0.26)	
GD							-0.00		0.00	
(p-value)							(0.32)		(0.50)	
PANEL B - REGRESSION COEFFICIENTS – PRE-IR PERIOD ESG VARIABLES										
PreESG		-0.01*								
(p-value)		(0.06)								
PreED				-0.01*						-0.01
(p-value)				(0.10)						(0.26)
PreSD						-0.01				-0.01
(p-value)						(0.17)				(0.21)
PreGD								0.00		0.00
(p-value)								(0.52)		(0.59)

TABLE 4 CONTINUED										
PANEL C - REGRESSION COEFFICIENTS – POST-IR PERIOD ESG VARIABLES										
	ESG		*ED*		*SD*		*GD*		*ED, SD and GD*	
	Eqn (1)	*Eqn (4)*	*Eqn (5)*	*Eqn (6)*	*Eqn (5)*	*Eqn (6)*	*Eqn (5)*	*Eqn (6)*	*Eqn (5)*	*Eqn (6)*
PostESG		-0.03***								
(p-value)		(0.00)								
PostED				-0.02***						-0.02**
(p-value)				(0.00)						(0.01)
PostSD						-0.01*				-0.00
(p-value)						(0.08)				(0.37)
PostGD								-0.01		-0.00
(p-value)								(0.14)		(0.35)
PANEL D - REGRESSION COEFFICIENTS – CONTROL VARIABLES										
Log MV	-1.27**	-1.66***	-1.26**	-1.64***	-1.31**	-1.47***	-1.30**	-1.47***	-1.27**	-1.64***
(p-value)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)
NoA	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01
(p-value)	(0.88)	(0.77)	(0.93)	(0.84)	(0.82)	(0.78)	(0.84)	(0.80)	(0.90)	(0.82)
Loss	0.02	0.02	0.00	-0.03	0.03	0.04	-0.00	0.01	0.02	-0.02
(p-value)	(0.89)	(0.89)	(1.00)	(0.79)	(0.84)	(0.76)	(0.98)	(0.95)	(0.89)	(0.89)
LAcc1	-0.17*	-0.21**	-0.17*	-0.19**	-0.17*	-0.19**	-0.16	-0.19**	-0.17*	-0.20**
(p-value)	(0.07)	(0.02)	(0.07)	(0.03)	(0.06)	(0.03)	(0.10)	(0.04)	(0.06)	(0.02)
Lev-FS	1.49	1.82	1.65	2.10	0.95	1.03	0.65	0.72	1.67	2.00
(p-value)	(0.58)	(0.50)	(0.52)	(0.42)	(0.74)	(0.73)	(0.82)	(0.80)	(0.52)	(0.46)
Lev-NFS	-1.83	-2.00	-1.83	-2.18*	-1.49	-1.46	-1.36	-1.34	-1.85	-2.15*
(p-value)	(0.13)	(0.11)	(0.13)	(0.09)	(0.23)	(0.24)	(0.26)	(0.25)	(0.12)	(0.08)
RoA-FS	-2.18	0.31	-2.14	0.29	-2.63	-1.89	-4.01	-2.68	-1.73	0.63
(p-value)	(0.77)	(0.97)	(0.78)	(0.97)	(0.72)	(0.80)	(0.59)	(0.72)	(0.82)	(0.93)
RoA-NFS	0.09	0.40	0.07	0.23	0.51	0.67	0.46	0.70	0.12	0.33
(p-value)	(0.92)	(0.67)	(0.94)	(0.82)	(0.57)	(0.47)	(0.61)	(0.43)	(0.90)	(0.75)

TABLE 4 CONTINUED										
	ESG		*ED*		*SD*		*GD*		*ED, SD and GD*	
	Eqn (1)	*Eqn (4)*	*Eqn (5)*	*Eqn (6)*	*Eqn (5)*	*Eqn (6)*	*Eqn (5)*	*Eqn (6)*	*Eqn (5)*	*Eqn (6)*
BM-FS	-1.80	-1.78	-1.62	-1.61	-2.04	-1.99	-1.86	-1.93	-1.77	-1.84
(p-value)	(0.17)	(0.14)	(0.20)	(0.16)	(0.13)	(0.12)	(0.15)	(0.13)	(0.16)	(0.12)
BM-NFS	0.68**	0.63**	0.66**	0.59**	0.62*	0.61*	0.58	0.54	0.67**	0.59*
(p-value)	(0.04)	(0.04)	(0.04)	(0.05)	(0.07)	(0.07)	(0.10)	(0.10)	(0.04)	(0.06)
PANEL E - F-STATISTICS FOR TESTS OF THE EQUALITY OF PRE-IR AND POST-IR ESG COEFFICIENTS										
PreESG = PostESG		7.20***								
PreED = PostED				9.83***						7.59***
PreSD = PostSD						1.04				0.36
PreGD = PostGD								6.63***		1.41
PANEL F - EXPLANATORY POWER										
Adjusted R^2	0.20	0.22	0.20	0.23	0.19	0.19	0.18	0.19	0.19	0.22

Notes: The regressions include firm and time fixed effects and are estimated using OLS for the coefficient estimates. The significance levels reported are based upon heteroscedasticity-adjusted standard errors. *PreESG* (*PostESG*) equals *ESG* for the period prior to (after the) introduction of the IR regime; 0 otherwise. *PreED* (*PostED*) equals *ED* for the period prior to (after the) introduction of the IR regime; 0 otherwise. *PreSD* (*PostSD*) equals *SD* for the period prior to (after the) introduction of the IR regime; 0 otherwise. *PreGD* (*PostGD*) equals *GD* for the period prior to (after the) introduction of the IR regime; 0 otherwise. See the notes to Table 1 for other variable definitions. ***, **, * denotes significance using a one-tailed test at the 1%, 5% and 10% level respectively for the experimental variables and F-statistics, two-tailed test otherwise.

TABLE 5

THE IMPACT OF ESG SCORES AND THE INTEGRATED REPORTING REGIME ON ANALYST FORECAST ACCURACY – SUB-SAMPLE ANALYSIS

Dependent Variable is Acc1

	Financial Services (60 Firm-Years)					**Other Sectors (145 Firm-Years)**				
PANEL A - REGRESSION COEFFICIENTS FOR THE PRE-IR ESG VARIABLES										
	ESG	*ED*	*SD*	*GD*	*ED, SD and GD*	*ESG*	*ED*	*SD*	*GD*	*ED, SD and GD*
	Eqn (4)	*Eqn (6)*	*Eqn (6)*	*Eqn (6)*	*Eqn (6)*	*Eqn (4)*	*Eqn (6)*	*Eqn (6)*	*Eqn (6)*	*Eqn (6)*
PreESG	-0.02					-0.01*				
(p-value)	(0.15)					(0.09)				
PreED		-0.01			0.01		-0.01			-0.01
(p-value)		(0.22)			(0.62)		(0.11)			(0.24)
PreSD			-0.00		-0.01			-0.01		-0.00
(p-value)			(0.44)		(0.22)			(0.13)		(0.32)
PreGD				-0.02	-0.02				0.00	0.01
(p-value)				(0.23)	(0.27)				(0.65)	(0.66)
PANEL B - REGRESSION COEFFICIENTS FOR THE POST-IR ESG VARIABLES										
PostESG	-0.04*					-0.03***				
(p-value)	(0.09)					(0.00)				
PostED		-0.03**			-0.02*		-0.02***			-0.02**
(p-value)		(0.04)			(0.07)		(0.00)			(0.04)
PostSD			-0.00		0.00			-0.01*		-0.00
(p-value)			(0.37)		(0.66)			(0.09)		(0.44)
PostGD				-0.03	-0.03				-0.01	0.00
(p-value)				(0.12)	(0.14)				(0.32)	(0.53)

TABLE 5 CONTINUED										
PANEL C - REGRESSION COEFFICIENTS FOR THE CONTROL VARIABLES										
	ESG	*ED*	*SD*	*GD*	*ED, SD and GD*	*ESG*	*ED*	*SD*	*GD*	*ED, SD and GD*
	Eqn (4)	*Eqn (6)*	*Eqn (6)*	*Eqn (6)*	*Eqn (6)*	*Eqn (4)*	*Eqn (6)*	*Eqn (6)*	*Eqn (6)*	*Eqn (6)*
Log MV	-1.05	-0.91	-0.50	-0.88	-1.00	-1.99***	-2.04***	-1.87***	-1.83***	-2.00***
(p-value)	(0.33)	(0.34)	(0.61)	(0.36)	(0.32)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
NoA	-0.06	-0.06	-0.04	-0.07	-0.08	0.01	0.01	0.01	0.01	0.01
(p-value)	(0.50)	(0.53)	(0.62)	(0.42)	(0.41)	(0.74)	(0.76)	(0.72)	(0.72)	(0.76)
Loss						0.06	0.01	0.09	0.06	0.02
(p-value)						(0.65)	(0.92)	(0.55)	(0.67)	(0.90)
LAcc1	-0.16	-0.13	-0.06	-0.07	-0.12	-0.22**	-0.21*	-0.21*	-0.22**	-0.22*
(p-value)	(0.20)	(0.30)	(0.66)	(0.70)	(0.34)	(0.04)	(0.06)	(0.05)	(0.05)	(0.06)
Lev	3.71	3.73	2.12	2.43	3.15	-1.54	-1.76	-1.12	-0.88	-1.70
(p-value)	(0.24)	(0.21)	(0.47)	(0.40)	(0.30)	(0.19)	(0.14)	(0.33)	(0.41)	(0.13)
RoA	11.18	11.07	8.07	7.93	9.14	0.93	0.78	1.19	1.31	0.89
(p-value)	(0.32)	(0.34)	(0.49)	(0.45)	(0.42)	(0.34)	(0.46)	(0.22)	(0.16)	(0.44)
BM	-1.66	-1.33	-1.48	-1.92	-2.40	0.48	0.43	0.45	0.40	0.43
(p-value)	(0.36)	(0.37)	(0.41)	(0.30)	(0.19)	(0.15)	(0.18)	(0.20)	(0.26)	(0.20)
PANEL D - F-STATISTICS FOR TESTS OF THE EQUALITY OF COEFFICIENTS										
PreESG = PostESG	1.12					5.18**				
PreED = PostED		0.94			1.43		9.02***			5.56**
PreSD = PostSD			0.14		1.24			0.24		0.12
PreGD = PostGD				2.13*	1.13				4.85**	0.40
PANEL E – EXPLANATORY POWER										
Adjusted R^2	0.20	0.19	0.14	0.19	0.18	0.26	0.27	0.23	0.23	0.25

Notes: The regressions include firm and time fixed effects and are estimated using OLS for the coefficient estimates. The significance levels reported are based upon heteroscedasticity-adjusted standard errors. See the notes to Table 1 for variable definitions. See the notes to Table 1 and 4 for variable definitions. ***, **, * denotes significance using a one-tailed test at the 1%, 5% and 10% level respectively for the experimental variables and F-statistics, two-tailed test otherwise.